U.S. Department of Transportation

Aviation
stration

Seattle

FINAL ENVIRONMENTAL IMPACT STATEMENT

for

PROPOSED MASTER PLAN UPDATE DEVELOPMENT ACTIONS

at

SEATTLE-TACOMA INTERNATIONAL AIRPORT

VOLUME 7 OF 7

APPENDIX T

This statement is submitted for review pursuant to the requirements of Section 102(2)(C) of the National Environmental Policy Act of 1969 (42 U.S.C. 4321 et seq); E.O. 11990, Protection of Wetlands; E.O. 11998, Floodplain Management; the 49 USC Subtitle VII; 42 U.S.C. 7401 et seq; 49 U.S.C. 47101 et seq; Washington State Environmental Policy Act (RCW 43.21C); and other applicable laws. The proposed action will impact the 100-year floodplain as indicated on the Federal Emergency Management Agency's Flood Insurance Rate Map. This Environmental Impact Statement (EIS) is a combined National Environmental Policy Act and Washington State Environmental Policy Act (SEPA) document. With regard to SEPA requirements, this EIS represents the second step of a phased environmental review which began with publication of the 1992 Flight Plan Final EIS, which assessed alternatives for addressing regional aviation needs. This Final EIS also contains the draft conformity statement, as required by the Clean Air Act amendments.

The Port of Seattle, operator of Seattle-Tacoma International Airport, has prepared a Master Plan Update for the Airport. The Plan shows the need to address the poor weather operating capability of the Airport through the development of a third parallel runway (Runway 16X/34X) with a length of up to 8,500 feet, separated by 2,500 feet from existing Runway 16L/34R, with associated taxiways and navigational aids. Other development needs include: extension of Runway 34R by 600 feet; establishment of standard Runway Safety Areas for Runways 16R/34L and 16L/34R; development of a new air traffic control tower; development of a new north unit terminal, Main Terminal improvements and terminal expansion; parking and access improvements and expansion; development of the South Aviation Support Area for cargo and/or maintenance facilities, and relocation, redevelopment, and expansion of support facilities. This Environmental Impact Statement assesses the impact of alternative airport improvements, including installation of navigational aids, airspace use, and approach and departure procedures. The proposed improvements would be completed during the 1996-2020 period, with initial 5-year development focused on the proposed new parallel runway, and existing passenger terminal, parking and access improvements. The proposed improvements and its alternatives would result in wetland impacts, floodplain encroachment, stream relocation, social, noise, water, and air quality impacts.

Responsible Federal Official:
Mr. Dennis Ossenkop
Federal Aviation Administration
Northwest Mountain Region
1601 Lind Ave, S.W.
Renton, Washington 98055-4056

SEPA contact:
Ms. Barbara Hinkle
Health, Safety and Environmental Management
Port of Seattle
P.O. Box 68727
Seattle, Washington 98168

Date: February, 1996

APPENDIX T

PUBLIC COMMENTS

As required by FAA Order 5050.4A, "Airport Environmental Handbook", a public hearing was held to provide an opportunity for the public to present oral and/or written comments concerning the social, economic, and environmental effects of the proposed Master Plan Update Environmental Impact Statement (Draft EIS). The first public hearing was held on June 1, 1995 at the SeaTac Red Lion Hotel from 1 p.m. until 10 p.m. Simultaneous with the conduct of the public hearing, a workshop was conducted to assist the public with understanding the contents of the Draft EIS. Testimony was provided by 77 individuals and the workshop/hearing was attended by about 150 people.

To further facilitate the receipt of comments, an additional public hearing was conducted on June 14, 1995 at the Calvary Lutheran Church in Federal Way from 6 p.m. until 10 p.m. Testimony was received from 15 individuals. This hearing was attended by approximately 40 people.

This appendix presents the entire public hearing transcripts from both hearings as well as approximately 250 correspondences received by Mr. Dennis Ossenkop, of the Federal Aviation Administration, Regional Airports Office and is organized as follows:

- Correspondence from the public and Federal, State, and local public agencies and private agencies
- Public Hearing Transcript (June 1, 1995)
- Public Hearing Transcript (June 14, 1995)
- Public Hearing submittals

Table T-1 provides an index to the individuals and organizations that either testified at the Public Hearing (listed as HT) or submitted written comments during the comment period.

A number of significant comments were received concerning six key topics:

- Aviation demand forecast relative to the Do-Nothing and With Project Alternatives
- The assessment of air pollutant conditions
- The assessment of surface transportation impacts
- The assessment of aircraft noise impacts
- Issues regarding the affected environs around the Airport
- The assessment the proposed project affects on human health issues

Once all the comments were received and the public hearing transcripts were prepared, responses to all appropriate public comments regarding the Draft EIS were prepared. To facilitate the review of comments and the preparation of responses, the comments were grouped by issue and/or chapter of the Final EIS. A code was then given to each unique comment to facilitate the review of the individual comment and the identification of the corresponding response. Each code corresponds to a comment noted in the public and agency correspondences and comments made and notated in the public hearing transcript. The code applied to each comment represents R-A-B, where R *indicates a response*, A is *the* *issue group*, and B is *a sequential number within the issue group*, representing a unique comment. The correspondences and public hearing transcript have been notated with brackets located in the right margins which refer to the appropriate response or responses to the comments. Due to the large number of comments received, the response to comments are included in a separate appendix, Appendix R - Response-to-Comments.

TABLE T-1

INDEX OF COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT SEATTLE-TACOMA INTERNATIONAL AIRPORT

Document Number [1/]	Page Number	Name	Organization
181	522	3 Signatures	Aircraft Noise Abatement Committee
30	23		Communities Against Noise (Beacon Hill)
38	28	7 Signatures	Glen Acres Homeowners Assoc.
47	39	5 Signatures	Glen Acres Homeowners Assoc.
116	212	25 Signatures	Glen Acres Homeowners Assoc.
147	499	A Concerned Citizen	
214	1339	Airport Commuties Coalition	ACC
27	21	Airport Commuties Coalition (Bob Olander)	ACC
31	23	Airport Commuties Coalition (Bob Olander)	ACC
124	217	Akers, Ray	Columbia City Neighborhood Coalition
125	218	Akers, Ray	Columbia City Neighborhood Coalition
73	110	Alishokis, Wayne & Sharon	Glen Acres
HT 88	2005	Allen, Frank	
103	129	Allen, Lynn	
HT 37	1933	Allmon, Rebecca	Expediters Inter. WASH
228	1753	Amelia, Marcelle	
57	45	Amero, Lynol	Mayor, City of Pacific
45	36	Anderson, Alvin	
90	122	Anderson, Joseph	
48	40	Anonymous	
67	106	Anonymous	
100	127	Ashunal, W.	Glen Acres
95	124	Austria, Almario	
HT 77	1988	Ayres, Marilyn	
115	209	Bader, Jorgen	
4	3	Bader, Jorgen	Revenna-Bryant Community Council
HT 20	1910	Bakst, Jay	Kent Chamber of Commerce
159	506	Balach, J.R.	
39	29	Bannon Residence	
149	500	Bartlemay, James	
150	501	Bartlemay, James	
HT 11	1897	Bartlemay, James	
188	528	Bass, Erika	
206	634	Batayola, Teresita	Seattle Water
81	116	Bedayan, K.	Glen Acres
237	1763	Benedum, Mark	Highline Community Hospital
133	223	Benjaminson, Michael	Customs Brokers & International Freight Forwarders
HT 118	2025	Berg, Avill	
44	35	Berg, Avill	
HT 25	1917	Berger, Dorian	Mt. Rainier High Student Body
96	125	Berho, Felipe	
230	1755	Bittendc, Linda	
177	520	Bittermann, Toby	
HT 112	2101	Bolles, R.C.	

[1/] "HT" Indicates that comment is located in the Hearing Transcript. The number following "HT" indicates the order of the individual's comment in either the transcript or receipt of letters.

136	225	Bolles, Bob	Southwest King County Citizens Group
HT 55	1958	Bonney, Ann	
136	225	Bonney, Ann	Southwest King County Community Group
163	508	Booth, Charles	City of Auburn
223	1750	Borgmann, Craig	
HT 35	1930	Brasher, Minnie	
136	225	Brasher, Minnie	Southwest King County Community Group
HT 28	1922	Brazil, Terry	
169	516	Brockey, Jerry	South Seattle Community College
205	571	Brown, A.	
HT 101	2060	Brown, Arlene	
HT 47	1949	Brown, Arlene	
HT 52	1956	Brown, Derek	
HT 98	2077	Brown, Derek	
248	1877	Browne, Almyra	
247	1877	Browne, Harriet	
246	1876	Browne, James	
196	557	Buckingham, Mark	
63	103	Bullard, Don	Queen Ann Community Council
56	45	Buller, John	Bon Marche
207	636	Burke, Herbert	
HT 49	1952	Burrage, Jannett	Des Moines City Council
153	503	Byington, Terry	American Electronics Association
82	117	Byrd, Barbara & Miller, Nelva	Glen Acres
HT 14	1902	Caldwell, Dan	
251	1879	Cannon, Robert & Ivanov, Barbara	Kent Chamber of Commerce
184	525	Carlson, Walter & Mary	
HT 72	1982	Carpenter, James	
120	215	Cauble, Gloria	
229	1754	Cegon, Robert & Grumm, Stephen	Prince of Peace Lutheran Church
HT 113	2022	Chapin, Ed	
HT 22	1913	Christy, Stephanie	
HT 114	2022	Clark, Margaret	
HT 67	1975	Clark, Rose	
HT 60	1965	Clifford, Chris	
37	27	Clymer, William J. & West, Ruth Catherine	
224	1751	Clymer, William J. & West, Ruth-Catherine	
80	115	Conner, Opal	Glen Acres
18	16	Cooper, John	
HT 96	2026	Copies of the Display Boards	
111	207	Coyote, Beth	
74	111	Creech, Greg	Glen Acres
213	653	Creighton, Stuart	RCAA
46	37	Creighton, Stuart	Regional Commission on Airport Affairs
HT 73	1983	Creighton, Stuart	
HT 23	1913	Cunningham, Guy	Pacific Northwest Lab/Batelle
HT 99	2053	Cunningham, Guy	Pacific Northwest Lab/Batelle
3	2	Dalbec, Fred	
70	109	Depner, Joe	
233	1758	Derrick, Robert	King County Depart. o Development & Env. Services
HT 89	2008	DesMarais, Debbie	
HT 13	1900	DesMarias, Debbie	
83	118	Dettman, Alan	
204	567	Dinndorf, Jerry	PSRC
HT 62	1969	Docherty, Don	
HT 58	1962	Dodge, Clark	Normandy Park City Council
HT 81	1996	Dolvey, Jack	Federal Way Council
176	520	Driscoll, Clarence	

148	500	Dulaney, Nancy	
76	112	Eaton, William	Glen Acres
72	110	Edwards, Gene	
HT 82	1997	Elder, Hope	Federal Way Council
33	24	Ellison, R.A.	
HT 54	1958	Ellison, Robert	
144	497	Engel, Virginia & William	
114	208	Engstrom, Frieda	
75	111	Erickson, Margaret	Glen Acres
HT 24	1915	Etkin, Mayer	
123	216	Feckley, Marie	
HT 53	1956	Feldman, Richard	King County Labor Co. AFL/CIO
208	637	Ferullo, E.J.	
HT 90	2011	Feuerstein, Joe	
232	1756	Ford, Angela	
HT 8	1894	Fornar, Elmira	
190	529	Forrey, Arden	
7	5	Forrey, Arden	Hawthorne Hills Community Club
195	534	Frause, Henry	
HT 110	2099	Frause, Henry	
HT 12	1898	Frause, Sophie	
22	18	Frutu, David	
HT 75	1986	Furney, Al	
HT 4	1890	Gates, Mary	Federal Way
HT 100	2055	Gates, Mary & Priest, Skip	
78	113	Gendo, Gladys	Glen Acres
85	119	Gibbons, Laura & Keyes, David	
50	41	Gilbreath, Janis L.	
HT 17	1907	Giles, Robert	Perkins & Coie
HT 32	1926	Gilespie, Bob	
68	107	Givens, John	Washington Public Ports Association
HT 69	1979	Gould, Trina	Air Washington
HT 87	2004	Graham, Jerry	
203	567	Green, Bob	Greater Federal Way Chamber of Commerce
17	13	Greene, James K.	
8	5	Griffith, Gregory	Office of Archaeology and Historic Preservation
36	27	Grubb, Ria	
229	1754	Grumm, Stephen & Cegon, Robert	Prince of Peace Lutheran Church
104	129	Gwinn, David	H.J. Gwinn & Company
99	126	Hablin, Arthur	Glen Acres
HT 59	1963	Hagstrom, Claes	Seattle RCA
222	1750	Hales, George	Glen Acres
2	1	Hall, Heidi	Department of Natural Resources
25	20	Hansen, Ingrid	
51	41	Hansen, Rodney	King County Solid Waste
84	118	Hansen, Rodney	King County Waste Division
197	560	Harding, Beverly	
218	1738	Harris, Keith	Highline Water District
102	128	Hatfield, M.E.	Glen Acres
215	1733	Hayden, John	Boeing
HT 45	1943	Heavey, Mike	State Representative
139	494	Heavey, Mike	State Senator
98	126	Helland, David	
86	120	Heslop, Serena	
134	224	Hess, James Dean	
HT 56	1960	Hetzel, Carol	ANAC
26	20	Hickman, James	
162	508	Hill, Jennifer	
121	215	Hitt, Ray	
138	493	Hoge, Michael	Seattle Public Schools

HT 39	1935	Hoglund, Eugene	Citizen
200	562	Hopkins, Henry	
89	121	Horne-Webster, Martha	
146	498	Horsley, Levi William	
HT 5	1891	Hoult, Linda	Snohomish County Citizens Group
53	43	Houser, Richard	Glen Acres Homeowners Assoc.
113	208	Hubbard, Minnie	
127	220	hultberg, Stephen	
251	1879	Ivanov, Barbara & Cannon, Robert	Kent Chamber of Commerce
19	17	Ivenson, Susan	
122	216	Jackson, Julie	
HT 41	1938	Jhaveri, Arun	Mayor, Burien
HT 97	2052	Jhaveri, Arun	
HT 33	1928	Jones, Bill	Sea-Tac Firefighters
178	521	Jones, Len	
93	123	Jones, Richard	
143	497	Judd, Adeline	
226	1752	Karlinsey, Joyce	
199	561	Kellogg, Kristine	
97	125	Kemron, Carol	
250	1878	Kennedy, Elizabeth	
HT 27	1920	Kennedy, Richard	Mayor, Des Moines
HT 105	2094	Kennedy, Richard	Talking Points
85	119	Keyes, David & Gibbons, Laura	
168	513	Kircher, David	PSAPCA
174	519	Kishida, Yone	
173	518	Kishida-Haley, Darlene	
179	521	Kittilsby, Lisa	
12	10	Klug, Bob	North East District Council
29	22	Klug, Bob	North East District Council
164	509	Ku, Peter	North Seattle Community College
108	132	Kumar, Ramendra	
68	107	Kuntz, Jim	WPPA Aviation Committee
HT 34	1929	LaFramboise, Bob	Heath Techna Aerospace
193	533	Lang, Elizabeth	
182	524	Lawder, William	Hertz Corp
137	489	Le Compte, Howard	
220	1748	Lepley, Jean	
54	43	Lewis, Randall	City of Tacoma
HT 16	1904	Lindsay, John N.	Tri City Industrial Dev. Council
1	1	Lund, Erik S.	
117	213	Luther, Rick	City of Black Diamond
160	507	MacPherson-Krutsky, Susan	
92	123	Maedche, Don	
158	506	Maes, Elaine	
191	530	Magnolia Community Club	Magnolia Community Club
9	6	Mandel, Eric	Leschi's Community Council
227	1753	Marshall, Viola	
234	1761	Mason, Dawn	State Representative
HT 43	1941	Matthews, Pierre	
HT 94	2017	Matthews, Peter	
HT 95	2019	Matthews, Vivian	
249	1878	Matthews, Vivian & Pierre	
14	11	Maurice, John	
151	501	McCollier, Elizabeth	
209	639	McDougall, CoCo	
HT 51	1954	McGeehan, Dr. Joseph	Highline School District
HT 102	2078	McGeehan, Dr. Joseph	
180	522	McGrath, Jeff	
59	47	McGwire, Elizabeth	
66	104	McKinney, Maureen & Buck	

HT 64	1971	Mealy, Carl	
243	1770	Means, Beth & Talbot, Chas.	Seattle Community Council
118	214	Mehlhoff, Mike	
69	108	Menorath, Pink Keo	
201	564	Miedema, Simon	
171	517	Miles, Frank	
238	1764	Miller, Alan	Trout Unlimited
HT 2	1888	Miller, David	Normandy Park
82	117	Miller, Nelva & Byrd, Barbara	Glen Acres
192	532	Miller, Raymond	The Church Council of Greater Seattle
HT 83	1998	Millsaps, Joe	John Graham Assoc.
HT 42	1940	Milne, Kitty	Burien City Council
HT 63	1970	Moeller, Jeanne	
217	1735	Montgelas, Renee	WS DOT
198	561	Moore, Barbara	
231	1756	Moriyason, Saya	
132	223	Motel, Cameo	
254	1880	Mueller, Thomas	
40	30	Mulder, Jan	Seattle City Light
61	101	Murphy, James	Fleet Glass Repair, Inc.
23	19	Murphy, Sherri	
129	221	Nelson, Katia	
HT 38	1934	Nelson, Robert	
5	4	Neuzil, Dennis	
HT 44	1942	Newby, Don	
155	504	O'Brien, Yvonne	
170	516	O'Keefe, Elise	
35	26	Okamoto, Dennis	U.S. West Comm.
107	132	Okamoto, Jean	
27	21	Olander, Bob	ACC
31	23	Olander, Bob	ACC
60	47	Osaki, Carl	King Co. Health Dept.
161	507	Osborne, Jennifer	
245	1874	Osterman, Doug, Julie & Mitchell	
212	650	Osterman, Doug, Julie & Mitchell	
HT 116	2024	Ott, Frank	
HT 115	2023	Overholt, Mark	
HT 76	1987	Parker, Kathy	
219	1739	Parkin, Richard	USEPA
HT 46	1945	Patterson, Julia	State Representative
165	511	Peterson, Bruce	
110	133	Peyton, Brian	Ravenna-Bryant Community Association
252	1879	Pichereau, Susan	
52	42	Platt, Tom & Marylin	
20	17	Plowman, Linda	
HT 31	1925	Pomeroy, Vernon	
HT 9	1895	Pompeo, Pat	
106	131	Powell, Mark	Unocal
64	103	Price, Mary	Glen Acres
HT 15	1903	Prichart, Janet	Tacoma Pierce County Chamber
HT 3	1889	Priest, Skip	Federal Way
HT 100	2055	Priest, Skip & Gates, Mary	
130	220	Ramirez, L. Dan	Greater Readmond Chamber of Commerce
96	125	Rannig, Majorie & Leslie	
HT 57	1961	Rants, John	Mayor Tukwila
HT 106	2096	Rants, John	Talking Points
126	219	Reardon, Ken	
28	21	Redlin, Victoria	Spokane Area Chamber of Comm.
HT 19	1908	Rees, Mike	Magnolia Community Club
HT 108	2098	Rees, Mike	
187	527	Rice, Norman	City of Seattle

175	519	Richardson, Earl	South East Effective Development Inc. (SEED)
HT 7	1893	Richter, Audrey	
240	1767	Riggs, Don	
210	640	Rohlfs, D. Scott	City of SeaTac
119	214	Rondaz, Seine	
HT 68	1977	Rosenberg, Matt	Regional Comm. On Airport Affairs
65	104	Rosenblatt, Roger	
140	495	Ross, Cheryl	
HT 65	1972	Rozdilsky, John	
225	1752	Saladis, John & Rose	
154	504	Sauer, Raymond	
43	32	Scarvie, Stanley	
216	1734	Schneider, S.G.	
152	502	Schreier, Eda	
145	498	Schuster, Andrew	Wedgewood Community Council
211	649	Schuster, John	John F. Kennedy High School
112	207	Scott, Nadine	
109	133	Scott, Ora	
21	18	Shawman, P.	
244	1874	Shinyeda, Amy	
87	120	Sican, Linda	
94	124	Sican, Lisa	
135	224	Simons, Richard	
HT 10	1895	Smith, Adam	State Senator
141	496	Smith, Audrey	
142	496	Smith-Buehler, Robyn	
194	533	Sobers, Frances	
15	11	Soltis, Jerry	
77	112	Sonislo, Barbara	Glen Acres
202	565	Southwest King County Chamber of Commerce - Nada Hughes	
136	225	Southwest King County Community Group	Southwest King County Community Group
236	1763	Spears, Patricia	
HT 36	1931	Springer, Elizabeth	
HT 107	2097	Springer, Elizabeth	
79	114	St. Laurent, Cornelia	Glen Acres
101	127	Stankey, Warren & Janice	Glen Acres
HT 74	1985	Stark, Ben	
13	10	Sternberg, Maxine	
88	121	Stonehocker, Patricia	
16	12	Stuhring, Barbara	
32	24	Stuhring, Barbara	
167	512	Suther, Suzanne	Issaquah Chamber of Commerce
156	505	Swhela, Tilesa	
243	1770	Talbot, Chas. & Means, Beth	Seattle Community Council
185	525	Talley, Karen Waddell	
183	524	Tang, David K.Y.	Washington Council on International Trade
166	511	Tate, Randy	Congressman
HT 48	1950	Tate, Randy	U.S. Congressman
HT 103	2091	Tate, Randy	
235	1762	Taylor, Laurie	
58	46	Taylor, Marie	
HT 111	2100	Taylor, Ralph	
55	44	Taylor, Willie	Department of Interior
221	1749	Terrell, Marion	Glen Acres
24	19	Thomas, Beverly	
HT 6	1892	Thompson, John	
HT 71	1982	Thompson, John	
HT 70	1981	Thompson, Lewis	

HT 50	1953	Thomson, Leslie	
HT 26	1919	Thornton, Dean	
6	4	Tilley, Steve	Puget Sound Water Quality Authority
HT 78	1990	Tinker, Carey	
HT 79	1992	Tinker, Jane	
71	109	Toepelt, Rovert	
HT 85	2001	Towe, Gary	DesMoines City Council
HT 93	2015	Townsend, Peter	
HT 104	2093	Tri Cities Industrial Development Council	
157	505	Uriyu, Hideko Sue	
41	30	Vaa, Robert	
HT 117	2024	Vaa, Robert	
HT 84	2000	Vance, Chris	King County Council
HT 66	1973	Vermeier, Kathleen	Normandy Park City Council
HT 1	1886	Vigilante, Mary	Landrum & Brown
HT 80	1994	Vigilante, Mary	Landrum & Brown
239	1766	Voeller, Ray & Judy	
HT 91	2012	Vonesh, Bob	
189	528	Wagner, David	
HT 18	1908	Walker, George	
11	7	Wantanabe, Stanley	
34	25	Wantanabe, Stanley	
HT 29	1923	Wantanabe, Stanley	
HT 109	2099	Wantanabe, Stanley	
241	1769	Webb, Kris	
HT 92	2013	Webb, Kris	
91	122	Webster, Lonnie	
105	131	West, Carla & Robert	
37	29	West, Ruth Catherine & Clymer, William J.	
224	1751	West, Ruth Catherine & Clymer, William J.	
62	101	Whitled, Vernon & Lori	
49	40	Whitlock, John	
HT 86	2002	Wiberg, Roy	
HT 61	1967	Wichert, Erhard	
10	6	Wieting, Donna	DOC, NOAA
128	220	Williams, Kari	
242	1770	Woodward, Bethany	
HT 40	1938	Woosley, T.J.	Greater Kirkland Chamber
HT 21	1911	Wordian, Laurie	
186	526	Wozniak, Joseph	
131	222	Yada, Joe	
HT 30	1924	Yamamoto, Amy	
172	517	Yanez, Tony	
253	1880	Yoshikawa, Troy	
42	31	Zembruski, Victor	
HT 119	2026	Zembruski, Victor	

214

City of Burien
City of Tukwila
City of Des Moines
City of Normandy Park
Highline School District
AIRPORT COMMUNITIES COALITION

REC'D ANM-610
PLAN, PGM, & CAP BR
OCT 25 1995
ANM-610

October 24, 1995

Mr. Dennis Ossenkop
Federal Aviation Administration
Northwest Mountain Region
1601 Lind Avenue, S.W.
Renton, WA. 98055-4056

Re: Corrections in the Airport Communities Coalition and the cities of Federal Way and Mercer Island Comments on the Draft Environmental Impact Statement for the Proposed Master Plan Update Development Actions at the Seattle-Tacoma International Airport.

Dear M . Hinkle:

The Ai ort Communities Coalition ("ACC") has discovered that there was a print g and production minor error in the comments submitted to the Federa viation Administration Northwest Region. This error resulted in the tra position of some data in Table 5.2.2 on pages and 5.2-15 of the Comme ts. Therefore, the ACC is enclosing a new copy of pages 5.2-14 and 5.2-15 with a corrected Table 5.2.2. Please substitute these pages in your copy of the draft Environmental Impact Statement Comments by the ACC and the cities of Federal Way and Mercer Island.

Should you have any further questions or concerns, please do not hesitate to contact me. Your time, attention and courtesy are appreciated.

Sincerely,

Chester S. Beattie

Chester S. Beattie, Jr.
Policy Analyst

Enclosures

21630 Eleventh Avenue South, Des Moines, WA 98198-6398
Phone 206/870-6581 Fax 206/870-6540

214

City of Burien
City of Tukwila
City of Des Moines
City of Normandy Park
Highline School District
AIRPORT COMMUNITIES COALITION

REC'D ANM-610
PLAN, PGM, & CAP BR
AUG - 8 1995
ANM-610

August 3, 1995

Mr. Dennis Ossenkop
Federal Aviation Administration
Northwest Mountain Region
Mail Code ANM-611
1601 Lind Avenue, S.W.
Renton, WA. 98055-4056

RE: Comments on the Draft Environmental Impact Statement for Proposed Master Plan Update Development Actions at Seattle-Tacoma International Airport

Dear Mr. Ossenkop:

On behalf of the Airport Communities Coalition, the cities of Burien, Des Moines, Federal Way, Mercer Island, Normandy Park and Tukwila, Washington, and the public officials listed on the inside cover, I present ten (10) copies of Comments on the Draft Environmental Impact Statement for Proposed Master Plan Update Development Actions at Seattle-Tacoma International Airport ("DEIS").

It is my understanding that you will distribute the appropriate number of copies to the Port of Seattle, the joint lead agency with the Federal Aviation Administration in the preparation of the DEIS.

Sincerely,

Kenneth B. Reid

Kenneth B. Reid,
Executive Director

cc: Airport Communities Coalition
Executive Board

21630 Eleventh Avenue South, Des Moines, WA 98198-6398
Phone 206/870-6581 Fax 206/870-6540

TABLE 5.2-2

Impacts of Hauling Fill Required for Expansion of Sea-Tac[a]

Haul Period:	App. J Traffic Analysis		More Likely Scenario		Multiple of DEIS Impact
	Compact	Loose	Compact	Loose	
1 Number of Years		2.5		2.5	
2 Days Per Year		300		250	
3 Total Haul Days (1 x 2)		750		625	
4 Hours Per Day		16		12	
5 Total Haul Hours (3 x 4)		12,000		7,500	
Near-Site Truck Trips:[1] (Impact on Des Moines Memorial Way S.)					
6 Max Total Cubic Yards[2]		5.55		8.00	1.44
7 Cubic Yards ÷ Truck		22.0		22.00	
8 Total Truck Trips (6 ÷ 7 x 2)[3]		504,545		727,273	
9 Avg Day Truck Trips (8 ÷ 3)		673		1,164	1.73
10 PCB Factor[4]		1.0		3.0	
11 Pass Car Equivalents (9 x 10)		673		3,491	5.19
12 Avg Hour Truck Trips (8 ÷ 5)		42		97	
13 Peak Hour 'Bunching' Factor[5]		1.00		1.50	
14 Peak Hour Truck Trips (12 x 13)		42		145	3.46
15 PCB Factor[4]		1.0		3.0	
16 Pass Car Equivalents (14 x 15)		42		436	10.38

[a] Source: DEIS, app. J at 3, Table C-1, 4, Table 3-2; DEIS at IV.19-13A, Table IV.19-1; calculations derived from analysis prepared for ACC by Kato & Warren, Inc.

TABLE 5.2-2 (Continued)

Haul Period:	App. J Traffic Analysis		More Likely Scenario		Multiple of DEIS Impact
	Compact	Loose	Compact	Loose	
Off-Site Truck Trips: (Converging At SR-509 or S. 160th Street Interchange)[6]					
17 Max Total Cubic Yards		10.72		21.00	1.96
18 Cubic Yards/Truck		22.0		22.0	
19 Total Truck Trips (17 ÷ 18 x 2)[3]		974,545		1,909,091	
20 Avg Day Truck Trips (19 ÷ 3)		1,299		3,055	2.35
21 PCB Factor[4]		1.0		3.0	
22 Pass Car Equivalents (20 x 21)		1,299		9,164	7.05
23 Avg Hour Truck Trips (19 ÷ 5)		81		255	
24 Peak Hour 'Bunching' Factor[5]		1.00		1.50	
25 Peak Hour Truck Trips (23 x 24)		81		382	4.70
26 PCB Factor[4]		1.0		3.0	
27 Pass Car Equivalents (25 x 26)		81		1,145	14.10

1 'Near-Site' borrow areas are those south of S. 200th called 'On-Site' in the DEIS.
2 All cubic yards in quantities of millions of cubic yards (mcy).
3 Loaded truck trips times 2 to include the empty truck return trips to borrow sites.
4 One Truck/Trailer combination is equivalent to 3 passenger cars on flat grades and at arterial street intersections, would be equivalent to 10 PCEs on SR-18 uphill grade.
5 Trucks will likely have an uneven rate of approach to the fill site, particularly when hauls are coming from multiple borrow areas.
6 Truck trips to/from the 16 more remote borrow areas identified in the DEIS.

214

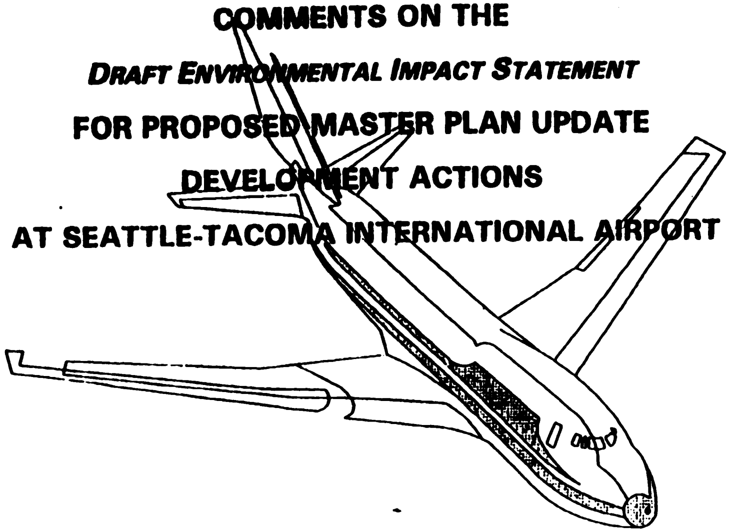
COMMENTS ON THE

DRAFT ENVIRONMENTAL IMPACT STATEMENT

FOR PROPOSED MASTER PLAN UPDATE

DEVELOPMENT ACTIONS

AT SEATTLE-TACOMA INTERNATIONAL AIRPORT



Submitted By

THE AIRPORT COMMUNITIES COALITION

CITY OF FEDERAL WAY

CITY OF MERCER ISLAND

August 3, 1995

214

AIRPORT COMMUNITIES COALITION

CITY OF BURIEN

Arun G. Jhaveri, Mayor
Vivian Matthews, Deputy Mayor
Kevin James, Councilmember
John Kennelly, Councilmember
Kitty Milne, Councilmember
Sally Nelson, Councilmember
Don Newby, Councilmember

CITY OF DES MOINES

Richard T. Kennedy, Mayor
Scott Thomasson, Mayor Pro Tem
Lew Anderson, Councilmember
Terry Brazil, Councilmember
Jeanette Burrage, Councilmember
Dan Sherman, Councilmember
Gary Towe, Councilmember

CITY OF NORMANDY PARK

David E. Miller, Mayor
Claire Drosdick, Mayor Pro Tem
K. W. Anderson, Councilmember
Bob Davis, Councilmember
Clark Dodge, Councilmember
John L. Rankin, Councilmember
Kathleen Vermeire, Councilmember

CITY OF TUKWILA

John W. Rants, Mayor
Joe Duffie, Councilmember
Joan Hernandez, Councilmember
Dennis Robertson, Councilmember
Allan Ekberg, Councilmember
Steve Mullet, Councilmember
Pam Carter, Councilmember
Jim Haggerton, Councilmember

HIGHLINE SCHOOL DISTRICT NO. 401

Wilton S. Viall, III, President
Eduardo I. Pina, Vice President
Ben Kodama, Board Member
Carol Mohler, Board Member
Tom Slattery, Board Member

KENNETH B. REID, Executive Director

CITY OF FEDERAL WAY

Mary Gates, Mayor
Hope Elder, Councilmember
Michael Park, Councilmember
Mahlon Priest, Councilmember
Ron Gintz, Councilmember
Phil Watkins, Councilmember
Jack Dovey, Councilmember

CITY OF MERCER ISLAND

Judy Clibborn, Mayor
Linda Jackman, Mayor Pro Tem
Elliot Newman, Councilmember
Gordy Edberg, Councilmember
Fred Jarrett, Councilmember
Jim Hale, Councilmember
David Clancy, Councilmember

THESE COMMENTS ARE ALSO SUBMITTED ON BEHALF OF

Congressman Randy Tate
9th Congressional District

Senator Ray Schow
30th Legislative District

Senator Adam Smith
33rd Legislative District

Senator Michael Heavey
34th Legislative District

Representative Timothy Hickel
30th Legislative District

Representative Maryann Mitchell
30th Legislative District

Representative Julie Patterson
33rd Legislative District

Representative Greg Fisher
33rd Legislative District

Representative Erik Poulsen
34th Legislative District

Representative Georgette Valle
34th Legislative District

Councilmember Pete von Reichbauer
Metropolitan King County Council 7th District

Councilmember Greg Nickels
Metropolitan King County Council 8th District

Councilmember Christopher Vance
Metropolitan King County Council 13th District

Prepared for Submission to

the FAA and Port of Seattle

by

Cutler & Stanfield
700 Fourteenth Street, N.W.
Tenth Floor
Washington, D.C. 20005

Counsel to the Airport Communities Coalition

In Consultation with:

BBN Systems & Technologies
21120 Vanowen Street
Canoga Park, California 91303

Consulting Services, Ltd.
2023 Simms Way
Port Townsend, Washington 98032

Kato & Warren, Inc.
2001 Western Avenue
555 Market Place One
Seattle, Washington 98121

Envirometrics, Inc.
4803 Fremont Avenue North
Seattle, Washington 98103-6527

Western Resources, Inc.
16150 N.E. 85th Street
Redmond, Washington 98052

TABLE OF CONTENTS

PAGE

PAGE

1344

PAGE

PAGE

PAGE

PAGE

1346

PAGE

LIST OF APPENDICES*

Volume 1

1. State of Washington, Puget Sound Regional Council, In the Matter of: Expert Arbitration Panel's Review of Noise and Demand/System Management Issues as Sea-Tac International Airport, Order on Phase I Noise Issues (Jan. 9, 1995)

2. State of Washington, Puget Sound Regional Council, In the Matter of: Expert Arbitration Panel's Review of Noise and Demand/System Management Issues at Sea-Tac International Airport, Final Phase I Order on Demand/System Management Issues (July 27, 1995)

3. Fed. Aviation Admin., Seattle-Tacoma International Airport, Airport Capacity Enhancement Update, Data Package No. 11 (Apr. 1995)

4. Puget Sound Regional Council Resolution A-93-03, A Resolution of the General Assembly of the Puget Sound Regional Council Amending the 1988 Interim Regional Airport System Plan (RASP) for Long-Term Commercial Air Transportation Capacity for the Region (Apr. 1993)

5. State of Washington, Puget Sound Regional Council, In the Matter of: Expert Arbitration Panel's Review of Noise and Demand/System Management Issues at Sea-Tac International Airport, Procedural Order (Sept. 22, 1994)

6. Aviation Simulations International, Inc., Impact of Boeing Field Interactions on the Benefits of a Proposed New Runway at Seattle-Tacoma International Airport (Prepared for the Fed. Aviation Admin., Northwest Mountain Region) (July 1992)

7. Sanford Fidell, et. al., Social Survey of Community Response to Noise Exposure Near Seattle-Tacoma International Airport (1995)

Volume 2

8. Glenn Weiss, Historic Properties Survey, City of Burien (1994)

9. City of Des Moines, Wash., Historic Properties Survey (1995)

10. Glenn Weiss, Historic Properties Survey, City of Normandy Park (1994)

11. Glenn Weiss, Historic Properties Survey, City of Tukwila (1994)

12. Renny Greenmun, Impact of Aircraft Noise Levels on CTBS Test Scores in Highline School District (1995)

13. Envirometrics, Inc., Review of the Air Quality Sections in the Draft Environmental Impact Statement for Sea-Tac Master Plan Update Development Actions (June 21, 1995)

14. Kato & Warren, Inc., Draft Environmental Impact Statement for Proposed Master Plan Update Development Actions at Seattle-Tacoma International Airport: Compendium of Comments Reviewing and Analyzing Construction, Surface Transportation, Water Quality and Wetlands/Wildlife Impacts (June 1995)

* These Comments contain a considerable number of citations to documents. All documents cited are incorporated herein by reference. The preponderance of the citations are to (a) documents to which the FAA and the Port of Seattle must take official notice (e.g., laws, regulations, ordinances and records of proceedings or official actions by governmental bodies such as the Puget Sound Regional Council and its authorized boards and panels); (b) documents which the Commenters have obtained from the Port or the FAA (through applicable open records statutes) and hence are already in the agencies' possession; (c) materials which the Commenters believe to be already in the record of this proceeding; and (d) materials to which the agencies have ready access and which the Commenters otherwise would have to obtain from the agencies or another government agency. In the interest of brevity, the Commenters have attached as appendices hereto only those cited materials which the Commenters believe are not within those four categories. In the event that any cited material is not available to the FAA or the Port, the Commenters will make such material available immediately to the agencies upon request.

SUMMARY AND CONCLUSIONS

- The DEIS Is Too Narrowly Focused:

  - The DEIS does not identify the actions for which it purports to examine the environmental impacts. *The Port must issue a detailed Master Plan Update which specifies, for example, how the runway construction projects would be implemented, the environmental and other consequences of relocating the terminals and how the location of cargo facilities in the South Aviation Support Area (SASA) would be made consistent with already approved plans for SASA which did not contemplate such intensive use by heavy equipment and aircraft.*

  - The DEIS does not detail the specific actions that would be required to construct a third runway or build new terminals.

  - The DEIS ignores the cumulative impacts of other projects in the vicinity of the Airport such as SASA, the Des Moines Creek Technology Campus, construction of the 28th/24th Avenue Arterial Project, State Route 509 Extension and South Access Road, development of an Aviation Business Center.

    THE DEIS DOES NOT SATISFY FEDERAL AND STATE LEGAL REQUIREMENTS FOR A PROJECT EIS, AND IT MUST BE REVISED AND REISSUED.

- The DEIS Is Based On Faulty Assumptions:

  - The DEIS wrongly assumes that the number of operations and passengers using Sea-Tac in 2020 would be the same with or without a third runway. *In fact, the Port concedes that Sea-Tac would reach maximum capacity in about 2000, and there is no evidence that the number of passengers and operations would continue to grow beyond the Airport's capacity.*

  - The DEIS incorrectly calculates and overstates future delays to aircraft without a third runway at Sea-Tac. *The calculations are based on inflated estimates of the occurrence of poor weather conditions. Those estimates overstate the occurrence of poor weather by 130 percent, and they assume erroneously that poor weather lasts for a continuous 24 hours, when those conditions actually last only for a few hours, often during periods of low Airport usage. Less than 1*

214

percent of aircraft operations at Sea-Tac take place during peak periods when weather conditions are poor.

- The DEIS seriously understates existing airfield capacity by ignoring present and future technological advances. *Existing technological improvements have made it possible to decrease the separation between aircraft which already has increased significantly the capacity of the Airport during poor weather conditions. Other advanced air traffic control technologies being tested by the FAA would further reduce poor weather delay conditions at Sea-Tac.*

THE DEIS IS FATALLY CONTAMINATED BY FAULTY ASSUMPTIONS WHICH MAKE ITS ANALYSIS INACCURATE, INCOMPLETE AND DECEPTIVE.

- <u>The DEIS Ignores The Role Of The Puget Sound Regional Council ("PSRC") And The Expert Arbitration Panel</u>:

  - The DEIS omits any mention of the PSRC review process and the Expert Arbitration Panel which require the Port to meet noise reduction and demand and system management conditions. *The PSRC cannot approve the Airport expansion project unless these conditions are met, and the Port may not build the third runway without PSRC approval.*

  - The Expert Arbitration Panel could require the Port to take actions to reduce noise and it could determine that rail service on the Portland-Seattle-Vancouver, B.C. rail corridor is a feasible method of system management. *A finding by the Expert Arbitration Panel that a sufficient number of passengers would be diverted from Sea-Tac to rail service would have serious implications for the Port's assertions about the actual need for additional capacity at Sea-Tac and would mean that any need for additional poor weather arrival capacity at the Airport would be met without the need to build a third runway.*

THE PORT DOES NOT HAVE THE LEGAL AUTHORITY TO BUILD A THIRD RUNWAY AT SEA-TAC UNTIL THE EXPERT ARBITRATION PANEL FINDS THAT IT COMPLIED WITH THE CONDITIONS OF THE PSRC RESOLUTION.

214

- <u>The DEIS Does Not Consider Alternatives To The Airport Expansion</u>:

  - The DEIS ignores the effects of instituting reasonable demand management programs. *A demand management program would allow Sea-Tac to meet the needs for aircraft arrival capacity in 2020 with acceptable levels of delay without building a third runway.*

  - The DEIS considers only on-airport alternatives. *The diversion of commuter aircraft to other airports would provide Sea-Tac with enough capacity to handle arriving aircraft with acceptable levels of delay through at least 2020 without building a third runway.*

  - The DEIS analyzes only runways that are at least 7,000 feet in length. *Runways as short as 4,000 feet could satisfy the asserted need for increased poor weather aircraft arrival capacity.*

  - The DEIS considers each alternative only individually. *A combination of alternatives could meet the stated need for increased poor weather capacity at Sea-Tac without the construction of a third runway.*

  - The DEIS ignores a delayed action alternative. *Delaying action could allow the effects of additional technological improvements and the implementation of a demand management program an opportunity to address the stated need for additional Airport capacity without spending hundreds of millions of taxpayer dollars to build a third runway.*

THE DEIS DOES NOT COMPLY WITH FEDERAL AND STATE LAWS, BECAUSE NUMEROUS REASONABLE ALTERNATIVES THAT WOULD MEET THE STATED NEED FOR EXPANDED CAPACITY AT SEA-TAC WERE NOT CONSIDERED.

- <u>The DEIS Does Not Consider The Airspace Conflicts Between A Third Runway At Sea-Tac And Boeing Field</u>:

  - The FAA's own study shows that airspace conflicts with aircraft using Boeing Field would limit the effectiveness of a third runway at Sea-Tac.

AIRSPACE CONFLICTS WITH BOEING FIELD WOULD MAKE IT IMPOSSIBLE TO ATTAIN THE PROJECTED INCREASED CAPACITY BENEFITS OF A THIRD RUNWAY AT SEA-TAC.

- <u>The DEIS Seriously Underestimates All Environmental Consequences Of The Expansion Of Sea-Tac</u>:
  - The DEIS assumes that the almost all of the environmental impacts that would result from expanding the Airport also would occur without the expansion. *Sea-Tac would not be able to handle the same number of passengers and operations without the construction of a third runway, and, therefore, the Do-Nothing alternative would not have the same environmental impacts as the third runway alternatives.*
  - The DEIS attributes the environmental impacts to the increased number of passengers and operations projected for 2020. *Negative environmental impacts would be a direct consequence of the Airport expansion which, in turn, would allow the Airport to serve many more passengers and operations.*

ENORMOUS NEGATIVE IMPACTS ON AIR AND WATER QUALITY, LOCAL AND STATE ROADS, PARKS, SCHOOLS AND THE OVERALL QUALITY OF LIFE IN THE PUGET SOUND REGION WOULD RESULT FROM THE AIRPORT EXPANSION AND NOT JUST FROM NORMAL REGIONAL GROWTH.

- <u>The DEIS Contains Misleading Information About The Noise That Would Result From A Third Runway At Sea-Tac</u>:
  - The DEIS does not consider the impacts of noise on residents living near Sea-Tac.
  - The DEIS wrongly assumes that noise impacts in 2020 would be the same with or without a third runway. *Construction of a third runway would increase noise levels and the effects of noise farther north and south than indicated in the DEIS.*
  - Projected future noise contours are based on estimates of unpredictable circumstances and inaccurate data.

INACCURACIES, OMISSIONS, ERRORS AND IMPLAUSIBLE ASSUMPTIONS PERVADE THE EVALUATION OF NOISE IMPACTS IN THE DEIS AND OBSCURE THE REALITY OF INCREASED NORTH AND SOUTH NOISE IMPACTS THAT WOULD RESULT FROM AT LEAST A 30 PERCENT INCREASE IN THE NUMBER OF AIRCRAFT OPERATIONS AT SEA-TAC.

- <u>The DEIS Analysis Of Construction Impacts Is Incomplete, Misleading and Flawed</u>:
  - The DEIS ignores the overwhelming impacts on surrounding communities of mining and transporting more than 26 million cubic yards of fill for more than 2 years.
  - The DEIS ignores local restrictions on mining activities that would increase significantly the time it would take to construct the third runway and other actions. *Local zoning regulations and permit conditions would not allow the Port to transport fill 16 hours a day, 6 days a week, 52 weeks a year -- as the Port has proposed.*
  - The DEIS dismisses the effects of increased truck traffic on roads leading from the mining sites to the construction site. *Already overcrowded local and state roads -- and I-5 -- could experience up to an equivalent of 1,269 additional vehicles in a peak hour, or more than 10,000 additional vehicle trips each day, clogging roads to the point of gridlock.*

MINING AND TRANSPORTING 26 MILLION CUBIC YARDS OF FILL WOULD SLOW TRAFFIC TO A PERPETUAL CRAWL ON MANY MAIN ROADS FOR MORE THAN 2 YEARS AND WOULD HAVE A DEVASTATING IMPACT ON MANY COMMUNITIES -- EVEN THOSE FAR FROM THE AIRPORT -- IN THE PUGET SOUND REGION.

- <u>The DEIS Does Not Demonstrate That The Proposed Airport Expansion Is Compatible With Local Land Use Plans</u>:

  - The DEIS ignores the provisions of land use plans adopted by neighboring communities. *The Growth Management Act requires that the Port coordinate its plans with local governments in the area and that the Port's plans be consistent with other local plans.*

  - Communities in the vicinity of Sea-Tac have drafted comprehensive plans which rely on the Port's commitments not to build a third runway.

    THE PROPOSED EXPANSION OF SEA-TAC IS INCOMPATIBLE WITH THE LAND USE PLANS OF NEIGHBORING JURISDICTIONS.

- <u>The DEIS Does Not Address the Impacts Of The Huge Increases In Vehicular Traffic That Would Result From The Expansion of Sea-Tac</u>:

  - The DEIS assumes that the same amount of vehicular traffic would be generated with or without a third runway. *The construction of a third runway would allow Sea-Tac to serve twice as many passengers as presently use the Airport. A 100 percent increase in passengers would result in a significant increase in the number of vehicles traveling to and from the Airport.*

  - The DEIS looks only at off-site traffic conditions and does not consider on-Airport traffic problems.

  - The DEIS ignores parking demands and the adequacy of parking resources.

  - The DEIS assumes that major traffic and mass transportation improvements would be made. *Many of these projects would be built only if the Port provides the funding, and the Port has not made a commitment to do so.*

THE EXPANSION OF SEA-TAC WOULD HAVE A MAJOR, NEGATIVE IMPACT ON ROADS AND OTHER SURFACE TRANSPORTATION RESOURCES IN THE PUGET SOUND REGION BY INCREASING THE NUMBER OF MOTOR VEHICLES WHICH WOULD BE CARRYING THE PROJECTED 100 PERCENT INCREASE IN THE NUMBER OF PASSENGERS USING THE AIRPORT BY 2020.

- <u>The DEIS Does Not Accurately Report The Air Quality Impacts Of The Airport Expansion Project</u>:

  - The Port and the FAA did not conduct air quality impact tests in accordance with the federal guidelines.

  - The air quality analyses does not account for immense increases in truck traffic during construction of a third runway or for an increased number of vehicles going to and from the Airport if a third runway were built. *The air quality modeling should have been done at additional intersections and freeway ramp junctions and monitors should have been placed closer to the roadways.*

  - The DEIS does not give sufficient consideration to the air quality impacts of the construction activities including mining operations, increased truck traffic, pollutants from heavy-duty construction vehicles, dust at the construction sites.

    THE EXPANSION OF SEA-TAC WOULD INCREASE AIR POLLUTION IN THE PUGET SOUND REGION AND COULD PREVENT THE REGION FROM COMPLYING WITH THE CLEAN AIR ACT.

- <u>The DEIS Does Not Consider The Full Extent Of Water Quality Problems That Would Result From The Airport Expansion</u>:

  - The DEIS only superficially considers the fragile condition of Des Moines and Miller Creeks.

  - The DEIS does not explain how the already-overburdened and inadequate industrial wastewater system at Sea-Tac would handle the additional runoff from an expanded Airport.

214

THE EXPANSION OF SEA-TAC THREATENS THE QUANTITY AND QUALITY OF SURFACE AND GROUNDWATER IN THE PUGET SOUND REGION BY INCREASING THE AMOUNT OF POLLUTED RUNOFF FROM THE AIRPORT AND INCREASING THE AMOUNT OF PAVED SURFACE WHICH PREVENTS RAINWATER AND OTHER PRECIPITATION FROM FILTERING BACK INTO THE GROUNDWATER TABLE.

- The DEIS Does Not Provide For The Conservation And Replacement Of Wetlands:
  - The wetlands analysis in the DEIS is inconsistent with the Port's original wetlands studies.
  - The DEIS proposes to replace wetlands destroyed by the Airport expansion outside of the Miller and Des Moines Creek drainage basins. *The laws of the local governments in which the wetlands are located require wetlands replacement in the same drainage basin. There is sufficient land available to create replacement wetlands within the Miller and Des Moines Creek drainage basins.*

THE EXPANSION OF SEA-TAC WOULD DAMAGE PRECIOUS WETLANDS AND WOULD NOT REPLACE THEM IN THE SAME AREAS IN WHICH THEY WERE DESTROYED, AS REQUIRED BY LOCAL LAW.

- The DEIS Does Not Address The Harm The Expansion Of Sea-Tac Would Do To Historic Properties And Parks And Recreation Areas:
  - Consultants to the Port and FAA conducted an incomplete survey of historic properties. *Historic properties that were neither residences nor public buildings were ignored.*
  - The DEIS does not consider the impacts of changing noise patterns on parks and recreation areas.
  - The DEIS does not address the impacts of the massive mining and transporting of fill on nearby recreation areas.

214

THE CONSTRUCTION OF A THIRD RUNWAY AT SEA-TAC AND OTHER ASSOCIATED ACTIVITIES THREATENS TO HARM OR DESTROY HISTORIC PROPERTIES AND RECREATIONAL RESOURCES AS A RESULT OF HIGH AIRCRAFT NOISE LEVELS, ON- AND OFF-SITE MINING ACTIVITIES AND THE OPERATION OF THE EXPANDED AIRPORT.

- The DEIS Gives Only Superficial Consideration To The Many Other Environmental And Community Impacts That Would Result From The Expansion Of Sea-Tac:
  - The DEIS does not consider the property tax impacts on nearby jurisdictions of the Port's acquisition of adjacent property.
  - The DEIS does not consider whether a sufficient number of affordable housing units would be available to replace those that are lost because of the Airport expansion project.
  - The DEIS ignores the impacts of increased levels of hazardous substances from de-icing chemicals and from the installation of additional massive fuel tanks.
  - The DEIS does not provide information about the effects of additional noise and aircraft activity on classroom instruction and other school-based activities.
  - The DEIS does not include a detailed analysis of the effects of the Airport expansion on endangered or threatened species of animals or plants.

THE AIRPORT EXPANSION WOULD HAVE MULTIPLE NEGATIVE ENVIRONMENTAL EFFECTS ON THE ECONOMIC AND SOCIAL LIFE IN COMMUNITIES IN THE PUGET SOUND REGION AND WOULD THREATEN THE OVERALL QUALITY OF LIFE BY IGNORING LOCAL LAND USE PLANS AND BY 1) INCREASING EXPOSURE TO AIRCRAFT NOISE; 2) ELIMINATING PORTIONS OF RESIDENTIAL COMMUNITIES AND 3) CLOGGING LOCAL ROADS AND HIGHWAYS WITH ADDITIONAL TRUCK AND OTHER VEHICULAR TRAFFIC.

- **<u>The DEIS Claims That An Expanded Airport Would Have Significant Economic Benefits</u>:**
  - The DEIS asserts that the expansion of Sea-Tac would result in increased employment, increased sales tax revenues, a strengthened housing market and airport-related development in neighboring cities which would have a ripple effect on economic development throughout the Puget Sound region. *If the Port is correct that the same number of operations and passengers would use Sea-Tac with or without expansion, then the same economic benefits would accrue to the region without an additional runway. Moreover, those economic benefits would not be offset by the economic losses, social disruptions and significant environmental impacts that would result from the Airport expansion. The Port is attempting to have its cake and eat it too:*

    BY ASSIGNING SIGNIFICANT ECONOMIC BENEFITS AND FEW ECONOMIC, SOCIAL AND ENVIRONMENTAL CONSEQUENCES TO THE ADDITION OF A THIRD RUNWAY AT SEA-TAC, THE DEIS COMES TO ABSURD AND LEGALLY IMPERMISSIBLE CONCLUSIONS ABOUT THE ACTUAL EFFECTS OF THE AIRPORT EXPANSION.

- **<u>The DEIS Does Not Recommend A Sufficient Number of Mitigation Measures</u>:**
  - **The DEIS suggests only a modest number of mitigation actions to temper environmental impacts that would result from the Airport expansion.**

- The DEIS wrongly assumes that little mitigation would be necessary, because the same environmental impacts would result with or without the third runway. *Major mitigation actions would be required to address the negative environmental impacts on water quality, surface transportation resources, wetlands, parks and recreational areas and the overall quality of life in the Puget Sound region.*

  THE PROPOSED MITIGATION MEASURES ARE GROSSLY INADEQUATE TO ADDRESS THE MAGNITUDE OF NEGATIVE ENVIRONMENTAL AIR AND WATER QUALITY, TRANSPORTATION, NOISE, AND OTHER NEGATIVE IMPACTS OF THE EXPANSION OF SEA-TAC WHICH WOULD THREATEN THE QUALITY OF LIFE IN THE PUGET SOUND REGION.

1.0 INTRODUCTION

The cities of Burien, Des Moines, Normandy Park and Tukwila, Washington and the Highline School District (known as the Airport Communities Coalition or the "ACC"),[1] the cities of Federal Way and Mercer Island, Washington, and the public officials whose names appear on the inside cover page (all of whom collectively will be referred to as the "Commenters") individually and collectively submit these Comments[2] on the Draft Environmental Impact Statement ("DEIS") prepared jointly by the Federal Aviation Administration ("FAA") and the Port of Seattle ("Port") for the proposed Master Plan Update development actions at Seattle-Tacoma International Airport ("Sea-Tac" or "Airport").[3]

The ACC and the cities of Federal Way and Mercer Island ("Federal Way" and "Mercer Island") are located in close proximity to the Airport (See FIGURE 1-1) and presently are affected by aircraft noise attributable to Sea-Tac (See FIGURE 1-2). As the dominant regional public facility, the Airport also has innumerable other environmental, economic and social impacts on the ACC, Federal Way, Mercer Island and other nearby municipalities. R-5-4

[1] The Airport Communities Coalition (the "ACC") is a voluntary association of local governmental entities created and established pursuant to the provisions of state law and Chapter 39.34 of the Revised Code of Washington ("RCW").

[2] In addition to these Comments, written and oral comments on the scope of the environmental impact statement were submitted by the cities of Burien, Des Moines, Normandy Park and Tukwila individually and on behalf of the ACC, and by the cities of Federal Way and Mercer Island. These comments are incorporated by reference into this document. These Comments also incorporate by reference the attached appendices, see page x, which provide some of the technical analysis upon which these Comments are based.

[3] Fed. Aviation Admin. and Port of Seattle, Draft Environmental Impact Statement for Proposed Master Plan Update Development Actions at Seattle-Tacoma International Airport ("DEIS") (Apr. 1995).

FIGURE 1-1

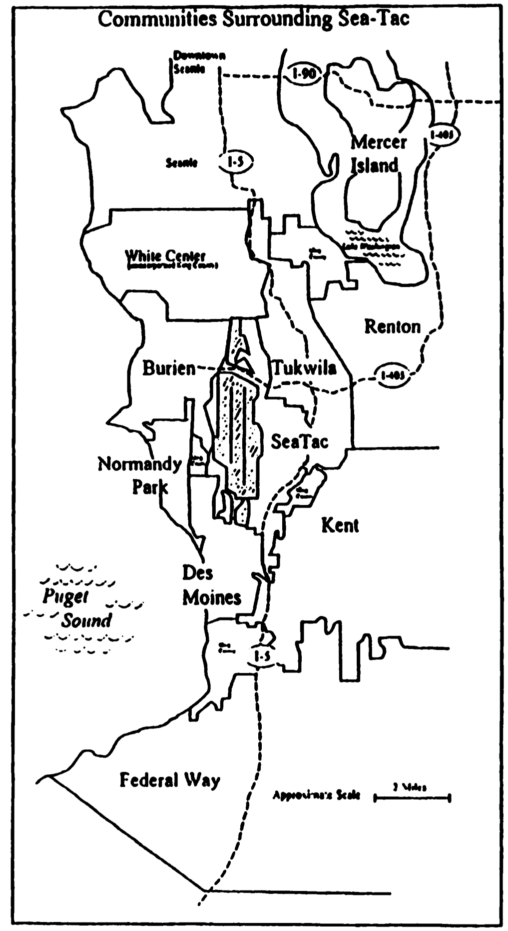


FIGURE 1-3

Seattle-Tacoma International Airport
Environmental Impact Statement
for the Master Plan Update

1994 Noise Exposure Pattern

File SEA36

Jurisdictional Boundary

Generalized Study Area

Noise Contours of 65 DNL and Above

60 DNL Noise Contour

Source: Gambrell Urban, Inc. and Landrum & Brown, 1995

Scale 1" = 6,000'

0 6000 12000 18000

SCALE IN FEET

R-5-4 R-2-7 R-7-24

The impact of the Airport, and the effect of its operations, are exacerbated by the fact that nearby communities and local governments are unable to rely on the Port's plans, its planning documents or its commitments to its neighbors. The Port's previous Master Plan Update[1] definitively asserted that

> no new runways at Sea-Tac would be considered, primarily because (1) the existing runway configurations had previously been determined to provide adequate capacity for the planning period, (2) there already has been an enormous investment in the existing runways, and (3) construction of a new runway <u>would have a large environmental impact</u>.[2]

Moreover, the 1985 Master Plan determined that "[b]ecause of site constraints at Sea-Tac . . . the existing runway configuration is fixed. The existing runway lengths are <u>adequate</u> to handle all classes of aircraft on current or proposed stage lengths from the Airport."[3] Less than 4 years later, the Port and the Puget Sound Regional Council ("PSRC") entered into a joint planning process for the development of a regional air carrier system plan[4] which would include, among other features, a third runway at Sea-Tac.

The Port proposed building a third runway at Sea-Tac despite its commitment to the community that it would not do so, and in the face of its failure to mitigate the noise impacts of the second runway.[5] The Port has conceded that the implementation of its noise mitigation program has lagged far beyond its rosy promises. In late 1992, it adopted a resolution recommending the development of a third runway at Sea-Tac which included instructions to the

1/ Port of Seattle, <u>Master Plan Update for Sea-Tac International Airport (Final Report)</u> ("1985 Master Plan") (Sept. 1985).

2/ <u>Id.</u> at 1, 2-3 (emphasis added). The 1985 Master Plan was based on short-, medium-, and long-term "planning activity levels" corresponding approximately to the 5-, 10-, and 20-year planning horizons. <u>Id.</u> at 2. The existing two runway Airport, therefore was determined to provide sufficient capacity through at least 2005.

3/ <u>Id.</u> at 4-8 (emphasis added).

4/ <u>See infra</u> § 1.4.

5/ A second runway was put into service at Sea-Tac in 1973.

Port staff "to develop and implement a plan to insulate up to 5,000 eligible single family residences in the existing noise remedy program included on the waiting list as of December 31, 1993, before commencing construction of the proposed runway."[9] The resolution also directed that any remaining eligible single family residences still on the waiting list for insulation "are to be insulated prior to operation of the proposed [third] runway."[10]

Despite the Port's commitment to increase the pace of its noise insulation program, an independent agency has found that, based on the Port's own figures, completion of the noise insulation program will take until 2001.[11] Further, the independent evaluation expressed concern

> that the acoustical insulation program does not appear to be meeting at least one of its stated goals, which is a 5 dB reduction in A-weighted DNL in the treated houses. The [Port] also appears not to be meeting its design goals for each individual house for additional Noise Level Reduction after insulation. Additionally, a 5 dB reduction in overall A-weighted DNL may be too modest a goal for meaningful reduction in interior noise due to aircraft, especially in the lower frequencies.[12]

R-7-24

The Commenters have learned through bitter experience that they cannot rely on the Port's representations about its future Airport development plans or about operations at the Airport. It is from this perspective, and in this context that the Commenters evaluated the DEIS and drafted these Comments. It is not the purpose of these Comments to set forth the Commenters' position on the advisability of constructing a third runway at Sea-Tac (the

[9] Port of Seattle, Res. No. 3125, as amended § 1(c) (Nov. 3, 1992) (emphasis added).

[10] Id. (emphasis added).

[11] PSRC, In the matter of: Expert Arbitration Panel's Review of Noise and Demand/System Management Issues at Sea-Tac International Airport, Order on Phase I Noise Issues ("Order on Phase I Noise Issues") at 9 n. 14 (Jan. 9, 1995) (attached to these Comments as app. 1).

[12] Id. at 7 (emphasis added).

Commenters' position on that subject is well established), nor is it appropriate to address the absurdity of spending $1 billion[13] to construct a runway that would, at best, provide only short-term relief to the need for additional air transportation capacity in the Puget Sound region. Rather, pursuant to the National Environmental Policy Act ("NEPA")[14] and the Washington State Environmental Policy Act ("SEPA"),[15] the purpose of these Comments is to set forth the Commenters' responses to the Port's and FAA's assertions about the environmental impacts of implementing the proposed Master Plan Update development actions.

The DEIS which was prepared by the FAA and the Port purports to comply with the requirements of both NEPA the SEPA.

1.1 THE PURPOSE OF THE ENVIRONMENTAL IMPACT STATEMENT UNDER NEPA

NEPA "declares a broad national commitment to protecting and promoting environmental quality."[16] By enacting NEPA, Congress recognized the critical importance of environmental concerns to the well-being and development of our nation and its citizens. Accordingly, NEPA mandates a detailed and searching study and consideration of the direct and indirect environmental impacts of all proposed major projects and their alternatives, as well as the relationship of short-term projects to long-term productivity. This analytic process is designed to "create and maintain conditions under which man and nature can exist in productive harmony,

[13] The DEIS estimates that construction of a third runway would cost $300 to $600 million. DEIS at II-37A, Table II.3-1. This figure does not include the cost of land acquisition or the cost of noise and other required mitigation measures. In fact, the third runway is likely to cost at least $1 billion.

[14] 42 U.S.C.A. §§ 4321-4370d (West 1994).

[15] Chapter 43.21C RCW.

[16] Robertson v. Methow Valley Citizens Council, 490 U.S. 332, 348 (1989) (citations omitted).

and fulfill the social, economic, and other requirements of present and future generations of Americans."[16]

To implement this broad policy NEPA directs that, to the fullest extent possible:

[A]ll agencies of the Federal Government shall -

. . . .

(C) include in every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment, a detailed statement by the responsible official on-

(i) the environmental impact of the proposed action,

(ii) any adverse environmental effects which cannot be avoided should the proposal be implemented,

(iii) alternatives to the proposed action,

(iv) the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and

(v) any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented.[17]

The regulations of the Council on Environmental Quality ("CEQ")[18] and of the FAA[19] describe an environmental impact statement ("EIS") as "an action-forcing device to

---

[16] 42 U.S.C.A. § 4331(a).

[17] Id. § 4332.

[18] 40 C.F.R. pt. 1500 (1994).

[19] See Fed. Aviation Admin., U.S. Dep't of Transp., Order 5050.4A, Airport Environmental Handbook ("Order 5050.4A") (1985); Fed. Aviation Admin., U.S. Dep't of Transp., Order 1050.1D, Policies and Procedures for Considering Environmental Impacts ("Order 1050.1D") (1983).

insure that the policies and goals [of NEPA] are infused into the ongoing programs and actions of the Federal Government."[20] Both CEQ and FAA regulations state that an EIS

> shall provide full and fair discussion of significant environmental impacts and shall inform decisionmakers and the public of the reasonable alternatives which would avoid or minimize adverse impacts or enhance the quality of the human environment.[21]

The language of NEPA is "intentionally broad, reflecting the Act's attempt to promote an across-the-board adjustment in federal agency decisionmaking so as to make the quality of the environment a concern of every federal agency."[22] As the Supreme Court stated:

> [S]imply by focusing the agency's attention on the environmental consequences of a proposed project, NEPA ensures that important effects will not be overlooked or underestimated only to be discovered after resources have been committed or the die otherwise cast.[23]

The NEPA requirements, therefore, "are not highly flexible. Indeed, they establish a strict standard of compliance."[24]

The NEPA requirement for a "detailed" EIS serves three purposes:

- "First, it permits the court to ascertain whether the agency has made a good faith effort to take into account the values NEPA seeks to safeguard."[25] This requires that an agency fully explain its analysis and reasoning.

---

[20] 40 C.F.R. § 1502.1; accord Order 5050.4A ¶ 71.

[21] 40 C.F.R. § 1502.1; accord Order 5050.4A ¶ 71.

[22] Foundation for N. Am. Wild Sheep v. Department of Agric., 681 F.2d 1172, 1177 (9th Cir. 1982) (quoting Scientists' Inst. for Pub. Info., Inc. v. Atomic Energy Comm'n, 481 F.2d 1079, 1088 (D.C. Cir. 1973)).

[23] Methow Valley Citizens Council, 490 U.S. at 349 (citations omitted).

[24] Calvert Cliffs' Coordinating Comm., Inc. v. Atomic Energy Comm'n, 449 F.2d 1109, 1112 (D.C. Cir. 1971).

[25] Silva v. Lynn, 482 F.2d 1282, 1284 (1st Cir. 1973).

- "Second, it serves as an environmental full disclosure law, providing information which Congress thought the public should have concerning the particular environmental costs involved in a project."[27] The EIS must, therefore, "be written in language that is understandable to nontechnical minds and yet contain enough scientific reasoning to alert specialists to particular problems within the field of their expertise."[28] The EIS "must set forth sufficient information for the general public to make an informed evaluation, and for the decisionmaker 'to consider fully the environmental factors involved and to make a reasoned decision after balancing the risks of harm to the environment against the benefits to be derived from the proposed action.'"[29]

- Finally, the requirement for a detailed EIS "preclud[es] stubborn problems or serious criticism from being swept under the rug."[30] The EIS must avoid conclusory statements "unsupported by empirical or experimental data, scientific authorities, or explanatory information of any kind."[31]

The United States Court of Appeals for the Ninth Circuit has explained that, in order to be adequate, an EIS must examine "not every possible alternative, but every reasonable alternative," and warned that the "existence of a viable but unexamined alternative renders [a draft] environmental impact statement inadequate."[32]

---

[27] Id. at 1285.

[28] Id. (quoting Environmental Defense Fund v. Army Corps of Eng'rs, 348 F. Supp. 916, 933 (W.D. Miss. 1972, aff'd, 492 F.2d 1123 (5th Cir. 1974)).

[29] Sierra Club v. Army Corps of Eng'rs, 701 F.2d 1011, 1029 (2d Cir. 1983) (citation omitted).

[30] Silva, 482 F.2d at 1285.

[31] Natural Resources Defense Council, Inc., v. Grant, 355 F. Supp. 280, 287 (E.D.N.C. 1973).

[32] Citizens for a Better Henderson v. Hodel, 768 F.2d 1051, 1057 (9th Cir. 1985) (citations omitted).

1.2 THE PURPOSE OF THE ENVIRONMENTAL IMPACT STATEMENT UNDER SEPA

SEPA is the State of Washington's most fundamental and pervasive environmental statute. In enacting SEPA, the state legislature proclaimed that "each person has a fundamental and inalienable right to a healthful environment . . . a responsibility to contribute to the preservation and enhancement of the environment."[33] SEPA is intended to ensure that environmental values are considered by state and local governmental officials prior to taking any action.[34] SEPA commits the state to policies of environmental concern and protection.[35] "SEPA bestows broad powers and is to be given a vigorous construction."[36]

Similar to NEPA, SEPA mandates "action-forcing" procedural requirements designed to assure the integration of environmental values and consequences in the decisionmaking of all agencies of state and local government.[37] The most prominent of these requirements is the preparation of a "detailed statement" -- an EIS -- analyzing, among other things, the environmental impacts of recommendations, proposals and other major actions "significantly affecting the quality of the environment."[38] The EIS requirement, as administratively elaborated and judicially interpreted, really is a cluster of related requirements concerning the determination of whether an EIS is required,[39] and the nature, content and use of the EIS.[40]

---

[33] RCW 43.21C.020(3).

[34] See id. 43.21C.030(e).

[35] See id. 43.21C.010, .020.

[36] Victoria Tower Partnership v. City of Seattle, 59 Wash. App. 592, 599, 800 P.2d 380, 384 (1990).

[37] RCW 43.21C.030(2)(a)-(b).

[38] Id. 43.21C.030(2)(c).

[39] Id. 43.21C.033.

[40] Id. 43.21C.110.

As one commentator has explained:

> The EIS is the central, most valuable, tangible, and frequently contested SEPA requirement.
>
> . . . .
>
> The EIS is to be regarded not as an end, in itself, but as a means of integrating SEPA's policies into the actions and agendas of state and local agencies. The EIS, by providing environmental information for agency decisionmakers and interested citizens, is designed to foster government actions consonant with SEPA's policies; moreover, review and comment by interested citizens and agencies during the EIS preparation process should result in more reliable final impact statements. . . . [T]he purpose of the EIS is more than mere disclosure, rationalization or justification; it is to be used by agency officials in making decisions on proposed actions.[41]

If properly implemented, the EIS process, therefore, should provide decisionmakers and the public with an "impartial discussion of probable significant environmental impacts, reasonable alternatives, and mitigation measures that would avoid or minimize adverse impacts."[42] EIS content, format, and procedures are determined almost entirely by the SEPA implementing regulations.[43]

In addition to imposing procedural obligations, SEPA also contains a substantive authorization for action, directing that the "policies, regulations, and laws of the state of Washington [be] interpreted and administered in accordance with [its] policies."[44] Moreover, SEPA "expressly provides that it is 'supplementary' to existing [legislative and regulatory]

41/ Richard L. Settle, The Washington State Environmental Policy Act: A Legal and Policy Analysis § 14 at 141, 144-45 (1994) (citations omitted).

42/ Washington State Department of Ecology, State Environmental Policy Act Handbook, at 1-1 (1993).

43/ See Washington Administrative Code (WAC) 197-11-400 et seq., -500 et seq., -600 et seq. (1993).

44/ RCW 43.21C.030(1).

authorizations" that govern agency action.[45] "The change in the substantive law brought about by SEPA introduces an element of discretion into the making of decisions that were formerly ministerial, such that even if we assume, arguendo, that the issuance of a . . . permit was, prior to SEPA, a ministerial, non-discretionary act, SEPA makes it legislative and discretionary."[46]

Although Washington courts are exacting in scrutinizing whether SEPA-based denials of projects meet statutory and regulatory requirements,[47] they explicitly recognize the authority conferred by SEPA on state and local government agencies substantively to deny or condition governmental action on the basis of a project's unacceptable, unmitigable environmental impacts. "The policies and goals of SEPA supplement the existing authority of all government agencies and give officials the discretion to deny projects based on negative environmental impacts disclosed by an EIS."[48]

SEPA requirements are applicable not only to state agencies, but also to municipalities, counties, port districts and other political subdivisions of the state.[49] Furthermore, all state

---

45/ See Eastlake Community Council v. Roanoke Assoc., Inc., 513 P.2d 36, 47 (Wash. 1973).

46/ Polygon Corp. v. City of Seattle, 578 P.2d 1309, 1312, (Wash. 1978) (quoting Juanita Bay Valley Community Ass'n v. Kirkland, 9 Wash. App. 59, 73, 510 P.2d 1140, 1149 (1973), petition for review denied, 83 Wash.2d 1002 (1973)).

47/ Subsequent to plaintiff's filing the action in Polygon -- but prior to the court's decision -- the legislature amended SEPA to require that use of SEPA to condition or deny approval of a project must be based on formally designated agency SEPA policies in effect at the time a determination of nonsignificance, or a draft EIS was issued by the project sponsor, and that conditional approval, or project denial, must be evidenced by a document available to the public which states the decision, cites the specific agency SEPA policy basis for conditioning or denying approval, and describes any required mitigating measures. RCW 43.21C.060; WAC 197-11-660(1)(a), (b).

48/ Victoria Tower Partnership, 59 Wash. App. at 599-600 (citing Polygon with approval). See also West Main Assocs. v. City of Bellevue, 49 Wash. App. 513, 526 (1987) (upholding Polygon and finding that "SEPA gives a municipality discretion to deny an application because of adverse environmental impacts even if the project meets all other local requirements").

49/ RCW 43.21C.030(2). The adoption of, and amendment to a comprehensive plan by a municipality or a port district are actions triggering compliance with SEPA. See WAC 197-11-704(2)(b)(ii).

and local agencies are required to adopt their own regulations implementing SEPA requirements and policies.[19]

It is within the legal context and regulatory parameters of SEPA and NEPA that the DEIS for the proposed expansion of Sea-Tac must be examined.

1.3 THE PURPOSE OF A DRAFT ENVIRONMENTAL IMPACT STATEMENT UNDER NEPA AND SEPA

Prior to issuing a final EIS, a draft EIS must be prepared. NEPA regulations direct that

> [t]he draft statement must fulfill and satisfy to the fullest extent possible the requirements established for final statements in section 102(2)(C) of [NEPA]. . . . The agency shall make every effort to disclose and discuss at appropriate points in the draft statement all major points of view on the environmental impacts of the alternatives including the proposed action.[20]

The purpose of a draft EIS is to identify the proposed action, to discuss feasible alternatives, and to analyze the environmental impacts of the proposed action and its alternatives. Federal and state agencies and the public must be provided with an appropriate period of time to comment on a draft EIS[21] and the final EIS must assess, consider and respond to these comments, both individually and collectively.[22]

Thus, a draft EIS is the foundation stone of an agency's final decisionmaking process under NEPA. It must provide sufficient information and analysis for other agencies and the

[19] The individual agency regulations must be consistent with the state-adopted SEPA rules found at Chapter 197-11 WAC. See id. 197-11-020(1). The Port's SEPA policies were adopted by, and are incorporated in, Port of Seattle Res. No. 3028 (Dec. 1, 1987).

[20] 40 C.F.R. § 1502.9(a) (emphasis added).

[21] Id. § 1503.1.

[22] Id. §§ 1502.2(b), 1503.4.

public to make constructive comments. A draft EIS that is so inadequate as to preclude meaningful analysis must be revised and reissued by the agency.[23]

Similarly, the preparation of a draft EIS is an important step in the environmental review process required under SEPA. A draft EIS allows the lead agency (or agencies) to consult with members of the public and with other state and federal agencies.[24] A draft EIS must be made available for agency and public comment,[25] and the lead agency must respond to the comments in its final EIS.[26]

The Port and the FAA, therefore, were obligated to issue a draft EIS that complies with the letter and spirit of NEPA and SEPA; a draft EIS that is sufficiently detailed to provide the public and other government agencies with enough information to facilitate thoughtful review and useful comments.

1.4 PROCEDURAL BACKGROUND OF THE DRAFT ENVIRONMENTAL IMPACT STATEMENT

The PSRC, composed of representatives of King, Pierce, Snohomish and Kitsap Counties and their incorporated cities and towns, is designated under federal and state laws as the Metropolitan Planning Organization and Regional Transportation Planning Organization for the central Puget Sound region. It is the agency authorized under state law to develop and adopt a regional transportation plan, and to certify that the transportation elements of local comprehensive plans conform to requirements of state law and are consistent with the regional

[23] Id. § 1502.9(a).

[24] WAC 197-11-405(2).

[25] Id. 197-11-502(5).

[26] Id. 197-11-560.

transportation plan.[58] The PSRC also is empowered under state law to ensure that all transportation projects which have a significant impact upon regional facilities or services are consistent with the regional transportation plan.[59]

In 1989, the PSRC entered into an agreement with the Port to establish a joint planning process for developing a regional air carrier system plan which, among other things, would provide input to the PSRC for updating and amending the aviation component (known as the Regional Airport System Plan ("RASP")) of the Regional Transportation Plan.[60]

The agreement led to preparation -- by the Port and the PSRC -- of a nonproject (or programmatic) EIS ("Flight Plan EIS") pursuant to SEPA.[61] According to SEPA rules, "'[n]onproject' means actions which are different or broader than a single site specific project, such as plans, policies, and programs."[62]

The Flight Plan EIS examined long-term needs for increased air transportation capacity in the Puget Sound region and briefly reviewed the environmental effects of a number of conceptual alternatives for meeting those needs on a regional basis.[63] The Flight Plan EIS did

[58] RCW 47.80.030(1)(a), (b); Id. 36.70A.070(6). See also PSRC, Interlocal Agreement for Regional Planning of the Central Puget Sound Area § VI(21) (Mar. 11, 1993).

[59] RCW 47.80.030(1), (2).

[60] Port of Seattle and Puget Sound Council of Governments, Interagency Agreement for Long Term Air Carrier System Planning at 2 (May 23, 1989). On September 30, 1991, the Puget Sound Regional Council of Governments was dissolved, and on October 1, 1991, the Puget Sound Regional Council ("PSRC") was formed in its place. PSRC Res. A-91-01. The PSRC thereafter assumed the Puget Sound Council of Governments' role in the Interagency Agreement with the Port.

[61] RCW 43.21C.030(2)(c). The document was not designated as a programmatic EIS pursuant to NEPA and never has been so-designated. See 40 C.F.R. §§ 1502.4(c)(2), 1502.20.

[62] WAC 197-11-774.

[63] PSRC and Port of Seattle, The Flight Plan Project, Final Environmental Impact Statement ("Flight Plan EIS") (1992).

not purport to examine alternatives on other than an abstract and general level.[64] "System alternatives are generic in nature. . . . Site-specific studies to be conducted later will address the more-specific questions of 'Where should we implement the chosen system alternative and how will we make it work?'"[65]

The Flight Plan EIS determined that additional air transportation capacity was needed in the Puget Sound region to prevent airlines from diverting their operations to other airports when Sea-Tac reached maximum capacity[66] and in summary fashion reviewed the environmental effects of a number of conceptual alternatives for meeting the identified need.[67]

Although the Port may rely on the Flight Plan EIS for SEPA purposes, the FAA may not use the Flight Plan EIS to fulfill its independent obligations under NEPA.[68]

The FAA's independence in preparing the draft and final EISs particularly is important with respect to the proposed expansion of Sea-Tac because the Port is both the project sponsor and the joint lead agency, and because the Port has similar, but distinct, obligations to fulfill under SEPA.[69] Although the DEIS purportedly has been prepared pursuant to both NEPA and SEPA, CEQ regulations provide that the more restrictive requirements of the two statutes must

[64] See Id. at 3-1 through 3-10.

[65] Id. at 3-1 (emphasis added).

[66] Id. at 2-15.

[67] See generally Flight Plan EIS.

[68] To the extent that the FAA purports to incorporate by reference the Flight Plan EIS into the DEIS for NEPA purposes, the ACC, Federal Way and Mercer Island have not been afforded the opportunity to comment on that document's compliance with NEPA. Without waiving the right to challenge the FAA's procedural errors, these Comments will serve to incorporate by reference all comments submitted during the Flight Plan process and the entire PSRC administrative record in that proceeding.

[69] See, e.g., Citizens Against Burlington, Inc. v. Busey, 938 F.2d 190, 195-96 (D.C. Cir. 1991) (finding that the FAA bore responsibility for defining the objectives of an action and deciding which alternatives to consider in an EIS).

prevail.[29] For example, under the concept of tiering, SEPA regulations permit the Port to narrow the scope of a site-specific EIS if a nonproject (or programmatic) EIS previously has been prepared.[30] The FAA has no such authority to circumscribe the scope of an EIS for which it had not previously prepared a programmatic EIS under NEPA. Consequently, the FAA must ensure that the DEIS -- and the final EIS -- strictly adhere to NEPA scoping requirements and must avoid even the appearance of bias in narrowing the scope of the environmental review of the proposed expansion of Sea-Tac. Therefore, the DEIS should have critically examined and independently evaluated the factual bases upon which the Flight Plan EIS rests, the Flight Plan EIS's conclusions with respect to the regional need for the proposed expansion project, and the Flight Plan EIS's discussion of alternatives and their environmental effects. To the extent that the DEIS has failed to do so, it has failed to comply with the requirements of NEPA.

R-3-4

[29] "Where State laws or local ordinances have environmental impact statement requirements in addition to but not in conflict with those in NEPA, Federal agencies shall cooperate in fulfilling these requirements as well as those of Federal laws so that one document will comply with all applicable laws." 40 C.F.R. § 1506.2(c).

[30] WAC 197-11-442, -443.

2.0 THE DEIS DOES NOT SATISFY THE REQUIREMENTS OF SEPA OR NEPA

R-1-13

The DEIS on the proposed expansion of Sea-Tac ignores the purpose of a DEIS under SEPA and NEPA thereby flouting the fundamental public disclosure aims of the statutes. Moreover, implausible assumptions, errors, omissions, and inaccuracies in the DEIS so thoroughly infect the document that it cannot provide the FAA, the Port or the public with a scientifically defensible analysis of probable environmental impacts of the Airport expansion project. The FAA and the Port cannot possibly use the DEIS to reach an informed decision as contemplated by both SEPA and NEPA.

2.1 FAULTY ASSUMPTIONS FATALLY CONTAMINATE THE DEIS

The DEIS asserts that "Sea-Tac Airport, in its current configuration, is unable to efficiently serve the air travel demands of the Region now and in the future."[1] That general observation was disaggregated into a four-part statement of needs. The project is designed to:

(1) Improve the poor weather airfield operating capability in a manner that accommodates aircraft activity with an acceptable level of aircraft delay;

(2) Provide sufficient runway length to accommodate warm weather operations without restricting passenger load factors or payloads for aircraft types operating to the Pacific Rim;

(3) Provide runway safety areas that meet current FAA standards; and

(4) Provide efficient and flexible landside facilities to accommodate future aviation demand.[2]

The various elements of the proposed Master Plan Update development actions must be tailored to address one or more element of the stated need. Thus, for example, proposed actions

[1] DEIS at II-1.

[2] Id. at II-2.

which are designed to meet the need to improve poor weather airfield operating capability must relate directly to poor weather capacity problems and may not be designed to accommodate increases in passengers and operations projected to occur because of anticipated population growth and economic conditions in the Puget Sound region.[7] The DEIS must, therefore, carefully analyze the coincidence of poor weather conditions with peak demand periods and propose actions and alternatives that address the resulting need.

2.1.1 The DEIS is Based on the Unwarranted and Unsupported Assumptions that the Growth in Airport Activity Will be the Same With or Without the Third Runway

R-3-7

The DEIS is a house of cards built upon one major unsupported and erroneous assumption: that aircraft operations will grow by 30 percent and the number of passengers will grow by 100 percent by 2020, regardless of the future facilities available at Sea-Tac Airport. "Each of the 'With Project' alternatives would result in the same level of total airport activity as the Do-Nothing."[4] The DEIS contains numerous assertions that the growing population and economic conditions in the Puget Sound region inevitably will result in an increased level of airport activity at Sea-Tac with or without a third runway.[5] Thus, the DEIS asserts that demand for airport capacity in the Puget Sound region is not constrained by the presence or absence of airport capacity at Sea-Tac.[6] While it probably is true that the population in the Puget Sound region will continue to grow, and the demand for air transportation capacity in the

[3] See id. at I-9.

[4] Id. at IV.8-4 (emphasis added).

[5] See, e.g., id. at I-9, II-12, II-35.

[6] Airport capacity primarily is a function of two different capacities: the airfield capacity and the landside, or terminal capacity. The DEIS asserts that growth in demand in the Puget Sound region is unconstrained by either landside or airside capacity at the Airport. Id. at IV.8-4. This assumption is critically important, because it means that the expansion of airside and landside facilities is not needed to accommodate increased demand, but only to serve that demand more conveniently.

region also will grow, it does not follow that such increased demand would be accommodated at Sea-Tac in its present operational mode.

R-3-24

There is neither an historical nor a logical basis to support these assumptions. If growth in Airport activity at Sea-Tac causes the level of service to deteriorate below critical levels (i.e., an increase in the number and length of delay conditions) then the level of demand at Sea-Tac would not continue to increase. The Port recognizes this upper limit on aircraft operations, and it and its consultants often have articulated the fact that "Sea-Tac's runways will reach capacity near the turn of the century."[7] In a number of documents, they have conceded that "[i]n response to continuing growth demands, plans are being evaluated to improve the capacity and efficiency . . . at Sea-Tac."[8]

R-3-7

- The DEIS asserts that average all-weather delay will reach the "maximum tolerable level" of ten minutes per operation by 2000.[9] Projected delays for 2020 -- based on the DEIS assumption that demand is not constrained by existing Airport facilities -- would exceed 30 minutes and would add more than $176 million annually to airlines' operating costs.[10] If delay in excess of 10 minutes per operation is "intolerable," then market forces would act to limit demand so that average delay per operation would never exceed 10 minutes. Stated differently, a delay cannot be "intolerable" and be exceeded by a factor of 3.

[7] P & D Aviation, Airport Master Plan Update For Seattle-Tacoma International Airport, Technical Report No. 6 ("Technical Rep't No. 6") at 1-1 (Sept. 19, 1994). See also P & D Aviation, Airport Master Plan Update for Seattle-Tacoma International Airport, Technical Report No. 7A ("Technical Rep't No. 7A") at 3-1 (Nov. 15, 1994; revised Feb. 17, 1995) ("[T]he maximum airside capacity of Sea-Tac as well as its terminal and landside facilities may be reached in the relatively near future.")

[8] Technical Rep't No. 6 at 1-1 (emphasis added).

[9] DEIS at II-5.

[10] Id. at II-4.

- The DEIS indicates that the Airport, as presently configured, could not physically accommodate the projected 20 percent increase in the number of gates needed in 2020 to service the projected 30 percent increase in operations,[11] and additional gates would be needed whether or not an additional runway were to be constructed.[12]

- The DEIS has found that the Airport would not have sufficient terminal space to accommodate the projected 100 percent increase in passengers by 2020,[13] and that aircraft gate forecasts "suggest a need to add between 500,000 and 650,000 square feet of new terminal area to the existing 1.9 million square foot terminal complex within ten years to support the forecast levels of passengers and aircraft gates."[14] Moreover the Port "has concurred with the goal that the terminal component of the Master Plan must provide as much flexibility as possible to meet changes in airline service, passenger behavior, regulatory requirements, and other conditions which may develop in the future."[15]

- The DEIS indicates that presently there is insufficient curbfront to accommodate the existing demand during peak periods.[16] The existing Airport complex could not accommodate the projected increase in passengers by 2020. "With a projected doubling of the passenger population using the Sea-Tac terminal in twenty-five years, access to the terminal complex for passengers, employees and visitors is an important issue and vital element of a successful master plan."[17]

R-3-7

[11] Id. at II-28.

[12] Transcript of Hearings before the Expert Arbitration Panel on Noise and Demand/System Management at 46 (May 3, 1995) (testimony of Michael Feldman, Mgr. of Aviation Planning, Port of Seattle).

[13] DEIS at II-28.

[14] Technical Rep't No. 7A at 2-3, 2-4 (emphasis added).

[15] Id. at 3-2 (emphasis added).

[16] DEIS at II-28.

[17] Technical Rep't No. 7A at 7-1 (emphasis added).

- The DEIS proposes the development of centralized cargo facilities to accommodate forecast additional cargo needs.[18] "A decentralized concept is needed since the year 2020 program requirements cannot be met within the confines of the existing cargo area. This necessitated the identification of other sites to provide the supplemental cargo facilities."[19]

The DEIS presents a grim picture of operations at the Airport if its own assumptions were to become a reality and future operational congestion and delay increased to projected levels.

> As aircraft operations increase, delay will increase exponentially. Such delays will result in a spreading of the peak operating hours. . . . By year 2020, aircraft delay would be so great that seven aircraft operations during an average day would be delayed into nighttime hours.
>
> . . . .
>
> While the level of service afforded passengers would decline substantially in accordance with passenger growth, the peak travel periods would be extended. In summary, it would take passengers longer to enter the Airport, access parking and move to the ticket counters and gates. Similarly, cargo and freight activities would incur greater congestion and delay in deliveries.[20]

The suggestion that airline and passenger traffic at Sea-Tac would continue to increase in the face of the situation described above is contrary to common sense and all economic reasoning. It is unrealistic to assume that both passengers and airlines would accept added hours of delay and congestion on the runways, in ground transportation, in terminal facilities, parking, baggage and gate access. As congestion increases, passengers and airlines change their

R-3-7

[18] DEIS at II-31.

[19] P & D Aviation, Airport Master Plan Update for Seattle-Tacoma International Airport, Technical Report No. 7B ("Technical Rep't No. 7B) at 6-1 (Feb. 24, 1995) (emphasis added).

[20] DEIS at II-35.

behavior.[21] People will choose other modes of travel, they will drive to an airport in another city for long distance travel, and airlines will look for other alternatives -- such as other airports -- to accommodate their operations. These are precisely the consequences which the Port foresaw in the Flight Plan EIS. "When these [delays] jeopardize airline profitability, this will lead to rescheduling and diversions of aircraft to other airports, and a reluctance by the airlines to add additional service."[22]

R-3-7

In practice, a number of events would occur that cause demand to be reduced below forecast level by a sufficient amount so that delays would remain tolerable. According to the DEIS, "10 minutes was identified to be the maximum tolerable level of total all-weather delay per operation to maintain efficient and profitable air service."[23] Interpolation between the delay values shown in the DEIS[24] shows that 10 minutes of delay occurs at a level of approximately 395,000 annual operations.

R-3-24

Therefore, airport traffic would not grow beyond 395,000 operations if improvements were not made to Sea-Tac (because delays would become intolerable and airlines would find operations at Sea-Tac no longer profitable). As a result, the assessments of the Do-Nothing alternative in the DEIS are incorrect, and the benefits of any improvements are overestimated by significant amounts.

It is important to consider that traffic is not forecast to reach 395,000 operations until approximately 2005, and that delays would remain tolerable until that time, even in the Do-Nothing alternative.

[21] See, e.g., Flight Plan EIS at 2-15; P & D Aviation and Claire Barrett & Assocs., Preliminary Report on Demand Management to the PSRC Regional Council Expert Arbitration Panel (Progress Draft) at 7-1 (Nov. 17, 1994).

[22] Flight Plan EIS at 2-15. The Flight Plan EIS and its conclusions have been incorporated by reference in the DEIS.

[23] DEIS at II-5.

[24] Id. at II-4.

R-3-7

The above analysis also could be applied to the "average delay level of less than 6-7 minutes (that) was determined desirable to minimize airline operating costs and passenger inconveniences."[25] If airlines, passengers, and others took actions based on this desirable level of delay, rather than based on the maximum tolerable delay, traffic would not grow beyond 370,000 operations, if no improvements were made to Sea-Tac. Therefore, errors in the assessment of the Do-Nothing alternative in the DEIS would be more substantial, and the benefits of any improvements would have been overestimated by even larger amounts.

The experience of other congested airports which did not expand their capacity provides some lessons for the Port as to what would be likely to occur under the Do-Nothing alternative:

- The traffic would become more evenly spread over the hours of the day, reducing peak hour demand.
- Passenger enplanements per aircraft would increase.
- Some passengers and freight would elect to use alternative modes.
- Some aircraft operators would move to other airports.

These actions would occur naturally in response to the level of service and do not require specific actions by the Port or by others.

R-3-8

2.1.1.1 The Traffic Would Become More Evenly Spread Over the Hours of the Day, Reducing Peak Hour Demand

The distribution of arrival and total traffic over the hours of the day is shown in DEIS Exhibits II.1 and II.2-3. The peak hour for arrivals occurs between 6 and 7 p.m., when 49 arrivals are forecast to take place.

[25] Id. at II-5.

The proportions of these aircraft in the peak hour that are air carrier, commuter, and general aviation aircraft are shown in Table 5-20 of the Port's Technical Report No. 5.[26] The 49 arrival aircraft consist of 36 air carriers, 12 commuters, and 1 general aviation aircraft. The number of arrivals in 2020 in the hours before and after the arrival peak hour is significantly lower than that in the peak hour, as shown in TABLE 2-1.

TABLE 2-1

Air Carrier and Total Arrival Before and After the Peak Hour in 2020[27]

Hour	2pm	3pm	4pm	5pm	Peak Hour 6pm	7pm	8pm	9pm	10pm
Total Arrivals	30	38	23	37	49	41	38	27	26
Air Carrier Arrivals	22	28	17	27	36	30	28	20	19

If congestion were to occur, some of the demand would move to adjacent hours. For example, if 5 percent or 10 percent of the peak arrivals move to adjacent hours, then peak hour traffic would be lower, as illustrated in TABLE 2-2.

[26] P & D Aviation, Airport Master Plan Update for Seattle-Tacoma International Airport, Technical Report No. 5 ("Technical Rep't No. 5") at 5-48 (Apr. 12, 1994).

[27] Source: DEIS at II-35A, Exhibit II.2-3 (showing hourly activity levels); Technical Rep't No. 5 at 5-48, Table 5-20 (showing proportion of operations that are air carrier operations).

R-3-7

R-3-8

TABLE 2-2

Effect of Minor Peak Spreading on Peak Hour Arrival Demand in 2020

	No Peak Spreading	5 Percent Peak Spreading	10 Percent Peak Spreading
Total Arrivals	49/hour	47/hour	44/hour
Air Carrier Arrivals	36/hour	34/hour	32/hour

The Expert Arbitration Panel on Noise and Demand/System Management ("Expert Arbitration Panel") which is legally obligated to determine, inter alia, whether the Port has pursued and achieved all feasible demand or system management options which could obviate the need for a third runway at Sea-Tac,[28] has found that a "small reduction in the total level of aircraft operations occurring during peak periods can have a significant impact upon the delays that would occur during conditions of poor visibility at the Airport."[29]

2.1.1.2 Passenger Enplanements Per Aircraft Would Increase

Enplanements per departure are forecast to increase naturally with time because of market forces.[30] For example, enplanements per departure for domestic air carrier operations are forecast to increase from 87.5 in 1993 to 123 in 2020 due both to an increase in seats per

[28] See infra § 2.2.2.

[29] PSRC, In the Matter of: Expert Arbitration Panel's Review of Noise and Demand/System Management Issues at Sea-Tac International Airport, Final Phase I Order on Demand/System Management Issues ("Final Phase I Order on Demand/System Management Issues") (July 27, 1995). Inasmuch as this Order was released only a few days before the deadline for submission of these Comments, there was insufficient time to analyze all of its ramifications (attached to these Comments as app. 2).

[30] Technical Rep't No. 5 at 5-34, 5-35, Table 5-14.

R-3-7

R-3-8

R-3-7

R-3-8

aircraft from 151 to 205, and load factor increase (passengers per seat) from 58 percent to 60 percent.

A significant amount of Airport congestion would hasten this trend, and might result both in larger aircraft and less empty seats on aircraft (e.g., 210 seats per aircraft and 62 percent load factor would increase passenger enplanements per aircraft to 130 in 2020). With a constant passenger forecast, this would result in a reduction in the number of peak hour aircraft operations by 5 percent, from 49 to 47 arrivals in the peak hour.

2.1.1.3 Some Passengers and Freight Would Elect to Use Alternative Modes

Evidence provided to the Expert Arbitration Panel by the Washington State Department of Transportation indicated that changes in the relative travel time of surface transportation would result in the replacement of up to 2 percent of Sea-Tac total aircraft operations in the year 2000. [21]

The large delays to aircraft reported in the DEIS would shift the balance between travel times in this market for air and surface transportation even more, thereby causing significant reduction in air traffic in the peak period.

2.1.1.4 Some Aircraft Operators Would Move to Other Airports

R-4-4

Other existing airports are available now for general aviation, commuter, and air carrier operations. Boeing Field and Paine Field are examples of underused facilities that could serve as alternative airports for some of the forecast air traffic, thereby reducing peak-hour demand at Sea-Tac.

[21] Washington State Dep't of Transportation, Response to Information Requests from the Expert Arbitration Panel on Demand/System Management ("WSDOT Response to Expert Arbitration Panel") at 3 (Apr. 14, 1995).

R-3-7

2.1.2 The DEIS Makes Erroneous Assumptions About the Magnitude of Aircraft Delay Without a Third Runway

R-3-18

The DEIS states that delay would increase exponentially if a third runway were not constructed.[22] This assertion is incorrect, and is based on a faulty computation of delays to aircraft using both a faulty methodology and faulty assumptions concerning weather conditions, airfield capability, future demand, and delays to aircraft. The delays that would actually occur to aircraft -- 7-10 minutes -- would be significantly less than those shown in the DEIS.

The methodology is faulty because the annualization technique used to estimate annual delays to aircraft improperly aggregates daily delays. The methodology assumes that delays to aircraft can be estimated for representative days in the peak month with different weather conditions that last for 24 hours, and that these delays can then be factored up by the percent occurrence of different weather conditions. This methodology ignores the fact that poor weather occurs more often in the low demand winter months and the low demand nighttime hours of the day, that poor weather normally occurs for short periods that are significantly less than 24 hours in duration, and that delays on days in low demand months cannot be represented accurately by multiplying daily delays by an "equivalent days" factor.[23] The DEIS methodology by itself overestimates delays by an order of 10 percent.

R-3-19

The analysis of weather conditions is faulty because (a) it is based on 11 winters and 10 summers of data, thereby overstating the percent of poor weather conditions;[24] (b) it assumes that certain Visual Flight Rule ("VFR") weather conditions (between 2,500 and 1,000 feet ceiling with at least 3 miles visibility) are Instrument Flight Rule ("IFR") conditions;[25] and

[22] DEIS at II-4, II-35.

[23] Fed. Aviation Admin., Seattle-Tacoma International Airport, Airport Capacity Enhancement Update, Data Package No. 11 ("Data Package No. 11") at 16 (Apr. 1995) (attached to these Comments as app. 3).

[24] P&D Aviation, Airport Master Plan Update For Seattle-Tacoma International Airport, Technical Report No. 4 ("Technical Rep't No. 4) at 2-14 (Oct. 1994).

[25] Id.

R-3-7

R-3-19

(c) it assumes that IFR weather lasts for 24 hours continuously, rather than the shorter periods that occur in practice.[16]

According to the Port's Technical Report No. 4, the percent of IFR weather (ceiling less than 1,000 feet and or visibility less than 3 miles) is 9.4 percent based on data from 1/1/82 to 3/31/93. These data include 11 winters and 10 summers and, therefore, overestimate the percent of poor weather conditions. The Sea-Tac February 1992 Airport Layout Plan ("ALP") shows the percent of IFR weather to be 7.9 percent. The amount of time during which poor weather occurs is significantly less than is reported in the materials referenced in the DEIS.[17] The DEIS, therefore, both overestimates the amount of delay with the Do-Nothing alternative and overestimates the benefits of the "With Project" development options.

Analysis of Sea-Tac weather data shows that for the years 1983 through 1994, the average occurrence of IFR weather conditions is 8.8 percent; not the 9.4 percent used to compute delay DEIS. Weather in the peak traffic months is significantly better than the average weather conditions used to arrive at the delay computations in the DEIS. Analysis of Sea-Tac weather data shows that IFR conditions occur only 5.5 percent of the time in the peak traffic months (i.e., May, June, July, and August), and IFR conditions occur 6.2 percent of the time during peak arrival traffic hours (i.e., 10 am to 9 pm). When these conditions are combined, and weather in the peak arrival traffic hours of the peak traffic months is examined, the occurrence of IFR conditions even is less frequent: IFR conditions only occur 2.8 percent of the time in the peak arrival traffic months.

Since poor weather conditions occur 2.8 percent of the time during peak arrival periods, and not the 9.4 percent used in the DEIS delay computations, delays to aircraft in 2020 were overestimated in the DEIS by a factor of 50 percent or more.

16/ Fed. Aviation Admin., Seattle-Tacoma International Airport, Airport Capacity Enhancement Plan Update, Data Package No. 10 ("Data Package No. 10") at C-1 (Mar. 1995).

17/ See eg., Technical Rep't No. 4 at 2-14, Table 2-5, 2-15; Technical Rep't No. 6 at 4-2, Figure 4-1, 4-2; DEIS at iii, II-2.

R-3-7

R-3-21B

The analysis of airfield capability is faulty because it excludes existing and future technological advances. The impact of future technological advances on aircraft delay is discussed in detail elsewhere in these Comments.[18]

The impact of existing available technological advances also has been ignored. For example, the DEIS fails to recognize the benefit of the 2.5 mile separation between aircraft already introduced at Sea-Tac which presently results in an increase in poor weather airport capacity of approximately 10 percent.[19] The DEIS fails to consider the advantages of the Localizer Directional Aid ("LDA") approaches already in place at Sea-Tac. At the St. Louis and San Francisco airports, the poor weather minima required for such approaches have been set at a 1,200-foot ceiling and 4 miles or less visibility. Similar reductions in minima at Sea-Tac for LDA approaches would reduce the effect of poor weather conditions on arrival capacity from 44 percent of the year to approximately 15 percent of the year.[20]

R-4-7

The analysis of future demand is faulty because it excludes peak spreading, use of other airports and other modes of transportation, and other demand management techniques.

The DEIS also refers to demand and delay associated with an annual traffic level of 525,000 aircraft operations,[21] and thereby misleads the reader of the DEIS, because the forecast for 2020 is 441,600,[22] not 525,000 operations.

In addition, demand also would be lower in poor weather (1) because some (particularly general aviation) pilots are not qualified to operate, some aircraft are not properly equipped, some pilots make a choice not to operate in poor weather even though they and their aircraft are

18/ See infra § 4.2.2.

19/ See infra id.

20/ The Expert Arbitration Panel also recommends that "the potential impacts of rapidly improving air traffic control technology should continue to be a focus of attention for both the [Port] and the FAA in their assessments of the need for the new runway." Final Phase I Order on Demand/System Management Issues at 8.

21/ DEIS at II-4.

22/ Technical Rep't No. 5 at 5-39.

qualified, and (2) some aircraft either are diverted to an alternative airport or flights are canceled to avoid poor weather and/or congestion.

The analysis of airfield capability is faulty because it fails properly to consider the impact of Boeing Field on the operation of a potential third runway. Conflicts between aircraft using Boeing Field and those using Sea-Tac would eliminate most of the potential value of a third runway. Aircraft using a third runway at Sea-Tac in poor weather conditions would conflict with aircraft using Boeing Field, thereby reducing the usefulness of the additional runway at Sea-Tac. As a result, the benefits of a third runway are overstated significantly. A more detailed discussion of airspace interactions between Boeing Field and Sea-Tac and the effect of such interactions is found elsewhere in these Comments.[13] R-3-24

Finally, and most importantly, contrary to the assertions in the DEIS

Sea-Tac is not currently a highly congested airport. According to the most recent ASQP data available from the U.S. [Department of Transportation] (for May 1995), Sea-Tac ranks #1 in on-time departures (90.0%) and #6 in on-time arrivals (84.6%). In recent years, the total annual hours of delay (as defined in the 1995 FAA Capacity Enhancement Update) have dropped from 48,000 in 1988 to only 26,000. Reported delays as compiled in the FAA's ATOMS data series show a similar decline, from 30 delays per thousand operations in 1990 to six delays per thousand operations in 1994.[14]

Moreover, the FAA has analyzed the impact of demand management, and demonstrated that a reduction in peak traffic of 3 percent would save approximately 23 percent of delays to aircraft.[15]

R-3-7

[13] See infra § 4.2.4.4.

[14] Final Phase I Order on Demand/System Management Issues at 6 (emphasis added).

[15] Data Package No. 11 at 46 through 48.

2.1.3 The DEIS Makes the Illogical Assumption that All "With Project" Alternatives Will Have Environmental Impacts that are Only Marginally Greater than the Do-Nothing Alternative

Based upon its initial erroneous assumption -- that the number of passengers and operations will grow at the same rate with or without expansion -- the DEIS concludes that all "With Project" alternatives will have environmental impacts that are similar, and only marginally greater, than the Do-Nothing alternative. Thus, for example, increases in noise levels to which the community is exposed; Airport-related induced socio-economic impacts; air quality impacts; and alterations in the surface transportation system are projected to be almost the same whether or not the third runway is constructed.[16] Moreover, the DEIS attributes environmental impacts to the specific new Airport facilities to be developed and not to the growth in the number of flights and passengers and the increase in surface transportation attributable to the increase in aircraft operations and enplanements.

Although the DEIS projects an additional 100,000 operations over the next 20 years, it avoids addressing the environmental consequences of making the physical improvements in the Airport facility which will make a significant increase in the number of operations at Sea-Tac feasible. In fact, all the impacts identified in the DEIS as related to Airport growth are directly attributable to the physical construction of the third runway and associated terminal improvements necessary to accommodate the increased passenger demands. TABLE 2-3 demonstrates that increases in passengers, operations, and ground facilities would be the direct result of the addition of a third runway at Sea-Tac rather than the inevitable result of regional population and economic growth as asserted in the DEIS.[17]

R-3-7

[16] See DEIS at IV.1-1, IV.1-6, IV.1-9, IV.8-4, IV.9-3, IV.15-3.

[17] See id. at I-9, II-12, II-35.

TABLE 2-3

Capacity Increases at Sea-Tac Resulting from Third Runway[18]

Year	Air Passengers: Enplanements (Millions)	Air Passengers: Avg Day	Total Annual	Operations Avg Day	Pass Per Carrier Operation	Ann. Average Delay[4]: Arrivals (Minutes)	Ann. Average Delay[4]: Total (Minutes)	Aircraft Gates (NBEG)	Terminal Space[2] (1000s sf)	On-site Parking[2]: General	On-site Parking[2]: Employees
1996(Exist)	21.0	57,500	355,500	973	64	10.0	7.0	90	1,900	9,400	4,500
2000	21.6	59,200	379,200	1,039	62	18.5	10.0	100	2,400	9,700	4,800
Capacity[1]	22.0	60,300	380,000	1,041	63	19.0	10.0	90	1,900	9,400	4,500
2010	29.0	79,500	405,800	1,112	78	22.5	13.5	110	2,800	11,900	6,100
2020	38.3	104,900	441,600	1,210	95	34.0	19.0	120	3,200	14,850	8,000
Capacity[3]	48.0	131,500	480,000	1,315	110	10.0	7.0	130	3,600	17,300	9,900
Percent Increase	118.2 Percent		26.3 Percent					44.4 Percent	89.5 Percent	84.0 Percent	120.0 Percent

Capacity increase effected by 3rd runway

Notes:
1. Capacity of existing runways and support facilities, Flight Plan EIS at 1-4, Figure 1-2; DEIS at II-8A, Table II-1.4.
2. Interpolated estimate of data prepared for the ACC by Kato & Warren.
3. Capacity with third runway in 2020, Flight Plan EIS at 1-4, Figure 1-2.
4. DEIS at II-4, Table II.1-2, interpolation of data prepared for the ACC by Kato & Warren.

18/ Sources: DEIS at I-10, Table I-3; I-11, Table I-4; II-4, Table II.1-2, and interpolations of data prepared for the ACC by Kato & Warren.

R-3-7

By focusing on the environmental impacts attributable to the new Airport facilities and ignoring the environmental impacts attributable to the increase in Airport activity, the DEIS seriously underestimates those environmental consequences of the proposed third runway project and attempts to minimize the needed mitigation.

2.2 THE DEIS IGNORES THE ROLE OF THE PUGET SOUND REGIONAL COUNCIL AND EXPERT ARBITRATION PANEL ON NOISE AND DEMAND/SYSTEM MANAGEMENT

2.2.1 Resolution A-93-03 Requires that the Port Fulfill Conditions Before it May Receive Approval From the Puget Sound Regional Council to Implement the Third Runway Project

R-2-5

Following completion of the Flight Plan EIS, the PSRC General Assembly adopted Resolution A-93-03 ("Res. A-93-03" or the "PSRC Resolution") amending its interim RASP to provide planning for a major supplemental airport and a third runway at Sea-Tac.[19] The PSRC Resolution declined to approve the construction of a third runway at Sea-Tac until an environmental assessment -- including financial and market feasibility studies -- demonstrated that a supplemental airport would not be feasible and would not eliminate the need for the third runway.[20] The PSRC Resolution also set two additional conditions which had to be satisfied before it would authorize the construction of the third runway at Sea-Tac:

- demand management and system management programs had to be pursued and achieved, or determined to be infeasible, based on independent evaluation; and
- noise reduction performance objectives had to be scheduled, pursued and achieved based on independent evaluation, and based on measurement of real noise impacts.[21]

19/ PSRC Res. A-93-03 ("Res. A-93-03") (Apr. 29, 1993) (attached to these Comments as app. 4).

20/ Id. at 2.

21/ Id. at 2-3 (emphasis added).

The PSRC prematurely abandoned the Major Supplemental Airport Study after its consultants recommended three sites (out of 25 potential sites studied) for a detailed evaluation.[51] The decision to terminate consideration of a supplemental airport was not based on environmental or financial or market feasibility studies as the Res. A-93-03 directed,[52] but rather on the fact that the PSRC was reluctant to address the community opposition to each alternative site.[53] In its resolution terminating the Major Supplemental Airport Study, the PSRC Executive Board reaffirmed its commitment not to proceed with final approval of a third runway at Sea-Tac until an independent evaluation determined that the Port had complied with the noise and demand and system management conditions set forth in Res. A-93-03.[54]

R-2-5

R-3-7

2.2.2 The Expert Arbitration Panel on Noise and Demand/System Management Must Determine that the Port Has Fulfilled the Conditions in Resolution A-93-03

The Expert Arbitration Panel on Noise and Demand/System Management (the "Expert Arbitration Panel") was established by the PSRC, the Port, the FAA and the Washington State Department of Transportation[55] to conduct an independent evaluation of 1) the Port's pursuit and achievement of demand and system management programs -- or the infeasibility of such programs; and 2) the Port's pursuit and achievement of noise reduction performance objectives based on the measurement of real noise impacts in accordance with the requirements of the

[51] PSRC Executive Board Res. EB-94-01 ("Res. EB-94-01") (Oct. 1994).

[52] Res. A-93-03 at 2.

[53] See, e.g., Arthur C. Gorlick, "Airport Choices Narrowed; Three Sites to be Scrapped," Seattle Post-Intelligencer, Oct. 27, 1994 at A1.

[54] Res. EB-94-01 at 2.

[55] Fed. Aviation Admin., Washington Dep't of Transp., PSRC and Port of Seattle, Memorandum of Understanding § III C (Mar. 19, 1994).

PSRC Resolution.[56] The Expert Arbitration Panel has held two public hearings to evaluate the Port's achievement of noise reductions and two hearings on the feasibility and implementation of demand and system management programs. It also has issued two Orders on noise issues[57] and two Orders on demand and system management issues.[58]

Although the Expert Arbitration Panel has not completed its inquiry, it has indicated that it presently is unconvinced that the Port has achieved a sufficient level of noise reductions to comply with the conditions of the PSRC Resolution.[59] The Expert Arbitration Panel remains unsatisfied that the Port has portrayed accurately the delay and capacity problems at Sea-Tac or that the extent of the delay and the timing and impacts of demand management programs lead to the conclusion that a third runway is required at Sea-Tac.

R-2-5

R-3-7

> We encourage the [Port], the WSDOT, the FAA, the airlines and the public to continue rigorous examination of the planning assumptions that underlie the proposal to build the runway and to persist in efforts to determine whether adequate solutions to the problems of capacity and delay can be found without building a new runway at Sea-Tac.[60]

The Expert Arbitration Panel intends to continue pursing the questions of whether more readily achievable improvements in existing rail service connections to the principal short-haul markets

[56] Res. A-93-03 at 2-3.

[57] See PSRC, In the Matter of: Expert Arbitration Panel's Review of Noise and Demand/System Management Issues at Sea-Tac International Airport, Procedural Order (Sept. 22, 1994) (attached to these Comments as app. 5); Order on Phase I Noise Issues.

[58] See PSRC, In the Matter of: Expert Arbitration Panel's Review of Noise and Demand/System Management Issues at Sea-Tac International Airport, Preliminary Order on Demand/System Management Issues (Feb. 24, 1995); Final Phase I Order on Demand/System Management Issues.

[59] See Order on Phase I Noise Issues at 2, 5.

[60] Final Phase I Order on Demand/System Management Issues at 4 (emphasis added).

served by Sea-Tac (i.e., Portland and Vancouver, B.C.) are "feasible," and if they are, what effect such improvements would have on the need for additional capacity at Sea-Tac.[illegible]

If the Expert Arbitration Panel determines that the Port has failed to comply with either the noise reduction or demand and system management conditions of Res. A-93-03 -- or with both of them -- the RASP could not be amended to authorize the construction of a third runway at Sea-Tac. Without such an amendment, the Port cannot proceed with the Airport expansion, because the RASP is a component of the Regional Transportation Plan maintained by the PSRC pursuant to the Washington Growth Management Act.[illegible]

The Port Commissioners publicly have recognized the necessity for obtaining final PSRC approval before the Port may begin to implement its proposed Airport expansion plan, and they properly have acknowledged their obligation to abide by the final decision of the PSRC with respect to the permissibility of undertaking an expansion of Sea-Tac.[illegible]

R-2-5 R-3-7

[illegible] Id. at 6-8.

[illegible] See RCW 47.80.023 (1994).

[illegible] David Schaefer, Port Won't Defy Elected Officials on Runway, The Seattle Times/Seattle Post-Intelligencer, Mar. 21, 1993 at B1.

> Port of Seattle commissioners, although overwhelmingly in favor of expanding Seattle-Tacoma International Airport, say they will live with the decision of regional elected officials even if those officials recommend against a third runway.
>
> . . . .
>
> [P]ort commissioners said they doubt they could defy the Puget Sound Regional Council if it recommends against expanding the airport. . . .
>
> 'We are a participant in a process,' said Port Commission chairman Gary Grant. 'We would abide by the recommendation of the regional council and not pursue the (third runway). . . .'

Id.

Nowhere in the DEIS is there any consideration of the deliberations of the Expert Arbitration Panel or of the Port's legal authority to implement the proposed Master Plan Update development actions.[illegible]

2.2.3 Compliance with Order Issued by the Expert Arbitration Panel Might Alter the Port's Proposed Expansion Program

It is possible that the Expert Arbitration Panel may determine that in order to achieve compliance with either the demand and system management or the noise conditions in the PSRC Resolution, the Port may be required to undertake specific demand and/or system management programs or noise abatement programs. Although the DEIS totally ignores the requirements of Res. A-93-03, a failure to comply with the PSRC Resolution would prevent PSRC approval of the Airport expansion project. Compliance with the PSRC Resolution, moreover, may alter some of the operational characteristics of the Airport upon which the DEIS analysis is based. For example, a finding by the Expert Arbitration Panel that improvements in existing rail service would be feasible, that such improvements would significantly affect the magnitude of delay at the Airport, and that the Port has not pursued or achieved the implementation of the rail option, would mean that the Port has failed to comply with the conditions established by the PSRC for the approval of the Airport expansion project. On the other hand, implementation of the rail option might "cause[] the airlines to eliminate some of their peak period operations, [which would be likely to result in] a significant reduction in the levels of future delay experienced at Sea-Tac, which could defer the need for the new runway."[illegible] Compliance with additional noise abatement measures similarly might affect the Airport's operational characteristics in a way which could affect capacity and desirability of building a new runway.

R-2-5 R-3-7

[illegible] These Comments incorporate by reference the administrative record of the Expert Arbitration Panel as of the date of these Comments.

[illegible] Final Phase I Order on Demand/System Management Issues at 7. See also infra § 4.2.1.

Since the Expert Arbitration Panel is not expected to issue its final orders until shortly before the April 1996 deadline, the Port and the FAA have only three options for bringing their NEPA/SEPA document into compliance with the law:

- They could wait until the Expert Arbitration Panel issues its final orders before completing work on a final EIS, so that the final EIS would reflect the recommendations of the Expert Arbitration Panel with respect both to a noise program and the ability of rail service to meet a portion of the projected future demand; or
- They could issue a revised draft EIS following the issuance of the Expert Arbitration Panel's orders which would incorporate the recommendations of the Expert Arbitration Panel and account for the effects of those recommendations; or
- They could issue a final EIS before the Expert Arbitration Panel issues its orders and then prepare and circulate a supplemental EIS to reflect the recommendations in those orders.

The DEIS impermissibly ignores a critical administrative process which could affect the Port's legal authority to undertake the proposed expansion project and which also is likely to affect the substantive justification for the project and how the project could be implemented.

R-2-5

R-3-7

3.0 SCOPE OF THE DEIS

3.1 THE DEIS FAILS TO IDENTIFY THE "ACTION" TO BE TAKEN

NEPA requires that "every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the environment" be accompanied by a detailed statement on the environmental impact of the proposed action.[1] SEPA contains nearly identical language.[2] "Actions" include "new and continuing activities, including projects and programs."[3] Federal actions tend to fall within one of four categories: 1) the adoption of official policy; 2) the adoption of formal plans, such as official documents which guide or prescribe alternative uses of federal resources upon which future agency actions will be based; 3) the adoption of programs, such as a group of concerted actions to implement a specific policy or plan; or 4) the approval of specific projects such as construction or management activities.[4]

SEPA defines "actions" to include 1) new and continuing activities; 2) new or revised agency rules, regulations, plans, policies, or procedures; and 3) legislative proposals.[5] SEPA classifies actions into two categories: project and nonproject actions.[6] Project actions include decisions on specific projects located in defined geographic areas. Projects include agency decisions to undertake any activity that will directly modify the environment.[7]

[1] 42 U.S.C.A. § 4332(2)(C) (emphasis added).

[2] RCW 43.21C.030(2)(c).

[3] 40 C.F.R. § 1508.18(a).

[4] Id. § 1508.18(b).

[5] WAC 197-11-704(1).

[6] Id. 197-11-704(2).

[7] Id. 197-11-704(2)(a)(i).

A review of the three-volume DEIS fails to reveal exactly what "action" is being examined.

R-4-14

NEPA review is required for the approval of an Airport Layout Plan[8] or for a federal grant for a new runway or a major runway extension.[9] The DEIS does not include or describe what Airport Layout Plan has been proposed for approval. In fact, there are no specific plans included in the DEIS or in any of the supporting documents made available to the Commenters. The DEIS cover states that the document was submitted for review pursuant to the requirements of NEPA and SEPA, among other statutes, and that the EIS assesses the impact of alternative Airport development in a Master Plan Update. However, no Master Plan Update document exists. Moreover, NEPA does not require that the FAA conduct an environmental review of a master planning document. Therefore, the DEIS does not properly state what the proposed action is for NEPA purposes.[10]

SEPA does require environmental review of master or comprehensive plans,[11] but such plans are classified, however, as nonproject actions.[12] The Port has not yet issued a master plan and it has not disclosed when it intends to do so. The DEIS does not contain sufficient

[8] See Order 5050.4A ¶ 21a(1).

[9] Id. ¶ 22a(2),(3).

[10] This defect is not a mere technical omission. The definition of the federal action must respond to the need, which in turn defines the alternatives. The DEIS, however, has adopted an extremely narrow need (including especially the need to improve poor weather airfield operating capacity at Sea-Tac to accommodate an acceptable level of delay). Many of the actions included in the Master Plan Update, including all landside actions, are nonresponsive to that need. Without disclosure of the federal action in the DEIS, it is impossible for the Commenters to understand the scope of the project upon which comments are sought.

[11] WAC 197-11-704(2)(b)(iii).

[12] Id.

detail concerning the way in which the proposed Airport improvements would be developed to qualify as a master plan.[13]

R-4-14

A proper master plan for SEPA purposes would have to contain sufficient detail about the proposed project in order to provide the public and other agencies with enough information to understand how every aspect of the project would be implemented. For example, the DEIS includes the development of new terminal facilities, but it omits any information regarding the environmental and other consequences of the actual task of relocating airport terminals. New terminals would require the abandonment of some fuel lines and the relocation of others; some fuel farms might have to be moved and others closed. These actions are not easily accomplished and involve precise coordination and the danger of environmental contamination. The DEIS for the Master Plan Update development actions does not address these issues. The DEIS says <u>what</u> will be done; it neglects to say <u>how</u> the task would be accomplished.

R-3-38

Another example of the lack of detail in the DEIS involves the proposal to move cargo facilities to the South Aviation Support Area ("SASA"). The FAA recently approved a final EIS for the development of the SASA for online and base maintenance operations.[14] The SASA plan never contemplated use of the area for heavy truck traffic, frequently arriving and departing aircraft or other intensifications of use associated with a major cargo facility. In fact, the SASA EIS indicated that aircraft noise would not be a problem because "[w]ithin the site, all aircraft movement would be with the use of tugs to minimize noise. For example, aircraft would be pushed away from the hangars and towed to hardstands."[15] The present DEIS, however, contemplates Airport cargo operations at SASA, either as one of several decentralized cargo facilities, or as a centralized cargo hub projected to handle 1,060,000 tons of cargo a year at 17

[13] If the DEIS is on the Master Plan Update as a nonproject SEPA document, it will have to be followed by project-specific EISs once the Port proposes to implement the action set forth.

[14] Port of Seattle, <u>South Aviation Support Area ("SASA") Final Environmental Impact Statement</u> at 3-16 (Mar. 1994).

[15] Id. at 3-2.

aircraft hardstands.[14] The DEIS fails to consider the recently-completed SASA plan and the approved EIS, and it provides no information as to how a major change in proposed use for SASA would be accomplished.

The superficiality and imprecision which pervades the entire DEIS prevents it from being considered as a master plan for SEPA purposes.

R-3-38

3.2 THE DEIS FAILS TO CONSIDER CUMULATIVE IMPACTS AND CUMULATIVE ACTIONS

CEQ regulations define "cumulative impact" as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."[15] The Supreme Court has stated that when several proposals pending before an agency would have a cumulative or synergistic environmental impact upon a region, their environmental consequences must be considered together.[16]

A proper evaluation of cumulative effects identifies 1) the area in which effects of the proposed project will be felt; 2) the impacts that are expected in that area from the proposed project; 3) other actions -- past, proposed, and reasonably foreseeable -- that have had, or are expected to have, impacts in the same area; 4) the impacts, or expected impacts, from these other actions; and 5) the overall impact that can be expected if the individual impacts are allowed to accumulate.[17]

R-5-3

14/ DEIS at II-31.

15/ 40 C.F.R. § 1508.7 (emphasis added).

16/ Kleppe v. Sierra Club, 427 U.S. 390, 409 (1976).

17/ Conservation Law Found. v. Federal Highway Admin., 827 F. Supp. 871, 880 (D. R.I. 1993) (quoting Fritiofson v. Alexander, 772 F.2d 1225, 1245 (5th Cir. 1985)).

Unrelated, but reasonably foreseeable, future actions may result in cumulative impacts.[20] Where several foreseeable similar projects in a geographical region have a cumulative impact, they should be evaluated in a single EIS.[21] Cumulative impacts from non-federal actions must also be analyzed.[22] Consideration of the cumulative impacts of a project after the project has been approved is insufficient to fulfill NEPA requirements.[23]

The DEIS identifies a number of projects in and around the Airport vicinity.[24] Some of these -- such as SASA and the Des Moines Creek Technology Campus -- are Port-sponsored or Port-cosponsored projects.[25] Others are projects scheduled to be undertaken by the state, the county or a special purpose authority.[26] Some, like SASA or the 28th/24th Avenue South Arterial Project already have been approved.[27] Clearly these projects, either singly or in

R-5-3

20/ Save the Yaak Committee v. Block, 840 F.2d 714, 721 (9th Cir. 1988) (finding inextricable nexus between the road reconstruction and the logging operations which must be considered in same environmental review document).

21/ See, e.g., City of Tenakee Springs v. Clough, 915 F.2d 1308, 1312-13 (9th Cir. 1990) (where a proposed action is related to other actions which produce significant cumulative impact, these effects must be addressed in the EIS); LaFlamme v. FERC, 852 F.2d 389, 401-03 (9th Cir. 1988) (remanding EIS to the agency for further consideration of cumulative impact, because the agency examined single projects in isolation without considering the net impact that all projects in the area might have on the environment. An EIS which does not analyze the effects other projects, pending or otherwise, might have on the river basin section "cannot possibly provide the necessary broad consideration of all 'past, present and reasonably foreseeable future actions' required in a cumulative impact analysis."). Id. at 401.

22/ Resources Ltd. v. Robertson, 8 F.3d 1394, 1400 (9th Cir. 1993) ("one does not need control over private land to be able to assess the impact that activities on private land may have in the Forest.").

23/ Thomas v. Peterson, 753 F.2d 754, 759-60 (9th Cir. 1985) (central purpose of an EIS is to force consideration of environmental impacts in the decisionmaking process and that purpose cannot be fully served if consideration of cumulative effects of successive, interdependent steps is delayed until the first step has already been taken).

24/ DEIS at III-6 through III-8.

25/ Id. at III-7.

26/ Id. at III-6, III-7.

27/ Id.

R-5-3

combination with the proposed Sea-Tac expansion project, would have a cumulative impact on the entire region. The DEIS must consider these projects along with the impacts of the Washington Growth Management Act, the comprehensive plans adopted by the ACC, Federal Way and Mercer Island, and the PSRC's regional transportation planning efforts. This is particularly true because of the importance of the Expert Arbitration Panel process, results of which must be incorporated into the RASP.[28]

The DEIS improperly dismisses consideration of the cumulative impacts of these projects by asserting that "a number of non-airport related developments are anticipated in the airport vicinity. . . . However, until specific projects are proposed for these developments, the total cumulative impacts can not be identified."[29] While it would be appropriate for the DEIS to omit analysis of the cumulative impacts of speculative projects whose implementation is not foreseeable,[30] several actions identified in the DEIS are far from speculative. Some, such as SASA, already have been approved and are within the Port's control to implement. Others are at varying stages of development, but all would come within the definition of cumulative actions under NEPA or SEPA for which consideration must be given in the DEIS.

The DEIS, therefore, improperly excludes consideration of the cumulative impacts of other projects.

---

[28] See supra §§ 2.2.2, 2.2.3.

[29] DEIS at IV.15-5. This statement is particularly inappropriate unless the Port apparently believes that this DEIS is a non-project EIS for SEPA purposes for which project specifics are not relevant.

[30] See South Louisiana Envtl. Council, Inc. v. Sand, 629 F.2d 1005, 1015 (5th Cir. 1980). See also LaFlamme v. F.E.R.C., 852 F.2d at 401-02 (the foreseeability of future development underscores the importance of performing a comprehensive cumulative impact analysis of a project's effects on the environment before any more development proceeds); Save the Yaak Committee v. Block, 840 F.2d at 721 (future actions must be "reasonably foreseeable" to require a consideration of cumulative impact).

3.3 SUBSTANTIVE FEDERAL ENVIRONMENTAL LAWS

In addition to NEPA's procedural requirements, several federal environmental statutes impose substantive obligations on the FAA. These statutes require that the FAA select a "feasible and prudent" or a "practicable" alternative if any project proposal or alternative potentially will have significant adverse environmental impacts on certain categories of protected lands. FAA regulations require that environmental impact statements document the FAA's compliance with these statutory obligations.[31]

R-1-12

The DEIS fails to develop adequately or to assess sufficiently the feasibility and prudence or the practicability of a number of on- and off-Airport alternatives for meeting the need and achieving the purpose set out for the proposed project, thereby making it practically impossible for the FAA to consider any alternative to the proposed Master Plan Update development actions. This failure taints the FAA's environmental review and implicates the FAA's entire decisionmaking process, while undermining the agency's compliance with NEPA and other relevant statutes.

This section comments generally on the FAA's failure to comply with the most important of these substantive federal statutory, regulatory, and administrative requirements. By artificially restricting the consideration of alternatives without analyzing and documenting their feasibility, prudence and practicability in the manner required by other environmental statutes, the FAA fails to comply with NEPA and other federal laws.

3.3.1 Federal Statutes, Regulations, and Orders Applicable to the FAA's Proposed Action

The DEIS constitutes much of the documentary record upon which the FAA will base its decisions. Before the FAA may approve the EIS, it must comply with a range of obligations

---

[31] Order 5050.4A ¶ 47a(7), (11).

imposed by important federal environmental laws. NEPA requires that the environmental impact statement document the FAA's statutory compliance with these other federal environmental laws:

> To the fullest extent possible, agencies shall prepare draft environmental impact statements concurrently with <u>and integrated with</u> environmental impact analyses and related surveys and studies required by ... [federal] environmental review laws and executive orders.[22]

Twenty-eight of these statutory, regulatory, and administrative obligations apply directly and indirectly to the two proposed actions analyzed in this DEIS. Many of them impose procedural requirements on the FAA's decisionmaking process. Other federal statutes and regulations (like Section 4(f) of the Department of Transportation Act[23] and Section 47106 of the Airport and Airway Improvement Act[24]) impose substantive obligations, requiring that the FAA select a feasible and prudent alternative to any project proposal which would have a significant adverse impact on protected lands.[25]

R-1-12

The twenty-eight statutes, regulations and orders are as follows:

1. <u>NEPA</u> (Pub.L. No. 91-190, 42 U.S.C § 4321 <u>et seq.</u>) establishes a broad national policy to improve the relationship between humans and their environment, and set outs policies and goals to ensure that environmental considerations are given careful attention and appropriate weight in all decisions of the federal government.

2. <u>40 C.F.R. § 1500 et seq</u>. Under NEPA, these Council on Environmental Quality regulations apply to all federal agency

[22] 40 C.F.R. § 1502.25(a) (emphasis added) (citations omitted).

[23] 49 U.S.C.A. § 303(c)

[24] 49 U.S.C.A. §§ 47101-47129

[25] In <u>Robertson v. Methow Valley Citizens' Council</u>, 490 U.S. 332 (1989), the Supreme Court recognized the distinction between substantive and procedural statutory obligations: "Other statutes may impose substantive environmental obligations on federal agencies, but NEPA merely prohibits uninformed -- rather than unwise -- agency action." <u>Id.</u> at 351 (footnote omitted). The Court cited section 4(f) of the Department of Transportation Act as an example of a federal statute imposing substantive obligations. <u>Id.</u> at 350 n.14.

environmental impact statements. They reflect the fundamental interpretation of NEPA which is applicable to federal agencies.

3. <u>Federal Aviation Administration Orders 5050.4A (1985) and 1050.1D (1983)</u>. These Federal Aviation Administration orders set forth the procedural and substantive requirements applicable to FAA environmental impact statements and to the agency's environmental review process.

4. <u>The Airport and Airway Improvement Act of 1982</u> (Pub.L. No. 97-248, 49 U.S.C. §§ 47101-47129). Section 509(b)(5) of the Act requires that the Secretary of Transportation certify that "no feasible and prudent alternative exists" before the FAA may approve any airport development project which "may have a significant impact on natural resources," including recreation assets "and other facts affecting the environment."

5. <u>Section 4(f) of the Department of Transportation Act of 1966</u> (recodified at 49 U.S.C. § 303(c)) states "[t]he Secretary may approve a transportation program or project requiring the use of publicly owned land of a public park, recreation area, or wildlife and waterfowl refuge of national, State, or local significance or land of an historic site ... only if (1) there is no prudent and feasible alternative to using that land, and (2) the program or project includes all possible planning to minimize harm to the park, recreational area, wildlife and waterfowl refuge, or historic site resulting from the use."

R-1-12

6. <u>Executive Order 11988, Floodplain Management, 43 Fed. Reg. 6030 (1978), U.S. Dep't of Transp., Order 5650.2(1979), Floodplain Management and Protection</u> links the need to protect lives and property with the need to restore and preserve natural and beneficial floodplain values. Agencies are required to make a finding that there is no practicable alternative before taking action that would encroach upon a floodplain.

7. <u>Executive Order 11990, Protection of Wetlands and U.S. Dep't of Transp., Order 5660.1A, Preservation of the Nation's Wetlands (1978)</u> requires action to minimize the destruction, loss or degradation of wetlands and to assure the protection, preservation, and enhancement of the nation's wetlands to the fullest extent

practicable during the planning, construction, and operation of transportation facilities and projects.

8. Section 106 of the National Historic Preservation Act of 1966 (Pub.L. No. 89-665, 16 U.S.C. § 470f) requires that any federal agency having jurisdiction over a federal or federally-assisted undertaking take into account, prior to approving such an undertaking, its effect on any district, site, building, structure, or object that is included in the National Register of Historic Places, and to give the Advisory Council on Historic Preservation a reasonable opportunity to comment on the proposed undertaking.

9. The Archaeological and Historic Data Preservation Act of 1979 (Pub.L. No. 86-253, amended by Pub.L. No. 93-291, 16 U.S.C. § 469) is directed to the preservation of historic and archaeological data that otherwise would be lost as a result of federal construction or other federally licensed or funded activities.

10. The Endangered Species Act of 1973 (Pub.L. No. 93-205, 16 U.S.C. § 1531 as amended, and 50 C.F.R. Part 402, Interagency Cooperation Regulations) require that all federal agencies, in consultation with the Secretaries of Interior and Commerce, carry out programs for the conservation of endangered or threatened species listed by the Department of the Interior and insure that actions authorized, funded, or carried out by them do not jeopardize the continued existence of the endangered species or result in the destruction or modification of the habitat of such species to an extent which is determined by the Secretary (of the Interior or Commerce) to be critical.

11. Section 2 of the Fish and Wildlife Coordination Act (Pub.L. No. 85-624, 16 U.S.C. § 662 et seq.) requires, with certain limited exceptions, that "whenever the waters of any stream or other body of water are proposed or authorized to be impounded, diverted, the channel deepened, or the stream or other body of water otherwise controlled or modified for any purpose whatever ... by any department or agency of the United States, or by any public or private agency under Federal permit or license, such department or agency shall consult first with the United States Fish and Wildlife Service, Department of the Interior, and with the head of the agency exercising administration over the wildlife resources of

R-1-12

the particular State wherein the ... control facility is to be constructed...."

12. Section 404 of the Federal Water Pollution Control Act Amendments for 1972 (Pub.L. No. 92-500, 33 U.S.C. § 1344, amended by the Clean Water Act of 1977 (Pub.L. 95-217, 33 U.S.C. § 1251)) establishes a permit procedure for activities involving dredging and filling of navigable waters. The Secretary of the Army, acting through the Army Corps of Engineers, is responsible for issuing such permits.

13. Section 2 of the Water Bank Act (Pub.L. No. 91-559, 16 U.S.C. § 1301) declares that "it is in the public interest to preserve, restore, and improve the wetlands of the Nation...."

14. Uniform Relocation Assistance and Real Property Acquisition Polices Act of 1970 (Pub.L. No. 91-528, 42 U.S.C. § 4601) requires consideration of the costs and impacts of residential dislocation in judging alternatives in the acquisition of real property.

15. Farmland Protection Policy Act (Pub.L. No. 97-98, 7 U.S.C. § 4201 et seq.) is intended to minimize the extent to which federal programs contribute to the unnecessary and irreversible conversion of farmland to nonagricultural uses, and to assure that federal programs are administered in a manner that, to the extent practicable, will be compatible with state and local government, and private programs and policies to protect farmlands.

16. Section 201(a) of the Federal Land Policy and Management Act of 1976 (Pub.L. No. 94-579 43 U.S.C. § 1701 et seq.) requires federal agencies to consult with the Bureau of Land Management to determine if land to be used for a federal action is land which is being considered for inclusion in the National Wilderness System.

17. Resource Conservation and Recovery Act of 1976 (Pub.L. No. 94-580, 42 U.S.C. § 6901 et seq., amended by the Quiet Communities Act of 1978) establishes requirements for the handling of solid waste.

R-1-12

18. 40 C.F.R. Parts 1500-1508 (43 Fed. Reg. 55978 (1978)) establishes uniform procedures, terminology, and standards for implementing the procedural requirements of NEPA's Section 102(2).

19. 14 C.F.R. Part 150 (46 Fed. Reg. 8316 (1981)), Airport Noise Compatibility Planning establishes regulations prescribing requirements for airport operators who choose to develop an airport noise compatibility planning program under the federal guidelines. This rulemaking implements portions of Title I of the Aviation Safety and Noise Abatement Act of 1979, adopting in modified form rules recommended by the Environmental Protection Agency and prescribing the administrative procedure to be followed by the FAA in fulfilling its responsibilities under that Act.

20. 36 C.F.R. Part 800 (39 Fed. Reg. 3365 (1974) and 44 Fed. Reg. 6068 (1979)), Procedures for the Protection of Historic and Cultural Properties establishes procedures to ensure that historic and cultural resources are given proper consideration in the preparation of environmental impact statements.

21. 7 C.F.R. Part 657 (43 Fed. Reg. 4030 (1978)), Prime and Unique Farmlands requires that the responsible agency official consult with the U.S. Department of Agriculture's Land Use Committee to determine whether land to be affected by agency action is prime and unique farmland.

22. Executive Order 11514, Protection and Enhancement of Environmental Quality (1970) orders all federal agencies to "initiate measures needed to direct their policies, plans, and programs so as to meet national environmental goals."

23. Executive Order 11593, Protection and Enhancement of the Cultural Environment (1971) requires that federal plans and programs contribute to the preservation and enhancement of sites, structures, and objects of historic, architectural, or archaeological significance.

R-1-12

24. The Clean Air Act, (amended by Pub.L. No. 91-604, 42 U.S.C. §§ 7401-7671q) provides that the EPA shall review and comment in writing on the air quality impacts of certain actions.

25. The Noise Control Act of 1972 (Pub.L. No. 92-574, 42 U.S.C. § 4901) provides for EPA consultation on noise standards and also permits EPA to propose aviation noise regulations to the FAA.

26. Executive Order 12372, Intergovernmental Review of Federal Programs (1982), and 49 C.F.R. Part 17, Intergovernmental Review of DOT Programs and Activities requires that federal agencies provide the opportunity for state and local officials to review and comment on federal actions for federal assistance or actions affecting them.

27. DOT Order 5610.1C, Procedures for Considering Environmental Impacts, as amended (44 Fed. Reg. 56,420 (1979)) and DOT Order 5610.1C (1982) provides guidelines for considering the environmental impacts of transportation actions.

28. DOT Order 1053.1, Policies and Procedures for Energy Planning and Conservation provides for assessing the energy demands of proposed projects.

NEPA requires that the FAA document its compliance with these provisions in the DEIS. The DEIS purports to document the FAA's compliance with NEPA, with the planning requirements of Section 47106(a)(1) of the Airport and Airway Improvement Act, with Section 4(f) of the Department of Transportation Act, and with federal wetlands and floodplains protection requirements.[38] In fact, the DEIS fails to do so.

R-1-12

[38] The cover of the DEIS states that it is submitted for review pursuant to NEPA, Executive Order 11990, Protection of Wetlands, Executive Order 11998, Flood Plan Management and SEPA.

4.0 THE DEIS FAILS ADEQUATELY TO CONSIDER ALTERNATIVES

4.1 THE DEIS FAILS TO SATISFY OBLIGATIONS UNDER NEPA AND SEPA TO DISCUSS REASONABLE ALTERNATIVES

4.1.1 The Scope of Alternatives Which Must be Addressed Under NEPA

NEPA directs federal agencies to examine all environmental impacts of proposed projects, to develop and explore all reasonable alternatives to such actions, and to analyze the potential environmental impacts of those alternatives.[1] Federal courts have emphasized that NEPA's purposes "are frustrated when consideration of alternatives and collateral effects is unreasonably constricted."[2] NEPA further directs federal agencies to "study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources."[3]

> [W]here . . . the objective of a major federal project can be achieved in one of two or more ways that will have differing impacts on the environment, the responsible [agency] is required to study, develop and describe each alternative for appropriate consideration.[4]

As the United States Court of Appeals for the Fifth Circuit has stated, the analysis of alternatives in an EIS

> was intended to emphasize an important part of NEPA's theme that all change was not progress and to insist that no major federal project should be undertaken without intense consideration of other more ecologically sound courses of action, including shelving the entire project, or of accomplishing the same result by entirely different means. . . .[T]he District of Columbia Circuit [has] recognized that this section did not intend to limit an agency to consideration of only those

[1] 42 U.S.C.A. § 4332(2)(C)(iii).

[2] Greene County Planning Bd. v. Federal Power Comm'n, 559 F.2d 1227, 1232 (2d Cir. 1976), cert. denied, 434 U.S. 1086 (1978).

[3] 42 U.S.C.A. § 4332(2)(E).

[4] Trinity Episcopal Sch. v. Romney, 523 F.2d 88, 93 (2d Cir. 1975).

> alternatives that it could adopt or put into effect. We agree. The imperative directive is a thorough consideration of all appropriate methods of accomplishing the aim of the action, including those without the area of the agency's expertise and regulatory control as well as those within it.[5]

Thus, the analysis of alternatives "is the heart of the environmental impact statement."[6]

The importance of the alternatives analysis is heightened by the requirements of substantive federal and state environmental laws which prohibit federal actions which cause specific types of environmental damage if alternatives exist to the federal action.[7] In

[5] Environmental Defense Fund v. U.S. Army Corps of Eng'rs, 492 F.2d at 1135.

[6] 40 C.F.R. § 1502.14.

[7] For example, Section 4(f) of the Department of Transportation Act provides that the Secretary of Transportation cannot approve any transportation project, including an airport project, which requires the

> use of publicly owned land of a public park, recreation area, or wildlife and waterfowl refuge of national, State, or local significance, or land of a historic site of national, State or local significance [in the absence of findings that] (1) there is no prudent and feasible alternative to using that land; and (2) the program or project, includes all possible planning to minimize harm to the parks, recreation area, wildlife and waterfowl refuge, or historic site resulting from the use.

49 U.S.C.A. § 303(c) (West 1995).

The Airport and Airway Improvement Act states that the Secretary of Transportation may approve an application for a federal grant for an airport development project runway location only if the sponsor certifies to the Secretary that

> if the application is found to have a significant adverse effect on natural resources, including fish and wildlife, natural, scenic, and recreation assets, water and air quality, or another factor affecting the environment, only after finding that no possible and prudent alternative to the project exists and that every reasonable step has been taken to minimize the adverse effect.

49 U.S.C.A. § 47106(c)(1)(C) (West 1995).

These statutes, as well as the Clean Water Act, 33 U.S.C.A. § 1344 (West 1986 & Supp. 1995), require vigorous examination and scrutiny of alternatives to the proposed project which is substantially more probing than the examination required by NEPA alone. FAA regulations require that the EIS comply not only with the strictures of NEPA but also with the requirements of numerous other federal environmental laws. See Order 5050.4A ¶¶ 83b, c, d.

examining possible alternatives, an agency may not eliminate alternatives simply because they do not achieve **all** of the articulated needs for the proposed project or because the lead agency does not have the authority to implement them.[8]

Under NEPA, an alternative is reasonable if it is "practical and feasible from a technical and economical standpoint."[9] An alternative, therefore, is reasonable if it meets at least some of the needs that the proposed action is intended to serve.[10]

In order to satisfy these demanding requirements of NEPA, the DEIS should have examined fully a number of reasonable and practical alternatives to the Port's proposed expansion of Sea-Tac:

- the institution of system and demand management programs at Sea-Tac;
- the imposition of operational restrictions at Sea-Tac -- including the diversion of commuter and/or general aviation traffic to other airports -- to limit growth of demand;
- different runway locations;
- different runway lengths and uses;
- alternative transportation modes, such as high-speed rail;
- a delayed action alternative; and
- the Do-Nothing alternative.

R-1-13

[8] See Town of Matthews v. United States Dep't of Transp., 527 F. Supp. 1055, 1057 (W.D.N.C. 1981); Save the Niobrara River Ass'n v. Andrus, 483 F. Supp. 861 (D. Neb. 1977); Rankin v. Coleman, 394 F. Supp. 647, 659 (E.D.N.C. 1975).

[9] CEQ, "Memorandum: Questions and Answers About the NEPA Regulations," ("Questions and Answers About the NEPA Regulations") 46 Fed. Reg. 18,026 (1981), as amended by 51 Fed. Reg. 15,168 (1986).

[10] Environmental Defense Fund v. U.S. Army Corps of Eng'rs, 492 F.2d at 1123; Joseph v. Adams, 467 F. Supp. 141 (E.D. Mich. 1978).

Instead of the thorough, searching analysis of alternatives mandated by NEPA, the DEIS identifies a number of alternatives addressed in previous SEPA or PSRC documents and briefly summarizes the utility and impacts of each, based on the assessments made in other, non-NEPA documents.[11] Those alternatives include 1) the use of supplemental or reliever airports; 2) the imposition of demand and system management mechanisms; 3) the imposition of restrictions to divert commuter and/or general aviation flights to other airports; 4) the usefulness of other modes of transportation; and 5) different on-Airport runway lengths.[12] The entire comparative evaluation of all alternatives, and the environmental impacts of alternative on-site airside options, is presented in two two-page summary tables.[13] The detailed analysis of alternatives in the DEIS is reserved for consideration of comparative environmental impacts of the Do-Nothing alternative and three alternative terminal locations coupled with three alternative lengths for a third runway (7,000, 7,500, and 8,500 feet).[14]

The DEIS attempts to justify its cursory, conclusory review of alternatives by referencing the Flight Plan EIS, technical reports prepared during the PSRC's Flight Plan study, and the Major Supplemental Airport Feasibility Study.[15] According to the DEIS, these documents (which are purported to be incorporated by reference in the DEIS) considered "a wide range of alternatives . . . for meeting the air capacity needs of the Puget Sound Region."[16] As discussed elsewhere in these Comments,[17] the Flight Plan EIS, however, was a nonproject (i.e., programmatic) EIS which, in accordance with its purposes, only examined alternatives at

[11] DEIS at II-9 through II-23, II-36 through II-37B.

[12] Id. at II-9 through II-23, II-27, II-36 through II-38.

[13] Id. at II-9A, II-9B, Table II.2-1, II-37A, II-37B, Table II.3-1.

[14] Id. at II-39 through II-42.

[15] Id. at II-9, app. B.

[16] Id. at II-9.

[17] See supra § 1.4.

an abstract and general level and was not prepared to comply with the stringent requirements of NEPA.[18] Throughout the discussion of the affected environment, significant impacts and mitigation measures, the Flight Plan EIS asserts that an evaluation of surface transportation, local land use impacts near airports, regional airport siting questions and specific impacts on the natural environment is deferred and "will be examined in detail in subsequent project-level environmental impact statements (EISs)."[19]

R-4-4

The consideration of alternatives in the Major Supplemental Airport Study similarly was limited to the narrow purposes of that study. When the PSRC prematurely halted the Major Supplemental Airport Study, it precluded detailed consideration of three potential airport sites and in-depth evaluations of the environmental effects of each.

The brief, conclusory listing of alternatives in the DEIS, thus, fails to satisfy the requirements of NEPA or to educate the public and applicable government agencies about the range of actions which are available to satisfy the stated purpose and need for the proposed expansion of Sea-Tac and the costs and benefits associated with each option.

4.1.2 The Scope of Alternatives Which Must be Addressed Under SEPA

SEPA requires that agencies must "[s]tudy, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources."[20] In both EIS preparation and throughout the entire process of agency decisionmaking, the development, analysis and consideration of alternatives is required. The alternatives analyzed need not be exhaustive but should be

[18] See Flight Plan EIS at 3-1 through 3-30. "System alternatives are generic in nature . . . . Site-specific studies to be conducted later will address the more-specific questions of 'Where should we implement the chosen system alternative and how will we make it work?'" Id. at 3-1 (emphasis added).

[19] Id. at 4-95. See also id. at 4-48, 4-56, 4-79.

[20] RCW 43.21C.030(2)(e).

representative of the range of choices[21] to permit intelligent comparative evaluation.[22] Such alternatives "shall include actions that could feasibly attain or approximate a proposal's objectives, but at a lower environmental cost or decreased level of environmental degradation,"[23] even though they would do so outside the authority of an agency with jurisdiction over the proposed project.[24]

R-4-17

SEPA requires that the DEIS for proposed Master Plan Update development actions at Sea-Tac discuss a reasonable number and range of alternatives,[25] including Do-Nothing and delayed actions alternatives.[26] Consideration of the delayed action alternative must discuss the benefits and disadvantages of reserving for some future time the implementation of the proposed action, compared with possible approval at this time. "The agency perspective should be that each generation is, in effect, a trustee of the environment for succeeding generations. Particular attention should be given to the possibility of foreclosing future options by implementing the proposal."[27]

The DEIS is required to "[d]evote sufficient analysis to each reasonable alternative to permit a comparative evaluation. . . ."[28] In Weyerhaeuser v. Pierce County,[29] the

[21] See Toandos Peninsula Ass'n v. Jefferson County, 648 P.2d 448, 454 (Wash. 1982). See also WAC 197-11-440(5)(b)(i).

[22] WAC 197-11-440(5)(c)(v).

[23] Id. 197-11-440(5)(b) (emphasis added).

[24] Rodgers, The Washington Environmental Policy Act, 60 Wash L. Rev. 33, 56-57 (1984).

[25] WAC-11-440(5)(b)(i), (c)(vi).

[26] Id. 197-11-440(5)(b)(ii), (c)(vii).

[27] Id. 197-11-440(5)(c)(vii).

[28] See, e.g., Methow Valley Citizens Council v. Regional Forester, 833 F.2d 810 (9th Cir. 1987) (EIS held inadequate for failure to analyze the expansion of existing ski areas as alternative to building new one); Friends of the Earth v. Hall, 693 F. Supp. 904 (W.D. Wash. 1988) (EIS held inadequate for failure to analyze alternative means of dredge spoil disposal).

Washington Supreme Court, for the first time, addressed the criteria for adequate treatment of alternatives in an EIS:

> There must be a reasonably detailed analysis of a reasonable number and range of alternatives. . . . [T]he alternatives section of the EIS must describe the objectives, proponents and principal features of reasonable alternatives, including the proposed action with any mitigation measures; describe the location of alternatives, including a map, street address and legal description; identify phases of the proposal; tailor the level of description to the significance of environmental impacts; devote sufficiently detailed analysis to each alternative so as to permit a comparison of the alternatives; present a comparison of the environmental impacts of the alternatives; and discuss benefits and disadvantages of reserving implementation of the proposal to a future time.[20]

Applying these criteria to the facts before it, the court concluded that the EIS discussion of a site selection process, which explained why alternative sites were discarded, was insufficient:

> [T]he final EIS do[es] not contain the required discussion. Instead, [the EIS] contains a discussion of LRI's site selection process, and the brief descriptions of rejected sites consist of conclusory statements of LRI's assessment of possible sites examined in the site selection process. They do not contain any location information such as a map, street address, and legal description. They do not contain any description of principal features of any alternatives. They do not tailor the level of description to the significance of environmental impacts, and, in fact, it is impossible from the brief, conclusory descriptions to engage in any meaningful comparison of the alternatives. There is absolutely no useful comparison of the environmental impacts of the alternatives.
>
> The EIS format is telling as to whether these descriptions were ever intended to be a discussion of alternative proposals. They are in a section titled "Site Selection," beginning at page 19. A "Description of Alternatives, Including the Proposal" begins on page 33 of the EIS. The latter section contains some discussion of onsite alternatives but no discussion of offsite alternatives.[21]

[19] 124 Wash.2d 26, 873 P.2d 498 (1994).

[20] Id. at 41.

[21] Id. at 41-42 (emphasis added).

The discussion of alternatives in the DEIS closely fits that which the court found inadequate in Weyerhaeuser. The DEIS contains a brief description of rejected sites and consists of conclusory statements of the Port's and FAA's assessments of possible sites. It does not contain any description of principal features of any alternatives. It does not tailor the level of description to the significance of environmental impacts, and, in fact, it is impossible from the brief conclusory descriptions to engage in any meaningful comparison of the alternatives. There is absolutely no useful comparison of the environmental impacts of the alternatives. The only alternatives discussed in any detail are the Do-Nothing alternative and combinations of three terminal locations (north, south and east) and three runway lengths (7,000, 7,500 and 8,000 feet).[22] The superficial, conclusory consideration of alternatives in the DEIS clearly does not satisfy the legal obligations of the Port under SEPA. R-4-8

Finally, the DEIS totally ignores the SEPA requirement for the inclusion of a delayed action alternative.[23] This failure particularly is important with respect to the development of a third runway at Sea-Tac because the Port has conceded that the Airport expansion is only a short-term solution and that additional airport capacity will be necessary after 2015.[24] If alternatives are available, therefore, which could delay the need for the third runway,[25] a future, more permanent, solution to the air transportation capacity needs in the Puget Sound region might obviate the need for a new runway at Sea-Tac. By impermissibly omitting consideration of a delayed action alternative, the DEIS potentially has foreclosed future options. R-4-17

[22] DEIS at II-39 through II-42.

[23] WAC 197-11-440(5)(b)(ii), (c)(vii).

[24] See Flight Plan EIS at 1-22.

[25] See e.g., Id. at 3-2 (observing that implementation of a broad system management program at Sea-Tac "will delay the time for which other improvements will be needed").

4.1.3 The DEIS Must Address Alternatives Which Meet Each Identified Need

NEPA and SEPA both require that the DEIS examine alternatives for meeting each of the needs identified. The DEIS includes a four-part statement of needs:

(1) Improve the poor weather airfield operating capability in a manner that accommodates aircraft activity with an acceptable level of aircraft delay;

(2) Provide sufficient runway length to accommodate warm weather operations without restricting passenger load factors or payloads for aircraft types operating to the Pacific Rim;

(3) Provide Runway Safety Areas (RSAs) that meet current FAA standards; and

(4) Provide efficient and flexible landside facilities to accommodate future aviation demand.[26]

R-4-18

The DEIS, therefore, must include separate consideration of alternatives and combinations of alternatives -- including a Do-Nothing and a delayed action alternative -- for meeting each of these needs. The fact that these Comments primarily focus on alternative means of meeting the asserted need for improved poor weather airfield operating conditions, does not alter the Port's and FAA's responsibility to conduct a legally sufficient analysis of alternatives for all four identified needs separately and cumulatively.

4.2 THE DEIS FAILS TO ADDRESS THE RANGE OF REASONABLE ALTERNATIVES

According to the DEIS, a new runway purportedly is needed to reduce delays for arrival aircraft in poor weather, because there is a need to "[i]mprove the poor weather airfield operating capability in a manner that accommodates aircraft activity with an acceptable level of

[26] DEIS at II-2.

aircraft delay."[27] As further noted in the DEIS, the "primary purpose [of a third air carrier runway] would be to enable two separate arrival streams to Sea-Tac during poor and good weather . . . ."[28] Data in the DEIS shows that departure delays would be acceptable in the future, with the Do-Nothing alternative, and therefore no new runway would be needed to accommodate departing aircraft.[29]

R-4-7

R-4-8

The DEIS must consider all alternatives which meet the identified need.[30] For reasons explained briefly below, detailed technical analysis would show that the Port could meet its stated need without constructing an additional runway.[31] There are two categories of alternatives which have improperly been omitted from the DEIS: alternative construction scenarios and alternative non-construction scenarios. Because of the omission of such alternatives from the DEIS, it is impossible for the relevant decisionmakers or the public to select among the alternatives identified in the DEIS. While all of the alternatives discussed below are operationally feasible and satisfy the NEPA and SEPA requirements as reasonable alternatives, considerable analysis must be conducted to assess their environmental impacts. Because the Port and FAA have an affirmative obligation under NEPA and SEPA to conduct such analysis, these Comments offer no opinion on the environmental effects of such alternatives.

It is important to note that the ensuing discussion is based upon the untested assumption that the need articulated in the DEIS (i.e., improved poor weather arrival capacity at the Airport) is valid. These Comments do not purport to assess whether that need is valid but are intended to demonstrate that, even if the Port's and FAA's articulated need can be supported, there exist

[27] Id. at II-2.

[28] Id. at II-6 (emphasis added).

[29] Id. at II-4, Table II.1-2.

[30] See id. at II-2.

[31] See infra §§ 4.2.1, 4.2.2.

214

alternatives to meet that need which have not been examined in the DEIS. The following discussion, therefore, cannot be substituted for a thorough revision of the DEIS to include substantive discussion of the environmental impacts of each alternative identified herein.

The analysis which the Commenters have conducted, although not exhaustive, conclusively demonstrates:

- The Port and the FAA improperly have omitted discussion of alternatives which satisfy the purported need at Sea-Tac.
- There is no necessity to build a new runway to satisfy the purported need.
- If the Port and the FAA choose to pursue the excessively costly and unnecessary construction of a new runway, the law will not permit construction of any of the alternatives identified in the DEIS.
- Several build alternatives have less environmental impact than any of the alternatives identified in the DEIS.
- The need can be satisfied without the use of any fill.

Notwithstanding the fact that the omitted alternatives might have less severe environmental impacts, the Commenters would not accept any of the construction alternatives; only the non-construction alternatives could be implemented in an acceptable manner. By identifying no-build alternatives which meet the purported need identified by the Port and the FAA, these Comments demonstrate the impermissibility of constructing a third runway of any length.

In the interest of full disclosure, however, the following Comments identify omitted construction alternatives as well. The reader should not misconstrue the thoroughness of these Comments as an explicit or implicit endorsement of any of the build alternatives. On the contrary, the technical analysis prepared for these Comments validates the position long-held by the Commenters that there is no need to build a new runway at the Airport.

214

R-4-7

4.2.1 DEIS Arbitrarily Dismisses Usefulness of Demand and System Management Mechanisms

The DEIS fails to give proper consideration to non-construction alternatives, such as demand and system management, as a strategy to reduce or eliminate the need for new construction at Sea-Tac. Several conditions require implementation of demand and system management; moreover, the FAA's and the Port's data demonstrate that demand and system management could be effective in reducing average delay at Sea-Tac, thereby satisfying at least part of the need articulated in the DEIS.

- Sea-Tac will be underused most of the time in 2020;
- Feasible demand management options are available;
- Feasible system management options are available.

4.2.1.1 Sea-Tac Will Be Underused Most of the Time in 2020

Data provided in the DEIS indicates that Sea-Tac will be underused most of the time in 2020, and, therefore, demand and system management options would address those infrequent occasions when demand could exceed capacity.

- Departures. Departures represent 50 percent of total annual operations. Delays to departing aircraft are nominal. According to the DEIS, average delays to departures in 2020 -- without a new runway -- would be 2.8 minutes per aircraft which is less than one-half the amount of delay or 28 percent of maximum tolerable delay.[12]
- VFR Arrivals. VFR arrivals represent 38 percent of total annual operations. Delays to arriving aircraft are nominal in VFR1 conditions. The DEIS states that average delays to arrivals in VFR1 conditions in 2020 -- without a new runway -- would be 1.9 minutes per aircraft,[13] which is approximately 30 percent of the

[12] DEIS at II-4.

[13] Id.

amount of the "desirable" delay or 19 percent of maximum tolerable levels of delay.[illegible] Delays in VFR2 conditions also would be similar with the use of appropriate LDA approach procedures.

- IFR Arrivals. IFR arrivals represent 12 percent of total annual operations. Delays to arriving aircraft in IFR conditions depend on variations in runway capacity and arrival demand.[illegible]

R-3-19

TABLE 4-1 shows the occurrence of different weather conditions at Sea-Tac and the arrival runway capacity that corresponds with these conditions for the existing runway system.

As weather conditions worsen, runway capacity decreases. The column for cumulative use shows the percent of the year that weather is at least as good as the corresponding weather condition. For example, weather that is at least as good as VFR2 consists of the percentage of VFR1 weather (56.1 percent) plus the percentage of VFR2 weather (19.7 percent), for a total of 75.8 percent.

[illegible] Id. at II-5.

[illegible] Id. at II-3.

TABLE 4-1

Sea-Tac Weather and Existing Arrival Runway Capacity[illegible]

Weather Conditions	Minimum Ceiling (in feet)	Minimum Visibility	Approach Type	Operational Use (Percent of Year)	Cumulative Use (Percent of Year)	Arrival Capacity (Aircraft per Hour)
VFR1	5,000	5 miles	Dual	56.1	56.1	60
VFR2	2,500	3 miles	Mixed	19.7	75.8	50
VFR3	1,000	3 miles	Single	14.8	90.6	40+
IFR1	800	2 miles	Non-Precision	2.2	92.8	40
IFR2A	400	1 mile	Non-Precision	3.7	96.5	40
IFR2B	200	1800' RVR	Cat I	1.5	98.2	40
IFR3	0	600' RVR	Cat II (700RVR)	1.5	99.7	40
IFR4	0	0' RVR	Cat III	0.3	100.0	24

Notes:
1. Ceilings and Visibilities shown above are the minima for each weather condition
2. RVR = Runway Visual Range
3. VFR = Visual Flight Rules in Visual Meteorological Conditions
4. IFR = Instrument Flight Rules in Instrument Meteorological Conditions

R-3-19

[illegible] Sources: Capacity in VFR1 and IFR4 -- DEIS at II-3.

Capacity in VFR2 -- DEIS at II-3, with correction for 2.5-mile intrail separation rule.

Capacity in VFR3 and IFR1 -- DEIS at II-3, with correction for 2.5-mile intrail separation rule.

Capacity in IFR2 and IFR3 -- FAA Data Package No. 10 at B-57 (shows that capacity in IFR2 and IFR3 is the same as that for IFR1).

Capacity in IFR4 -- DEIS at II-3 (based on the assumption that only one runway can be used regardless of how many runways are built).

Peak hour arrival demand in 2020 during the peak month is 49 aircraft per hour between 6 and 7 pm.[57] Traffic varies, however, over the hours of the day. On a day when peak hour demand is 49 aircraft per hour, arrival demand is less than 40 per hour for 20 of the 24 hours.[58] Traffic also varies over the months of the year. February has the lowest traffic levels, approximately 75 percent of the peak month, with a peak hour demand of 37 arrival aircraft, and no hours when arrival demand exceeds capacity, even in poor weather conditions.

TABLE 4-2 shows these month-to-month fluctuations in traffic volume, and the number of hours per day that arrival demand would exceed IFR arrival capacity. Averaged over the year, this represents approximately 1.5 hours per day and only on those days that experience IFR conditions.

Weather conditions also vary from month to month. July and August have less poor weather conditions than do January and February. Weather conditions also vary from hour to hour. Weather between 6 and 7 pm is better than weather between 6 and 7 am. Therefore, the likelihood that weather would be poor during peak traffic periods is considerably less than that assumed in the DEIS. Even with the conservative weather assumptions, the data shows that demand rarely would exceed arrival capacity. Since poor weather arrival capacity is the problem which the third runway is designed to solve, the DEIS grossly overstates the magnitude of the problem and, therefore, arbitrarily limits the scope of alternative solutions.

R-3-19

[57] DEIS at II-3A.

[58] Id.

TABLE 4-2

Monthly Fluctuation in Demand[59]

Month	Peak Hour Arrivals	Number of Hours per Day With Peak Hour Demand More than Arrival Capacity, for a Day in a Month with IFR Conditions
January	41	1
February	37	0
March	41	1
April	40	0
May	43	2
June	46	2
July	49	4
August	49	4
September	44	2
October	42	1
November	41	1
December	42	1
AVERAGE	43	1.5 hours

The data indicates that departures (50 percent of total operations) have no significant capacity problems, that VFR1 and VFR2 arrivals (38 percent of total operations) have no significant capacity problems, and that on average, IFR arrivals (12 percent of total operations) have only peak hour demand exceeding capacity for 1.5 hours out of every 24 hours (6.25 percent of the average IFR day, or 0.9 percent of total operations).

R-3-19

[59] Sources: DEIS at II-3, Table II.1-1; Data Package No. 11 at 48.

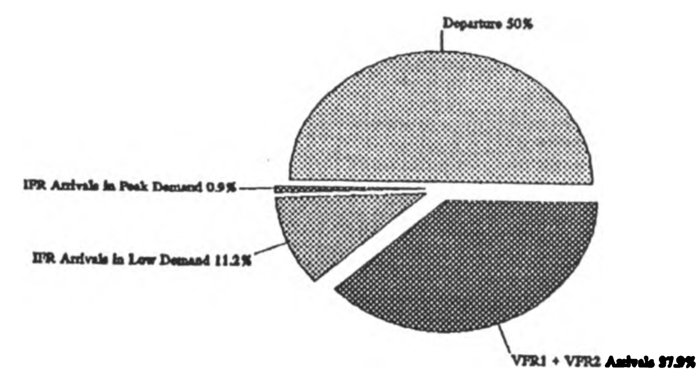
These percentages are shown in FIGURE 4-1, which demonstrates that the proportion of aircraft operations that take place during conditions in which demand exceeds capacity (in IFR conditions and in peak demand periods) is 0.9 percent, while the proportion of aircraft operations that take place during conditions in which there is no capacity constraint is 99.1 percent. The Expert Arbitration Panel[20] also has concluded that the Port has presented no evidence that a significant segment of the delay at Sea-Tac is attributable to the coincidence of peak demand and poor visibility.[21]

R-3-19

[20] See supra § 2.2.2.

[21] Final Phase I Order on Demand/System Management Issues at 4.

FIGURE 4-1
Frequency of Operations in IFR Weather



Proportion of aircraft operations in conditions when demand exceeds capacity

- IFR conditions in peak demand periods 0.9%

Proportion of aircraft operations in conditions with no capacity constraint

- Departures	50%
- VFR1 and VFR2 arrivals	38
- IFR arrivals in low demand conditions	11.1
	99.1%

Peak hour arrival demand during the average day of the peak month in 2020 is approximately 49. Seventy percent of this demand is forecast to be air carrier demand.[22] The remaining 30 percent of total traffic consists of commuter, air taxi, general aviation, and military aircraft operations. Therefore, the peak hour air carrier arrival demand on the average day of

R-3-19

[22] DEIS at 1-20; Technical Rep't No. 5 at 3-21, 5-48.

the peak month in 2020 would be 34. Hourly IFR arrival runway capacity in 2020 would be 40 aircraft per hour. Consequently, air carrier demand in 2020 would be less than the arrival capacity of the existing runways.

Therefore, even for the 9.0 percent of the year during which operations take place in IFR peak hours, air carrier operations could always be accommodated at Sea-Tac with the existing runways through 2020. Demand and system management actions would be necessary only to address commuter aircraft demand.

R-3-19

4.2.1.2 Feasible Demand Management Options are Available

R-4-7

The Port already has identified several feasible demand management options which would meet its asserted need to improve the poor weather airfield operating capability to accommodate projected aircraft activity with an acceptable level of delay.[23]

- The increased use of teleconferencing and electronic communications is estimated to satisfy up to 9 percent of Sea-Tac demand in 2020.[24] The Master Plan Update forecasts have not accounted for this trend in an appropriate manner.

- A gate utilization standard for air carrier airlines could reduce the number of air carrier operations and/or spread operations to off-peak hours by as much as 4 percent.[25]

- Landing fee surcharges or minima can reduce peak hour operations by as much as 7 percent.[26]

---

[23] DEIS at II-9A, II-9B; P&D Aviation and Claire Barrett & Assocs., Information on Demand/System Management Issues Requested by the Puget Sound Regional Council Expert Panel ("Port's Response to Expert Panel") at A-3 (Apr. 13, 1995).

[24] Port's Response to Expert Panel at A-3.

[25] Id.

[26] Id.

R-4-7

- If only 40 percent of the projected air traffic in the Seattle-Portland market were to switch to rail service in the year 2000, up to 2 percent of Sea-Tac total aircraft operations in the year 2000 could be eliminated.[27]

The cumulative impacts of these feasible demand management options have not been assessed in the DEIS. A preliminary assessment indicates that aviation demand at Sea-Tac could be reduced by as much as 22 percent with all of these options.[28] This would reduce the peak hour arrival demand on the average day in 2020 to 38, well below the capacity of the existing runways in both VFR and IFR conditions. At that level of demand, delays would be reduced to desirable levels.

R-4-22

In addition to the above actions, slight peak spreading could keep demand below capacity all year. The number of arrivals in 2020 in the hours immediately before and after the peak hour are forecast to be lower than in the peak hour, as shown in TABLE 4-3.

Minor peak spreading could require the rescheduling only of commuter demand so that overall arrival demand would always be less than in the peak period, as shown in TABLE 4-4.

---

[27] WSDOT Response to Expert Arbitration Panel at 3. The Expert Arbitration Panel has determined that high-speed rail is a feasible demand management tool, the benefit of which has not been fully explored by the Port or the FAA. Final Phase I Order on Demand/System Management Issues at 7. During Phase II of its inquiry on demand and system management options, the Expert Arbitration intends to seek additional evidence from the Port, the FAA, WSDOT and other interested parties on the extent of improvement in rails serves on the Portland-Seattle-Vancouver, B.C. rail corridor that would divert a sufficient number of passengers from Sea-Tac to obviate the asserted need for an additional runway. Id. at 7-8.

[28] Of course, these demand management tools may not be cumulative. Nevertheless, the DEIS acknowledges neither their individual effect on demand nor any more complicated cumulative effect. Although a 22 percent reduction in demand is likely to be a best case scenario, such measures individually could have a significant effect on demand.

TABLE 4-3

Peak Arrivals Hours Without Spreading (2020)[59]

Before Peak Spreading	2pm	3pm	4pm	5pm	Peak Hour 6pm	7pm	8pm	9pm	10pm
Air Carrier arrivals	21	27	16	26	34	29	27	19	18
Commuter/ Other Arrivals	9	11	7	11	«15»	12	11	8	8
Total Arrivals	30	38	23	37	49	41	38	27	26

TABLE 4-4

Effect on Arrivals of Minor Peak Spreading (2020)[60]

After Peak Spreading	2pm	3pm	4pm	5pm	Peak Hour 6pm	7pm	8pm	9pm	10pm
Air Carrier arrivals	21	27	16	26	34	29	27	19	18
Commuter/ Other Arrivals	9	11	13 (+6)	13 (+2)	6 (-9)	11 (-1)	12 (+1)	9 (+1)	8
Total Arrivals	30	38	29	39	40	40	39	28	26

R-4-7

[59] Source: DEIS at II-3, Table II.1-1; Technical Rep't No. 4 at 5-5, Table 5-3.

[60] Source: Analysis prepared for the ACC by Consulting Services, Ltd. based on data in DEIS at II-3, Table II.1-1; Technical Rep't No. 4 at 5-5, Table 5-3.

Thus, all capacity problems in 2020 could be solved by moving a total of only nine commuter arrivals to adjacent hours, without any major disruption to airport activity.[61]

R-4-7 R-4-22

4.2.1.3 Feasible System Management Options are Reasonable Alternatives

Diversion of commuter and general aviation operations from Sea-Tac to other area airports is a potential system management alternative which was not examined in the DEIS; neither have the cumulative impacts of these system management options been assessed completely. A preliminary analysis indicates, that if aviation demand at Sea-Tac could be reduced by up to 28 percent by these options, peak hour arrival demand in 2020 would be reduced to 35, which is significantly below the capacity of the existing runways. Average annual delays would be reduced to approximately 4 minutes per aircraft.

R-3-21B R-4-8

4.2.2 DEIS Ignores Potential Effects of Technology

The DEIS ignores both existing deployed technologies and those likely to become generally available before 2020.[62]

For example, the DEIS fails to recognize the benefit of the recently introduced 2.5-mile intrail separation between aircraft which replaced the previous 3-mile separation requirement. The arrival capacity of Sea-Tac in Instrument Meteorological Conditions ("IMC") previously was

[61] The Expert Arbitration Panel has determined that "a small reduction in the total level of aircraft operations occurring during peak periods can have a significant impact upon the delays that would occur during conditions of poor visibility at the Airport." Final Phase I Order On Demand/System Management Issues at 6.

[62] DEIS at II-9A, II-9B.

36 aircraft per hour,[64] before the rule change put into effect by FAA on April 10, 1995.[63]
With this rule change, capacity has increased to approximately 40 aircraft per hour.[65]

The FAA's analysis of the impact of the new 2.5-mile intrail separation demonstrates that
the reduction in separation from 3 miles to 2.5 miles alone will reduce delays to aircraft
operations by 19.6 percent.[66] The effect of the new separation requirement, however, was
excluded from all the delay estimates shown in the DEIS.

The DEIS also excludes use of other advanced air traffic control technologies that could
increase the capacity of instrument-assisted approaches to Sea-Tac runways in certain weather
conditions. The technologies include a Localizer Directional Aid and Microwave Landing
System approaches,[67] as well as other instrument approaches that will be available as a result
of the implementation of FAA technological advances. The FAA Office of System Capacity and
Requirements has identified Flight Management System, Global Positioning System, Precision
Runway Monitor, and Traffic Alert and Collision Avoidance System technologies that are
expected to permit increased arrival capacity for parallel runways by the year 2005:[68]

> FMS-flight path navigation procedures are expected to allow a reduction in
> weather minimums and offer alternative arrival paths for FMS-equipped
> aircraft.... Use of an LDA approach in conjunction with an ILS approach on
> adjacent closely spaced runways allows an additional arrival stream in weather
> minimums lower than those required for visual approaches. This procedure has
> been in use for several years at St. Louis Lambert Field and more recently at San

R-3-21B
R-4-9

---

[63] Fed. Aviation Admin., Northwest Mountain Region, Decision and Order at 11.3-2 (Apr. 1990).

[64] Port's Response to Expert Panel at A-7.

[65] Fed. Aviation Admin., Aviation System Capacity Annual Report ("1993 Aviation System Capacity Rep't") at 14 (Oct. 1993).

[66] Data Package No. 11 at 48.

[67] DEIS at II-21.

[68] 1993 Aviation System Capacity Rep't at 13-17; Fed. Aviation Admin., 1994 Aviation Capacity Enhancement Plan at 5-6 through 5-8, 5-13 (Oct. 1994); Fed. Aviation Admin., Capacity Initiatives, vol. 2 at 4-11 (Feb. 1994).

> Francisco International Airport. St. Louis has experienced a capacity gain of
> about 18 arrivals per hour.[69]

A very conservative perspective on the results which could be achieved from the
technologies listed above is that dual approaches could be made to runways separated by 800 feet
in IFR1 conditions, and that independent approaches could be made to runways separated by
2,500 feet in IFR2 through IFR4 conditions.

The FAA's wake vortex program is investigating ways to support a reduction in the
2,500-foot requirement under most meteorological conditions. Reducing the separation required
by wake vortex considerations would improve capacity for both arrivals and departures.[70] An
FAA analysis of the impact of reduced separations required by wake vortex considerations
already has demonstrated that such a reduction would reduce delays to aircraft at Sea-Tac by
12.9 percent.[71]

R-3-21B
R-4-9

4.2.3. DEIS Arbitrarily Dismisses Off-Airport Alternatives

The DEIS dismisses the use of other regional airports as a potential solution to the need
to reduce general aviation, commuter, and air carrier operations. Boeing Field and Paine Field
are examples of underused facilities that could be alternative airports for some of the forecast
air traffic, thereby reducing peak-hour demand at Sea-Tac.[72]

R-4-4

---

[69] 1993 Aviation System Capacity Rep't at 14-15.

[70] Id. at 15.

[71] Data Package No. 11 at 48.

[72] It is important to stress that these Comments do not endorse use of Boeing Field in any manner. As
explained, supra, this alternative is discussed here to illustrate the substantive defects of the DEIS and not to suggest
any support whatsoever for the use of BFI. Just because the Commenters vigorously oppose increased use of BFI
does not excuse the Port's and the FAA's failure to examine such usage as a reasonable alternative under the
standards of NEPA and SEPA.

Two airside, off-airport alternatives that must be considered are 1) the diversion of commuter operations to Boeing Field; and 2) the diversion of certain operations to Paine Field.

The Port's forecast states that commuter operations will represent approximately 30.8 percent of total operations in 2020. If all commuter operations were diverted, annual demand in 2020 would decrease to approximately 325,000, less than the number of operations at Sea-Tac today.[22] Based on annual demand of 325,000 operations, average annual delays to aircraft in 2020 would be approximately 4 minutes, with the Do-Nothing Sea-Tac development alternative.

The technical report prepared for the Port shows that approximately 1,100 domestic passengers per day on commuter aircraft (44 percent of a total of 900,000 commuter passengers per year) are expected to connect to other flights in 2020.[23] A bus or fixed-link transportation system could be built to transport the passengers connecting from commuter to air carrier aircraft at a cost substantially less than cost the of constructing a third runway.

If 20 percent of all operations were to move to Paine Field, annual demand at Sea-Tac would be 353,300 in 2020, which is similar to the number of operations using Sea-Tac today. Average annual delays to aircraft in 2020 at Sea-Tac then would be approximately 5 minutes, with the Do-Nothing Sea-Tac development alternative.

R-4-4

[22] The Expert Arbitration Panel observed that the structure of air demand at Sea-Tac, including large numbers of flights to and from Portland and Vancouver, B.C. -- especially during peak periods -- adds significantly to airport congestion. Based on those facts, the Expert Arbitration Panel indicated that "improved rail service along the Portland-Seattle-Vancouver corridor . . . could have a significant impact on the level and pattern of aircraft operations at Sea-Tac and might allow the [Port] to defer construction of the third runway without suffering unacceptable amounts of delay at the Airport." Final Phase I Order on Demand/System Management Issues at 6 (emphasis added).

[23] Technical Rep't No. 5 at 5-20, Table 5-8.

As noted in the PSRC Major Supplemental Airport Study,[24] the movement of traffic to an airport in Snohomish County would result in lower regional costs and environmental impacts.[25]

R-4-4

4.2.4 DEIS Arbitrarily Dismisses On-Airport Alternatives Which Do Not Provide for a 7,000 to 8,500 Foot Runway

4.2.4.1 Alternative Runway Lengths Arbitrarily Omitted

The asserted need for additional poor weather capacity could be accommodated by a new runway designed only for arrivals; and such a runway would not have to be designed to accommodate departures. Since a runway required for arrivals may be shorter than one required for departures, a shorter runway could meet the stated need with lower environmental, economic and social costs than those associated with the alternatives identified in the DEIS.

Runway landing length analysis was performed as part of the preparation of the Master Plan Update.[26] The length requirements were established for landing weights that are 90 percent of maximum landing weight. The runway length values are conservative, because landing aircraft typically have a decreased load of fuel.

Landing-length requirements for commuter, general aviation and military operations are 3,300 feet with a dry runway and 3,800 feet with a wet runway.[27] Therefore, a 4,000-foot runway could accommodate all current commuter, general aviation and military operations (38.4 percent of total operations) as well as those forecast for 2020 (30.8 percent of total operations).

R-4-11
R-4-12

[24] Feasibility Study of a New Major Supplemental Airport (1994), reprinted in DEIS, app. B, at B-4 through B-18.

[25] Id. at B-7.

[26] See Technical Rep't No. 6 at 2-19, 2-20, Tables 2-8 and 2-9.

[27] Id. at 2-20, Table 2-9.

An additional portion of the aircraft mix in 2020 could be accommodated on a new runway if its length were increased to 5,200 feet. A 5,200-foot runway could accommodate 92.1 percent of total operations in the year 2000 in dry runway conditions and 67.6 percent in wet runway conditions. In 2020, these values would become 91.0 percent in dry runway conditions and 63.7 percent in wet runway conditions. TABLE 4-5 shows the percentage of total landing operations that could be accommodated on a 5,200-foot runway, taking into account the differences between runway requirements in dry and wet runway conditions.

R-4-11
R-4-12

TABLE 4-5

Percentage of Total Landing Operations Which Could be Accommodated by a 5200-Foot Runway[27/]

	2000		2020	
	Dry	Wet	Dry	Wet
Commuter/GA/ Military	38.4	38.4	30.8	30.8
Air Carrier	53.7	29.2	60.2	32.9
Total	92.1	67.6	91.0	63.7

An additional portion of the aircraft mix in 2020 could be accommodated on a new runway if its length were increased to 6,000 feet. A 6,000-foot runway could accommodate 91.0 to 96.5 percent of all 2020 landing operations. TABLE 4-6 summarizes the percentage of total landing operations that could be accommodated on runways of different lengths.

[27/] Source: Technical Rep't No. 6 at 2-19, 2-20, Tables 2-8, 2-9.

TABLE 4-6

Percentage of Total Operations That Could be Accommodated on Third Runway[28/]

	4000-Foot Runway	5200-Foot Runway	6000-Foot Runway	8500-Foot Runway
2000				
Commuter/GA/Military	38.4%	38.4%	38.4%	38.4%
Total	38.4%	67.6%	92.1%	99.8%
2020				
Commuter/GA/Military	30.8%	30.8%	30.8%	30.8%
Total	30.8%	63.7%	91.0%	99.7%

It is significant that increasing the length of a new runway from 6,000 feet to 8,500 feet would provide only a minimal increase in the percentage of aircraft that could land on a wet runway and still would not permit use by all aircraft.[29/] The small benefit to be derived from the additional 2,500 feet would be far outweighed by the enormous construction cost -- in excess of $100 million -- for the additional length.

The FAA investigated the benefit to be obtained by increasing the length of the proposed runway in order to accommodate all heavy aircraft,[30/] and demonstrated that allowing all heavy jets to use a new runway achieved only a 3.5 percent decrease in delays (from 3.95 minutes to

R-4-11
R-4-12

[28/] Source: Technical Rep't No. 6 at 2-19, 2-20, Tables 2-8, 2-9.

[29/] Data Package No. 11 at 48.

[30/] Heavy aircraft represent 15.5 percent of the mix in 2000 and 28.1 percent in 2020.

3.82 minutes per aircraft)[12] but resulted in significantly increased construction costs. A 6,000-foot runway could accommodate all large transport jet aircraft and some heavy jets, such as the B-767-200 and -300. The development of an 8,500-foot runway rather than a 6,000-foot runway would result in only a marginal improvement in delay at an enormous financial and environmental cost.[13]

Each of the alternative runways described above would have its southern threshold in the vicinity of Station 123+50, the southern threshold of the 8,500-foot runway described in the DEIS.

R-4-11
R-4-12

4.2.4.2 The DEIS Impermissibly Omits Consideration of Runways Less than 7,000 Feet Long

The DEIS considers only the development of a third runway of at least 7,000 feet. However, a runway shorter than 7,000 feet would meet any need to improve poor weather airfield capacity at Sea-Tac. Six airside alternatives with runway lengths of less than 7,000 feet are explained below and illustrated in FIGURES 4-2 and 4-3:

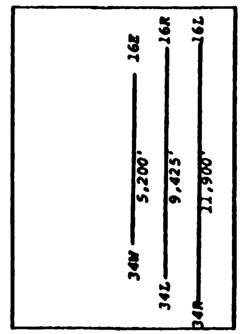
A. 5,200-Foot Runway, 1,500 feet west of Runway 16L-34R.
B. 6,000-Foot Runway, 1,500 feet west of Runway 16L-34R.
C. 4,000-Foot Runway, 2,500 feet west of Runway 16L-34R.
D. 5,200-Foot Runway, 2,500 feet west of Runway 16L-34R.
E. 4,000-Foot Runway, parallel to Boeing Field Runways 13-31.
F. 5,200-Foot Runway, parallel to Boeing Field Runways 13-31.

[12] Data Package No. 11 at 48.

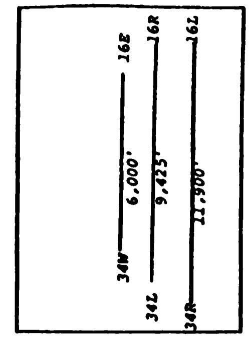
[13] An extra 15 percent in landing length might be required in Cat III-B weather conditions, when RVR is less than 600 feet. However, Cat III-B conditions only occur 0.3 percent of the year, including periods when the Airport is closed. This additional runway length would not be required in Category III-B conditions when pilots elect to use the aircraft automatic braking system. While some aircraft might require additional runway length in Cat III-B conditions and would request use of a longer runway, infrequent occurrence of Category III-B conditions means that such conditions have little, if any, impact on average annual aircraft delays.

FIGURE 4-2

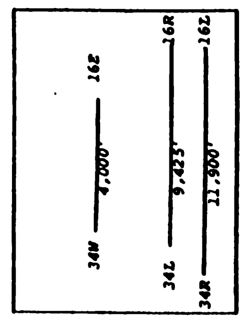
Schematic Drawings of Alternative Runway Configurations



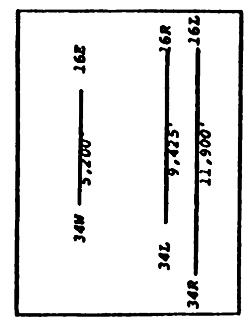
A. 5,200' Runway
1,500' West of 16L-34R



B. 6,000' Runway
1,500' West of 16L-34R



C. 4,000' Runway
2,500' West of 16L-34R

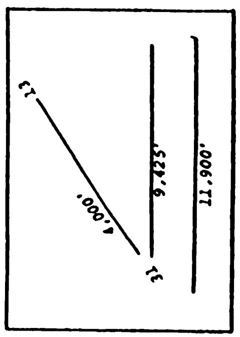


D. 5,200' Runway
2,500' West of 16L-34R

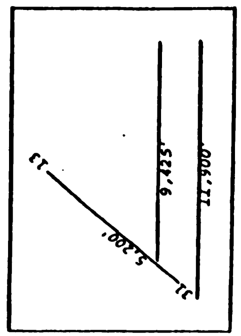
R-4-11
R-4-12

FIGURE 4-3

Schematic Drawings of Alternative Runway Configurations



E. 4,000' Runway
Parallel to BFI 13-31



F. 5,200' Runway
Parallel to BFI 13-31

R-4-11
R-4-12

A. <u>5,200-Foot Runway, 1,500 feet west of Runway 16L-34R</u>. A 5,200-foot runway could accommodate more than 90 percent of landing operations in dry runway conditions and approximately 65 percent in wet runway conditions. These percentages include all commuter aircraft and half or more of air carrier operations.

The FAA has analyzed the impact of a commuter runway located 1,500 feet west of 16L-34R.[illegible] FAA data shows that a combination of a commuter runway 1,500 feet west of 16L-34R with the 2.5-mile intrail separation now in place, would produce average delays to aircraft of only approximately 9 minutes.[illegible]

A commuter terminal could be built to the west of the new runway, connected to the passenger terminal via bus or fixed-link transit system.

B. <u>6,000-Foot Runway, 1,500 feet west of Runway 16L-34R</u>. A 6,000-foot runway could accommodate 91 to 97 percent of all 2020 landing operations.

A commuter terminal could be built to the west of the new runway, connected to the passenger terminal via by bus or fixed transit system.

C. <u>4,000-Foot Runway, 2,500 feet west of Runway 16L-34R</u>. A 4,000-foot runway would provide capacity for all commuter arrivals and most commuter departures. Some commuter departures also could use an existing runway such as Runway 16L-34R. A 4,000-foot runway would accommodate all current commuter, general aviation, and military landings (38.4 percent of total operations) and all landings forecast for 2020 (30.8 percent of total operations).

R-4-11
R-4-12

[illegible] Data Package No. 11 at 48.

[illegible] <u>Id.</u>

FAA data shows that a commuter runway located 2,500 feet west of 16L-34R, together with the 2.5-mile intrail separation now in place, would result in average aircraft delays of 5 to 6 minutes.[17]

A commuter terminal could be built between the new runway and Runway 16L-34R, connected to the passenger terminal via bus or fixed link transit system.

D. <u>5,200-Foot Runway, 2,500 feet west of Runway 16L-34R</u>. A 5,200-foot runway could accommodate more than 90 percent of landing operations in dry runway conditions and approximately 65 percent in wet runway conditions. These percentages include all commuter aircraft and half or more of all air carrier operations.

FAA data shows that a 5,200-foot runway located 2,500 feet west of 16L-34R, together with the 2.5-mile intrail separation now in place, also would result in average delays to aircraft of 5 to 6 minutes.[18]

R-4-11
R-4-12

A commuter terminal could be built between the new runway and Runway 16R-34L, connected to the passenger terminal by bus or fixed link transit system.

E. <u>4,000-Foot Runway, parallel to Boeing Field Runways 13-31</u>. A 4,000-foot runway, located west of Runway 16R-35L and parallel to BFI Runways 13-31 would provide for all commuter arrivals. Commuter departures could use an existing runway such as Runway 16R-34L.

A 4,000-foot runway could accommodate all current commuter, general aviation, and military landings (38.4 percent of total operations) and all landings forecast for 2020 (30.8 percent of total operations). A 4,000-foot commuter runway located parallel to BFI runways

[17] Id.

[18] Id.

13-31, together with the 2.5-mile intrail separation now in place, would result in average delays to aircraft of 5 to 6 minutes.[19]

Orienting the runway parallel to Boeing Field ("BFI") Runways 13-31 would avoid the interaction with (and capacity constraints imposed by) BFI operations that occurs with any of the parallel third runway options.[20]

A commuter terminal could be built west of Runway 16R-34L, connected to the passenger terminal by bus or fixed link transit system.

F. <u>5,200-Foot Runway, parallel to BFI Runways 13-31</u>. A 5,200-foot runway would accommodate more than 90 percent of landing operations in dry runway conditions and approximately 65 percent of landings in wet runway conditions. These percentages would include all commuter aircraft and at least half of air carrier operations.

R-4-11
R-4-12

Orienting the runway parallel to BFI Runways 13-31 would avoid the interaction with (and capacity constraints imposed by) BFI operations.

A commuter terminal could be built west of Runway 16R-34L, connected to the passenger terminal by bus or fixed link transit system.

4.2.4.3 <u>Delays to Aircraft</u>

The amount by which an additional parallel runway could reduce aircraft delay depends both on its separation from Runway 16L-34R and on the number of aircraft that could use the new runway.

An FAA analysis of the impact of a commuter runway 1,500 feet west of 16L-34R concludes that with such a runway, average delays to aircraft would be approximately 11

[19] Id.

[20] <u>See infra</u> § 4.2.4.4.

214

minutes.[21] When combined with the 2.5-mile intrail separation rule which has been implemented since the FAA analysis was completed, average delays to aircraft would be reduced to approximately 9 minutes.[22]

The FAA also analyzed the impact of a commuter runway 2,500 feet west of Runway 16L-34R.[23] The FAA data shows that with the addition of such a runway, average delays to aircraft would be approximately 6 minutes.[24] When combined with the new 2.5-mile intrail separation rule, average delays to aircraft would be reduced to approximately 5 minutes.[25]

These low (and acceptable) delays can be understood by reference to a comparison of arrival demand with arrival capacity for the peak hour during an average day of the peak month.

Data in the DEIS show that the peak hour for arrivals occurs between 6 and 7 pm, when 49 arrivals are forecast to take place in 2020.[26] The 49 arrival aircraft consist of 36 air carriers, 12 commuters, and 1 general aviation aircraft.[27] Since the capacity of a single arrival stream is 36-40 aircraft per hour, all air carrier arrival operations could be accommodated on the existing runways. The 12 commuter aircraft could be accommodated on a new commuter-length runway.

It is likely that advances in air traffic control (ATC) technology by 2020 would permit independent approaches to parallel runways separated by 2,500 feet, and the arrival capacities of the two runways could be added together to achieve a capacity significantly in excess of the hourly demand. If the technology were not available by 2020, existing ATC procedures would

R-4-11
R-4-12

[21] Data Package No. 11 at 48.

[22] Id.

[23] Id.

[24] Id.

[25] Id.

[26] DEIS at II-3A, II-35A, Exhibits II.1-1 and II.2-3.

[27] Technical Rep't No. 5, at 5-48.

214

allow dependent parallel approaches to the two runways with a capacity that also is sufficient to accommodate the demand.

This analysis of data provided by the Port and the FAA demonstrates that alternatives with runway lengths of less than 7,000 feet (with either a 1,500 or 2,500-foot separation from Runway 16L-34R) meet the stated purpose and need for the proposed Airport expansion. A runway of 4,000 feet also would be sufficient to accommodate all commuter landings and, therefore, meet the Port's and FAA's stated need.

4.2.4.4 Boeing Field Interactions

Conflicts between aircraft using Boeing Field and Sea-Tac would reduce the benefits of any new runway. The DEIS does not examine the effects of a new Sea-Tac runway on BFI. If there were any negative effects of such a runway, they would have to have appeared in the DEIS. Therefore, it is fair to conclude that the Port and the FAA intend for any capacity interaction penalties to be taken at Sea-Tac not BFI. Aircraft using the proposed new runway at Sea-Tac in poor weather conditions would conflict with aircraft using BFI and reduce the effectiveness of the runway at Sea-Tac.[28] As a result, the benefits of a new runway are greatly overstated in the DEIS.

R-4-11
R-4-12

These interactions would occur in three situations.

- North Flow Instrument Meteorological Conditions - Sea-Tac would not accommodate traffic even with a new runway;
- South Flow Instrument Meteorological Conditions - Sea-Tac capacity gains from a new runway would be small and would reduce BFI Capacity; and
- South Flow Visual Meteorological Conditions - Sea-Tac capacity gains from a new runway are not assured.

[28] See generally Aviation Simulations Int'l, Inc., Impact of Boeing Field Interactions on the Benefits of a Proposed New Runway at Seattle-Tacoma International Airport ("Impact of Boeing Field Interactions"). (Prepared for Fed. Aviation Admin., Northwest Mountain Region (July 1992) (attached to these Comments as app. 6.)

When problems caused by the interaction with BFI are taken into consideration, the total poor weather arrival capacity of Sea-Tac with a new runway would be only 36-45 aircraft per hour. Since the current arrival capacity of Sea-Tac with a single arrival stream is approximately 40 aircraft per hour, the gain to capacity with the new runway would be questionable and, in fact, there might even be a loss in capacity (from -10 percent to +12 percent).

> During [Instrument Meteorological Conditions ("IMC")], horizontal separation must be maintained between [Sea-Tac] departures and BFI arrivals and between [Sea-Tac] departures and BFI departures. Basically, no flights may go into or out of BFI while flights depart from [Sea-Tac] during IMC.
>
> In the simulation, [performed as part of the study,] no [Sea-Tac] departures from any runway were allowed when a BFI [arrival] was within 4 nm of touchdown. No BFI departure was allowed after a [Sea-Tac] departure until the [Sea-Tac] departure had passed BFI.
>
> The new runway did not alleviate the impact of north flow interactions so this would become the limiting capacity. At the highest, year 2015 demand level, the departure queue at [Sea-Tac] backed up, preventing all taxiing. It was therefore not possible to provide annualized cost data for this demand level.[99]

R-3-30
R-4-11
R-4-12

FIGURE 4-4 illustrates that a single arrival to BFI stops the arrival flow onto the new runway for a significant period.[100] For typical approach speeds (120 to 150 knots), the 10 nautical miles separation required between arrivals to the new runway is equivalent to 4 to 5 minutes, limiting the capacity of the new runway to 12 to 15 arrivals per hour when aircraft are using BFI.

There will be five hours each day with 10 or more arrivals per hour at BFI.[101] As a result, disruptions to the capacity of the new runway will be essentially continuous during these hours.

[99] Id. at 23.

[100] Id. at 20.

[101] Data Package No. 11 at 18.

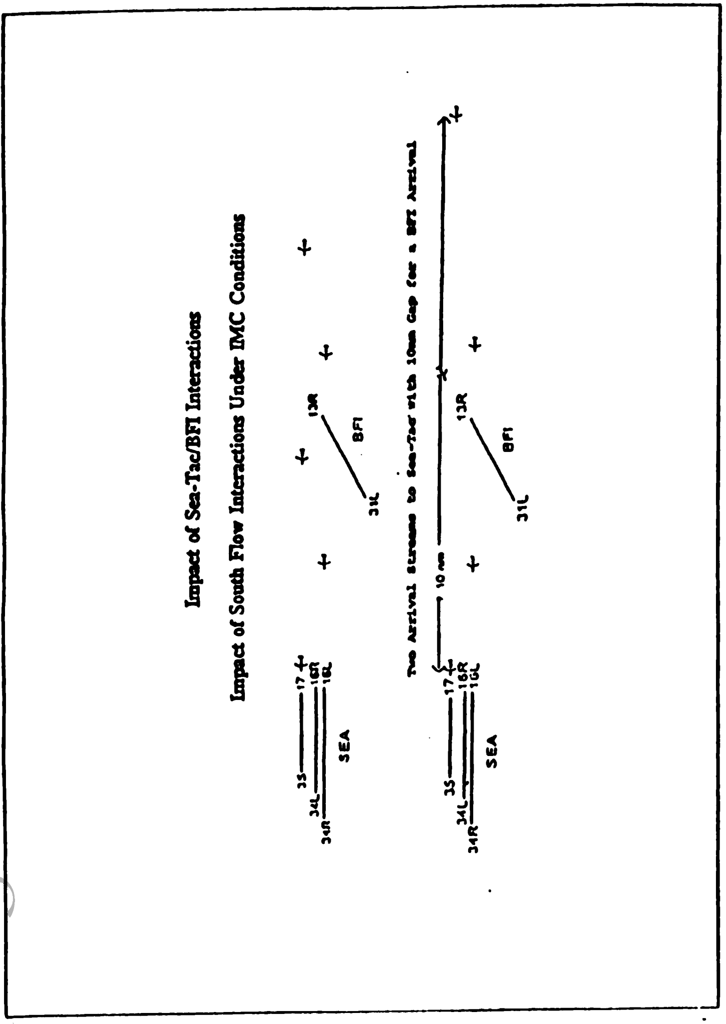
As shown in FIGURE 4-4, the FAA intends to use dependent instrument approaches to Runway 16L and the new runway. Therefore, any disruption of the new runway arrival flow will also disrupt arrivals to Runway 16L, thereby also reducing its capacity. Up to two aircraft could arrive on Runway 16L in each 10-mile gap between aircraft approaching the new runway. Therefore, the capacity of 16L for arrivals is 24-30 arrivals per hour, when it is used as a dependent runway in conjunction with the new runway, and the total arrival capacity of Sea-Tac with the new runway would be limited to 36-45 aircraft per hour based on projected interaction with BFI. Since the current arrival capacity of Sea-Tac with a single arrival stream is approximately 40 aircraft per hour, the gain in capacity with the new runway is questionable and may be a loss in capacity.

Arrivals to Runway 16L are independent of BFI arrivals only when special procedures are in place.[102] In weather conditions which allow the BFI Air Traffic Control Tower ("ATCT") to see the Sea-Tac arriving aircraft, visual separation is provided by the controllers and no loss in capacity is experienced. This operating arrangement is known as Plan Alpha. Cloud ceilings at BFI must be at least 2,500 feet for Boeing ATCT personnel to see Sea-Tac arrivals. The yearly occurrence of south flow conditions with ceilings below 2,500 feet (no Plan Alpha) is approximately 17 percent. However, the actual time of this impact on capacity is less because of special ATCT procedures. Under these procedures, during certain weather conditions, and for pilots familiar with BFI, aircraft approaching Sea-Tac are advised to maintain 3,000 MSL until the BFI ATCT advises TRACON that the landing of the other aircraft at BFI is assured. At this point, the Sea-Tac approaching aircraft is given final approach clearance and authorization to land. If the BFI approach pilot executes a missed approach, TRACON vectors the Sea-Tac approach back into the arrival stream and one arrival interval slot is lost in arrival capacity at Sea-Tac. However, this situation occurs very rarely. If the pilot's familiarity with BFI is unknown, the TRACON will leave an interval or empty slot in the Sea-Tac arrival stream in order to provide for a potential missed approach at BFI. This situation results in the loss of

R-3-30
R-4-11
R-4-12

[102] Technical Rep't No. 4 at 3-10.

FIGURE 4-4



one or two arrival intervals in the arrival capacity of Sea-Tac. The frequency of this occurrence is dependent on arrival demand at the two airports and the percentage of low familiarity pilots in the arrival stream to BFI.

BFI-Sea-Tac interactions also may occur in Visual Meteorological Conditions.

> Presently, because of special procedures, the south flow arrival streams to the existing runways do not require a gap for BFI arrival because vertical separation exists between the normal approach streams, and controllers closely monitor the BFI arrivals for the first sign of a missed approach. [Proposed] Sea-Tac Runway 17, however, is approximately 1,700 feet west of Sea-Tac Runway 16R so that arrivals to Runway 17 will cross the BFI arrival stream while the BFI flights are still airborne. It has not as yet [been] determined whether the [Plan Alpha] procedures can be extended to permit the BFI arrivals to cross without a gap in the Sea-Tac Runway 17 arrival stream.[159]

Adding a new runway at Sea-Tac parallel to BFI Runways 13-31 would overcome this problem and would provide additional capacity for commuter arrivals to the south in VFR and IFR1 weather conditions. With the introduction of additional technology, the weather minimums for this converging approach with arrivals to Runways 16L or 16R could be reduced in the future.

Therefore a runway parallel to BFI Runways 13-31 appears to offer the only opportunity for significant IFR runway capacity increases at Sea-Tac. R-3-30 R-4-11 R-4-12

4.2.4.5 The DEIS Fails to Consider Feasible Landside Alternatives

The DEIS fails to consider landside alternatives that would support a runway less than 7,000 feet long. For example, a separate commuter terminal could be built adjacent to the new runway to provide gate positions and other facilities for all commuter aircraft using the airport. With a 1,500-foot separation between the new runway and Runway 16L-34R, the commuter R-4-11

[159] Impact of Boeing Field Interactions at 18.

terminal could be placed to the west of the new runway. With a 2,500-foot separation between the new runway and Runway 16L-34R, the commuter terminal could be placed between the new runway and Runway 16R-34L. In each case, all crossings of an active runway by commuter aircraft would be eliminated and the number of runway crossings by air carriers (which are a major problem with the alternatives proposed in the DEIS) would be minimized.

The commuter terminal could be connected to the passenger terminal by bus (such as that which is in use by United Express at Los Angeles and San Francisco International Airports), or by a fixed-link transit system similar to that currently in use at Sea-Tac.

Depending on the specific requirements of Horizon, United Express, and other commuter carriers, full commuter terminal facilities could be constructed mid-field at minimum cost. Moving commuter operations from the passenger terminal also would reduce, and most likely eliminate, the need to provide additional terminal linear frontage for air carrier gates. Current and forecast gate requirements are shown in TABLE 4-7.

R-4-11

TABLE 4-7

Gate Requirements[104]

Year	Total Number of Gates		Terminal Frontage (Linear Feet)
	Parking Positions	Narrow Body Equivalents	
1993	75	90	12,100
2000	86	103	13,800
2010	94	113	15,100
2020	100	121	16,300

[104] Source: DEIS at II-28.

Inasmuch as approximately 30 percent of aircraft operations in 2020 are projected to be commuter aircraft, diverting commuter aircraft from the existing passenger terminal would provide sufficient narrow body equivalent gate space to accommodate future growth in air carrier operations through 2020 without the need for additional gates in the main terminal facility.

4.2.5 The DEIS Arbitrarily Dismisses the Use of a Combination of Alternatives

A combination of alternatives is a valuable means to achieve the stated need. The DEIS lists various combinations of alternatives only briefly before dismissing all such combinations without proper analysis or consideration.[105] The combination of use of other transportation modes, use of existing airports, and activity/demand management are the only combinations considered, which are referred to in the DEIS as "blended alternatives."

In addition to those mentioned and then summarily dismissed in the DEIS, combinations of the following alternatives must be considered:

R-4-11

R-4-18

Airside

A1. Technology which permits 2.5 miles intrail separation in IFR conditions.

A2. Technology which permits dual approaches to runways separated by 800 feet in IFR1 conditions.

A3. Technology which permits independent approaches to runways separated by 2,500 feet in IFR2 through IFR4 conditions.

A4. Alternatives with runways of length 4,000, 5,200, and 6,000 feet.

A5. Alternatives with runways separated by 1,500 feet.

A6. Alternatives with runways not parallel to Runway 16L-34R.

[105] DEIS at II-9A, II-9B.

1400

214

A7. Alternatives with runways with different threshold elevations.

A8. Demand management techniques.

A9. System management techniques.

A10. Deferred implementation alternatives.

A11. No extension of Runway 16L-34R.

A12. Diversion of operations to Boeing Field.

A13. Diversion of 20 percent of operations to Paine Field.

A14. Elimination of new air traffic control tower.

A15. Elimination of mid-field overnight parking apron.

A16. Elimination of new general aviation and/or corporate aviation facilities.

A17. Elimination of new dual 34L south parallel taxiway and bridge.

A18. Do-Nothing alternative for airside only.

R-4-11
R-4-18

Landside

L1. Mid-field commuter terminal.

L2. No additional gates at passenger terminal.

L3. Landside alternative identified in the DEIS.

L4. Off-airport facilities for TRACON, employee parking, and/or passenger parking

L5. No on-airport hotel.

L6. No new on-airport parking.

L7. No new on-airport cargo facilities and/or cargo development at Boeing Field.

214

L8. No implementation of the South Aviation Support Area.

L9. No development of the Des Moines Creek Technology Campus.

L10. Landside Do-Nothing alternative.

It is especially important that the Port and the FAA examine alternatives that include a mix of actions for some facilities and no actions for others. An example of such a combination-action and no-action alternative that must be considered is a combination of the following elements listed above:

A1; A4 (at 5,200 feet); A10 (until the year 2005) A12; A15; L1; L2; L4; L6.

R-4-11
R-4-18
R-4-17

4.2.6 DEIS Fails to Consider Deferred Implementation Alternatives

In addition to the decision as to which options, if any, to build or implement, there is also the question of when to implement various Airport expansion alternatives. SEPA requires that a deferred action alternative be considered.[189] The DEIS completely omits any consideration of a deferred action alternative. The DEIS, therefore is incomplete and invalid on its face.

Where feasible, it is prudent to defer actions. When actions are deferred their costs are deferred; adverse impacts are deferred, and options are kept open to respond to changing conditions and needs. Premature commitment to a particular action may preclude options that may be preferable as a result of changing circumstances or new technology.

Recognizing that there are uncertainties both in the forecast and with respect to other aviation-related decisions in the region, it is prudent to have a flexible plan for development of Sea-Tac through the year 2020 that can respond to events as they occur between now and 2020. Examples of significant uncertainties which could fundamentally alter the need for the Airport development actions in the next 25 years include:

[189] WAC 197-11-440(5)(c)(vii).

- Airline fleet purchase and market service choices;
- National and regional economic development;
- Development at other airports in the region;
- Improvements to other transportation modes; and
- Availability of new technologies.

There is no urgency with respect to a decision to construct a third runway, because:

- The increase in demand between 1993 and 2000 is forecast to be only 5 additional aircraft arrivals in the peak hour. The 2.5-mile in-trail separation requirement already has provided immediate additional IFR runway capacity. Therefore, delays in 2000 are expected to be similar to those experienced in 1993, even with a Do-Nothing alternative.

- Delays in 2020 are restricted to less than 1 percent of aircraft operations. Therefore, a deferred action alternative is likely to have a higher benefit-cost ratio than early implementation alternatives, because it would defer costs and adverse impacts without significantly affecting the vast preponderance of all aircraft operations.[107]

R-4-11

4.2.7 DEIS Fails to Consider Alternatives That Reduce Construction Costs and Impacts

Analysis of the alternative airside development options in the DEIS arbitrarily dismisses two types of options for runway construction that could minimize construction costs and construction impacts:

1. Change the south threshold of third runway so that it is in the vicinity of Station 123+50.

[107] The DEIS also should have considered delaying certain actions (e.g., the construction of a third runway) while going forward with other actions (e.g., landside actions).

2. Reduce elevation of north threshold of new runway.[108]

These options would offer the opportunity to reduce the construction cost and the adverse impact associated with the proposed enormous on-site fill and transportation of fill material from on- and off-site borrow areas.[109]

These options should have been considered in the DEIS.

R-4-11

[108] FAA airport design standards allow runway gradients on the order of one percent. Fed. Aviation Admin., Advisory Circular 150/5300-13, Airport Design ¶ 502 (1989). Reducing the gradient of the planned third runway, and thereby reducing the elevation of the north threshold, could significantly reduce the amount of fill and reduce the costs of building a new runway.

[109] See infra § 5.2.

5.0 SPECIFIC ENVIRONMENTAL IMPACTS

R-5-4

5.1 THE ANALYSIS OF NOISE IMPACTS IN THE DEIS IS INADEQUATE

5.1.1 Communities in the Vicinity of Seattle-Tacoma International Airport Already Experience High Levels of Aircraft Noise

High aircraft noise levels presently have a negative impact on the ACC, Federal Way, Mercer Island and other communities surrounding Sea-Tac.[1]

Severe noise problems in the vicinity of the Airport prompted the Port to prepare a noise compatibility plan (the "NCP") in accordance with FAA regulations[2] and to enter into a Mediation Agreement with Airport users, the FAA, local governments and community groups.[3] Although the Mediation Agreement was intended to produce an overall reduction in noise exposure levels of approximately 50 percent in communities near Sea-Tac, it did not contemplate the construction of a third runway and a projected increase of at least 100,000 operations a year at the Airport over the next 25 years.

R-6-1A

Despite the Port's NCP and implementation of the Mediation Agreement, a recent empirical field study (the "Social Survey") of responses to community noise levels in the vicinity of Sea-Tac documented the fact that a large majority of residents in the ACC, Federal Way and Mercer Island have not noticed any reduction in aircraft noise.[4] To the contrary, many residents have noticed an increase in aircraft noise in recent years.[5] Moreover a significant

[1] See Sea-Tac International Airport, 1991 Noise Exposure Map Update (Final) at app. D (1993).

[2] See 14 C.F.R. pt. 150 (1995).

[3] Mediation Committee, Final Package of Mediated Noise Abatement Actions for Seattle-Tacoma International Airport (1990).

[4] Sanford Fidell, et. al., Social Survey of Community Response to Noise Exposure Near Seattle-Tacoma International Airport (the "Social Survey") at 17, 19 (1995) (attached to these Comments as app. 7).

[5] Id. at 17, 19, 49-50.

R-6-1A

R-5-4

portion of the residents of the ACC, Federal Way and Mercer Island remain highly annoyed by aircraft noise.[6]

The quality of life in the neighborhoods of the ACC, Federal Way and Mercer Island already suffers from high noise levels attributable to Sea-Tac. Many of the residents of the area purchased homes west of the Airport based upon the Port's repeated assurances that it had no intention of constructing any additional runways at Sea-Tac. These and other residents of the affected areas will be subject to a further erosion of their quality of life, if a third runway were to be constructed at Sea-Tac.

Consequently, decisions by the FAA and the Port to approve and assist the expansion of Sea-Tac must be preceded by a thorough consideration of its potentially devastating impacts and by a detailed analysis of all reasonable alternatives to the Airport expansion.

5.1.2 The DEIS Fails to Address Adequately Noise Impacts of the Proposed Expansion of Seattle-Tacoma International Airport

The noise analysis in the DEIS fails to disclose the most probable noise impacts of the proposed expansion of Sea-Tac, and therefore, it is fatally flawed. This defect is so fundamental that the DEIS cannot fulfill the intended purpose of SEPA[7] and NEPA[8] to provide sufficient information to federal, state and local government decisionmakers to ensure that environmental values are considered prior to taking any action.[9] The FAA and the Port, therefore, must prepare a new and substantially more accurate and realistic DEIS.

The noise impact analysis in the DEIS is insufficient and inadequate for the following reasons:

[6] Id. at 21, 24.

[7] Chapter 43.21C RCW.

[8] 42 U.S.C.A. §§ 4321-4370d.

[9] See RCW 43.21C.030; 42 U.S.C.A. § 4332(2).

- The DEIS is based upon a number of fundamentally unreliable and implausible assumptions which fatally contaminate the noise analysis.
- The DEIS fails to define a study area that accurately reflects the noise impacts of the proposed airport expansion.
- The DEIS is misleading in its discussion of future noise exposure.
- The DEIS omits critical information about the nature and extent of noise impacts.

R-3-7

5.1.3 The Noise Analysis in the DEIS is Contaminated by Fundamentally Unreliable and Implausible Assumptions

All of the environmental analyses in the DEIS are based upon the same fundamentally flawed and implausible assumptions that 1) with or without airport development, airport activity is expected to increase as a consequence of regional population growth;[10] 2) increased air travel demand is expected to occur whether or not further airport facility improvements are pursued at Sea-Tac;[11] 3) notwithstanding the alleged enormous delays that would result without a third runway, Sea-Tac will handle 441,600 operations by the year 2020, with or without a third runway;[12] therefore, 4) each "With Project" alternative is projected to produce only slightly greater noise impacts than the Do-Nothing alternative;[13] and 5) a new third runway would be used only infrequently.[14] Moreover, according to the DEIS, none of the alternatives considered in the DEIS would result in aircraft noise levels that are higher than those to which the ACC,

[10] DEIS at II-2.

[11] Id. at II-39.

[12] Id. at I-10, Table I-3.

[13] Id. at IV.1-1, IV.2-4.

[14] See id. at IV.1-1, C-49.

R-3-7

Federal Way and Mercer Island presently are exposed.[15] As discussed elsewhere in these Comments,[16] the assumption that the number of operations and the number of enplanements at Sea-Tac will continue to rise at the same rate over the next 25 years, with or without the construction of an air carrier runway, defies logic, has no experiential basis, and contradicts the Port's assertions in the Flight Plan EIS.[17]

R-6-13

Not only does the DEIS rely upon unrealistic assumptions of traffic growth, but its analysis is grounded upon a highly suspect assumption about frequency of runway usage. The Port and the FAA seek to justify construction of a third runway at Sea-Tac solely for the purpose of alleviating what they allege would be intolerable delay conditions on the existing air carrier runways during those infrequent intervals when IFR conditions coincide with peak traffic periods.[18] According to the DEIS, those delays would be the inevitable consequence of increased demand for airport capacity.[19] Although the number of operations at Sea-Tac is projected to increase by nearly one-third over the next 25 years,[20] the Port maintains that the proposed half-billion dollar runway would be used only on an extremely limited basis:

- only 7.7 percent of all south traffic flow arrivals would use the third runway;
- only 1.7 percent of all south traffic flow departures would use the third runway;
- only 1.2 percent of all north traffic flow arrivals would use the third runway; and

[15] Id. at IV.1-1. According to the DEIS, the Port's noise reduction program and the federal mandate to phase out Stage 2 aircraft by the year 2000 will cause all future aircraft noise levels to decline, compared with present noise exposure. Id.

[16] See supra § 2.1.

[17] See Flight Plan EIS at 2-15. "Delays after the year 2000 [were predicted] as 'excessive.' When these jeopardize airline profitability, this will lead to rescheduling and diversions of aircraft to other airports, and a reluctance by the airlines to add additional service [at Sea-Tac]." Id.

[18] DEIS at II-2 through II-6.

[19] Id. at II-2

[20] Id. at I-10, Table I-3.

- only 0.5 percent of all north traffic flow departures would use the third runway.[21]

R-6-13

The addition of a third runway at Sea-Tac would add considerable flexibility to Airport operations and provide added capacity to support a large increase in the total number of operations at Sea-Tac -- particularly if technological development eventually permits its full independent use. Nonetheless, the Port and the FAA assert that the number of operations projected at Sea-Tac in 2020 would be unaffected by the addition of a third runway, even a quarter of a century in the future.[22] TABLE 5.1-1 illustrates that, according to the DEIS, the daily number of operations at Sea-Tac also would not vary with the addition of a third runway.

[21] See id. at C-49, Table C-20.

[22] Id. at I-10, Table I-3.

TABLE 5.1-1

Projected Future Daily Aircraft Operations[23]

R-6-13

YEAR	Alternative 1 (Do-Nothing)		Alternatives 2, 3, and 4 (Construct New Runway)	
2000	Day:	914	Day:	914
	Night:	124	Night:	124
	Total:	1,038	Total:	1,038
2010	Day:	980	Day:	980
	Night:	132	Night:	132
	Total:	1,112	Total:	1,112
2020	Day:	1,059	Day:	1,066
	Night:	151	Night:	144
	Total:	1,210	Total:	1,210

The Port and the FAA have based their analyses of noise impacts on the highly implausible assumptions that the noise levels would be nearly identical whether or not an additional runway were constructed, and that the third runway would be used only occasionally. Although it strains credulity to maintain that a new runway constructed at great expense to the public purse would seldom be used, this approach reduces the noise impact analyses of the DEIS to a simple tautology: a runway that is used so rarely that it has little discernable effect on the total number of operations conducted at the Airport can necessarily have only minor effects on noise exposure in nearby neighborhoods. Premised as it is on this narrow reasoning, the noise analysis in the DEIS drastically underestimates the noise effects the third runway would have

[23] Source: DEIS at II-35A, Exhibit II.2-3.

on the ACC, Federal Way and Mercer Island. Greater use of the third runway -- as is probable -- would result in more flight operations and increased levels of noise. It also would alter the projected noise exposure contours.

A more realistic prediction of third runway usage undoubtedly would extend the major (north/south) axis of the L_{dn} 65 dB contour considerably farther south into Federal Way and Des Moines and north into Burien, Normandy Park and Tukwila than is indicated by DEIS contours.[24] Since the majority of flight operations arrive from and depart to the south,[25] an increase in operations would be likely to have the greatest impact on Des Moines and Federal Way. Nowhere in the DEIS are such impacts identified or examined. The DEIS also contains no maps showing the extent of L_{dn} contours for the amount of Airport activity actually sustainable by three air carrier runways.

By adopting an unrealistically limited prediction of third runway usage, the DEIS defies reason and circumvents the SEPA- and NEPA-imposed requirements for a full and forthright analysis of noise impacts of the proposed runway.

At the very least, a revised DEIS must be prepared which would honestly acknowledge the extent to which a third runway could increase operations at Sea-Tac, and would identify a range of noise exposure conditions associated with more credible assumptions about operational uses of a third runway from 7,000 to 8,500 feet in length.

R-6-13

5.1.4 The Study Area Inaccurately Reflects the Noise Impacts of the Proposed Airport Expansion

The boundaries of the DEIS study area do not reflect actual noise impacts of the Airport under either present or future projected operating conditions. The DEIS defines a general study area for the purposes of graphically depicting the area potentially affected by existing and future

R-6-9

[24] See Id. at IV.1-14B through IV.1-14M, Exhibits IV.1-5 through IV.1-13.

[25] Id. at C-49, Table C-20.

noise exposure of L_{dn} 60 dB and greater.[26] This area was based on the study area used for the 1991 Noise Exposure Map Update for Sea-Tac Airport, and encompasses the Port's Noise Remedy Program boundaries.[27] The noise analysis study area in the DEIS, however, is focused primarily on areas exposed to L_{dn} of 65 dB and greater sound levels.[28] Although some limited data are provided about areas within L_{dn} 60 dB, they are provided only for informational purposes,[29] and receive only superficial consideration. SEPA and NEPA require that an EIS provide full disclosure and analysis of the noise impacts of the proposed action.[30] An appropriate analysis of noise impacts pursuant to SEPA and NEPA must be based on a study area bounded by an L_{dn} noise contour of no greater than 60 dB and must encompass the numbers of people likely to be highly annoyed and affected by aircraft noise attributable to the proposed third runway. The analysis of noise impacts in the DEIS is inadequate precisely because it limits meaningful evaluation to areas within the contour for L_{dn} 65 dB or greater, and reflects only the noise levels to which residents are exposed. This deficiency is particularly significant for interpreting noise impacts in communities with L_{dn} levels below 65 dB.

R-6-9

Scientific studies conducted in the ACC, Federal Way, Mercer Island and in other communities across the nation have demonstrated that community reaction to changes in noise exposure often cannot be anticipated fully by using standard noise and land use compatibility guidelines[31] which generally identify levels of noise exposure below 65 dB L_{dn} as compatible

R-5-2

[26] Id. at III-1.

[27] Id.

[28] Id. at xi, IV.1-1.

[29] Id. at xi, IV.1-3.

[30] See, e.g., WAC 197-11-444(2)(a)(i).

[31] See, e.g., Social Survey at 13, Table 4, 55-56, Tables 21, 22. For a thorough analysis of experiences in several other communities, see Sanford Fidell, Interpreting Findings About Community Response to Environmental Noise Exposure: What do the Data Say? 1992 Euronoise Conference (London, U.K.) (Sept. 1992); Harris Miller Miller & Hanson Inc., Presentation of Noise Issues from Review of Dallas/Fort Worth International Airport Draft (continued...)

with residential land use and residential activities. These hard-and-fast guidelines are inconsistent with, and fail to account for, the negative community reactions which can follow increases in noise exposure levels substantially below L_{dn} 65 dB.

The findings of the Social Survey and the accompanying set of field measurements of community noise levels in the vicinity of Sea-Tac confirm the necessity and importance of examining noise impacts in areas with noise exposure below L_{dn} 65 dB and of defining the study area in terms of both noise <u>impacts</u> and noise <u>levels</u>. The City of Federal Way provides one example of the importance of the DEIS omission. Average ambient L_{dn} levels attributable to sources other than aircraft noise were measured at 56.4 dB at two noise monitoring sites in Federal Way about four miles south of Runway 34R.[22/] Aircraft noise exposure elevated the total measured L_{dn} at the Federal Way locations by about 5 dB L_{dn}.[23/] Since non-aircraft noise exposure in Federal Way is relatively low for an urban area, degradation of the community noise environment by aircraft noise occurs throughout much of the City, even though the absolute levels of aircraft noise exposure may not exceed the arbitrary regulatory threshold of L_{dn} 65 dB.

R-6-34

R-5-2
R-6-9

The Social Survey also documented that more than one-half of the random sample of long-term residents of Federal Way had been annoyed by aircraft noise in their neighborhoods during the year prior to interviewing.[24/] Of those respondents who reported being annoyed by aircraft noise, nearly a third had been highly (i.e., "very" or "extremely") annoyed by aircraft noise.[25/] Although noise levels throughout much of Federal Way generally are below an L_{dn}

21/(...continued)
<u>Environmental Impact Statement</u> (Nov. 1990); C.A. Powell, NASA Technical Paper 2101, <u>Multiple-Event Airplane Noise Annoyance</u> (1983); J.B. Mabry, NASA Contractor Report 165945, <u>A Study of General Aviation Community Noise Impact and Annoyance</u> (1982).

22/ Social Survey at 13, Table 4.

23/ <u>Id.</u>

24/ <u>Id.</u> at 56-57, Tables 21, 22.

25/ <u>Id.</u> at 56, Table 21.

of 65 dB, it is evident that thousands of people in this city of 74,290, nonetheless are consequentially impacted by aircraft noise. This finding alone suggests the importance of focusing attention on areas within the L_{dn} 60 dB noise contour.

Proper definition of the study area is particularly important because an increase in the number of operations at Sea-Tac beyond that predicted in the DEIS will result in a longer L_{dn} dB noise contour, thereby increasing the total number of residents who will be highly annoyed by aircraft noise and whose lives will otherwise be negatively affected by the development of a third runway at Sea-Tac. As illustrated in TABLE 5.1-2, the more numerous the operations on a third air carrier runway, the longer the 60 dB noise contour will be.[26/] Each extension of 1,000 feet in the length of the L_{dn} 60 dB noise contour would expand the DEIS study area by another 0.5 square mile. In Federal Way, therefore, (with a population density of 3,500 people per square mile) each 1,000 foot extension in the southerly limit of the L_{dn} 60 dB noise contour could add an average of about 1,500 people to the study area, of whom a significant number would be highly annoyed by the noise exposure.

R-6-34

R-5-2
R-6-9

26/ The Port's claim that all future aircraft noise impacts are expected to decline, regardless of future development at Sea-Tac, is based on an analysis of conditions in L_{dn} 65 dB and above. <u>Id.</u> at IV.1-1. It does not include consideration of the effect on L_{dn} 60 dB of increased numbers of operations.

TABLE 5.1-2

Southerly Extent of L_{dn} 60 dB Aircraft Noise Contours From South End of Runway 34R and Projected Air Traffic

Year	Number of Projected or Sustainable Operations	Approximate Distance in Feet From South End of Runway 34R to Southerly Closure of L_{dn} = 60 dB Aircraft Noise Contour
2000	379,200	33,200[1]
2010	405,800	34,875[1]
2020	441,600	36,375[1]
2020 (Full dependent operation of third runway)	541,600	41,500[2]
2020 (Full independent operation of third runway)	641,600	46,500[2]

Notes: [1] DEIS at ii.
[2] Extrapolation (on a percentage basis) of data from average increase in contour extent for cases considered in DEIS, prepared for the ACC by BBN Systems & Technologies.

R-5-2
R-6-0

The DEIS provides little meaningful information about areas outside the current or probable future L_{dn} 65 dB noise contour or about the effect of a third runway on people living in those areas who may be highly annoyed or otherwise adversely affected by exposure to present or future aircraft noise. FAA Part 150 Regulations[37] and the FAA Environmental Handbook[38] might permit the FAA to confine its analysis of noise impacts to areas within L_{dn} 65 dB and greater.[39] Neither regulatory document, however, is relevant to the Port's obligation under SEPA which is to provide a "detailed statement" on the significant

[37] 14 C.F.R. pt. 150 (1995).

[38] Order 5050.4A.

[39] See 14 C.F.R. pt. 150, app. A. pt. B; Order 5050.4A ¶ 85a.

R-6-10

environmental impacts of the proposed action.[40] An impact is considered to be significant if, in light of relative and absolute environmental effects "more than a moderate effect on the environment is a reasonable probability."[41] The Social Survey provides strong empirical evidence that the impact of noise levels in the 60 dB L_{dn} noise contour must be considered to be significant, and therefore, must be subject to an appropriate level of analysis.

5.1.5 The DEIS is Misleading in its Discussion of Future Noise Exposure

Even if the DEIS had provided detailed analysis of noise exposure levels within L_{dn} 60 dB, the definition of the study area based exclusively on L_{dn} contours still would be inadequate, because it focuses on noise levels rather than on noise impacts. Noise measurements -- whatever the metric or threshold level -- are merely a surrogate for the quantity of actual interest; that is, the prevalence of a consequential degree of noise-induced annoyance in a community.

The DEIS states that "[t]his analysis focuses on the impacts within L_{dn} 65 and greater noise exposure; however, areas exposed to L_{dn} 60-65 were evaluated and are presented for information purposes."[42] The FAA's Part 150 Regulations[43] and the work of the Federal Interagency Committee on Noise ("FICON")[44] are cited as the authorities for limiting the analysis and as the authorities for the proposition that "[o]n the basis of scientific surveys and

R-5-2
R-6-0

[40] See RCW 43.21C.030(2)(c).

[41] Norway Hill Preservation & Protection Ass'n v. King County, 87 Wash.2d 267, 278 (1976). See also WAC 197-11-794(1).

[42] DEIS at IV.1-1 (emphasis added).

[43] 14 C.F.R. pt. 150, app. A, Table 1.

[44] Federal Interagency Committee on Noise (FICON), Federal Agency Review of Selected Airport Noise Analysis Issues (the "FICON Rep't") (1992).

analysis, the FAA has established 65 L_{dn} as the critical level for the determination of noise impacts."[45]

Thus, the DEIS confuses a noise exposure level selected as a threshold for administrative purposes (such as federal cost-sharing in noise mitigation activities) with an actual noise impact. The substantive concern which should have been addressed by the DEIS is not whether a L_{dn} value exceeds a policy threshold, but whether people are highly annoyed by aircraft noise. SEPA and NEPA require that an EIS provide full disclosure and analysis of the noise impacts of the proposed action.[46] An appropriate analysis of noise impacts pursuant to SEPA and NEPA must focus on identifying the numbers of people likely to be highly annoyed and affected by aircraft noise attributable to the proposed third runway. The analysis of noise impacts in the DEIS is inadequate precisely because it reflects only the noise levels to which residents are exposed, and disregards the value of the dosage-response relationship adopted by FICON[47] to estimate the numbers of people who would be highly annoyed by noise associated with the proposed third runway. As a result, the considerable increase in the number of people highly annoyed by aircraft noise in communities with L_{dn} values below 65 dB is ignored completely.

TABLE 5.1-3 shows the percentages of residential populations which the FICON Report expects would be highly annoyed by aircraft noise.

R-6-10

R-6-8

R-5-2

[45] DEIS at IV.1-3.

[46] See, e.g., WAC 197-11-444(2)(a)(i).

[47] FICON Rep't at 3-6.

TABLE 5.1-3

Percentages of Residential Populations Highly Annoyed by Aircraft Noise[48]

Day-Night Average Sound Level Interval (dB)	Midpoint (dB)	Predicted Percentage Highly Annoyed (Percent)
50-55	52.5	2.4
55-60	57.5	4.6
60-65	62.5	9
65-70	67.5	16.6
70-75	72.5	28.8

The Social Survey demonstrated that the prevalence of annoyance attributable to aircraft noise reported by residents of the ACC, Federal Way and Mercer Island generally is consistent with that predicted by FICON. (See FIGURE 5.1-1).

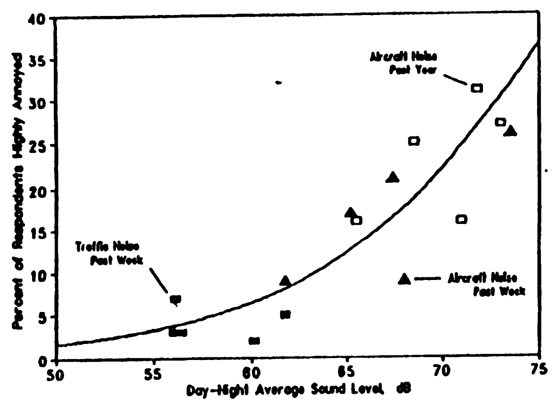
R-6-8

R-5-2

[48] Source: FICON dosage-response relationship: percentage highly annoyed = 100/(1+exp(11.13-.141 L_{dn})).

FIGURE 5.1-1

Relationship Between the Observed Prevalence of High Annoyance in the Social Survey Study Areas and Dosage-Response Relationship Recommended by FICON[19]



R-5-2
R-6-0

The Social Survey also provides compelling evidence of the fact that the impact of airport noise extends well beyond the borders of noise level contours generally considered to be below the level of concern. Thus, many residents in Federal Way, many of whom live outside of L_{dn}

[19] FICON Rep't at 34 through 36.

65 dB, are highly annoyed by aircraft noise.[20] Moreover, while the noise contours around Sea-Tac may be shrinking, and the noise exposure levels may be decreasing as the Port contends,[21] results of the Social Survey indicated that 90 percent of all respondents did not notice any reduction in aircraft noise in recent years.[22] Thus, a decrease in noise levels will not necessarily translate into a decrease in noise impacts.

SEPA and NEPA obligate the Port and the FAA to describe the noise impacts of a future third runway at Sea-Tac with at least as much attention and vigor as they give to the noise levels attributable to a third runway.

R-5-2
R-6-0

5.1.6 The DEIS Omits Critical Information About the Nature and Extent of Noise Impacts

5.1.6.1 The DEIS Does Not Reflect the Uncertainty in the Size and Shape of Noise Contours

R-6-4

The DEIS does not disclose the uncertainty of the predicted size and shape of noise exposure contours produced by the implausible assumptions made by the Port and the FAA about future Airport operational patterns. Recent history suggests that changes in approach and departure flight paths, fleet mix, flight schedules, and airport facilities utilization are the rule rather than the exception.[23] Although the FAA establishes flight paths, the DEIS contains no commitment from the FAA to maintain the current system of approach and departure paths in the face of variations in the absolute number of operations and the mix of aircraft types

[20] Social Survey at 55, 56, Tables 20, 21.

[21] See, e.g., Port of Seattle, Submittal to the Expert Arbitration Panel on Noise and Demand/System Management in Response to Information Requests Contained in the Procedural Order of September 22, 1994, Response to Question 17, Table 17-b (Oct. 1994).

[22] Social Survey at 17, 19, Figure 7.

[23] See DEIS at II-3 (identifying half a dozen recent examples of operational and other changes that can affect airport capacity and aircraft noise exposure).

operating at Sea-Tac over the next quarter of a century. As recent experience at Denver International Airport makes clear, the flight tracks, fleet mix and airport operating rules are likely to vary considerably from those predicted in the EIS.[21] Thousands of complaints from residents in the vicinity of the new Denver Airport who presently are exposed to unexpectedly high levels of aircraft noise resulting from FAA-directed flight track changes, serve to illustrate the unpredictability of future airport operations. If the FAA cannot make a binding commitment not to alter flight tracks or other operational variables, the DEIS at least should examine the effects of alternative operating scenarios. The reliance on a relatively small number of flight tracks to predict the aircraft noise exposure of communities to the north and east outside the immediate vicinity of the Airport -- such as Mercer Island -- is inadequate, because the resulting predictions are inaccurage and oversimplified. Airplanes do not fly on flight tracks; they use every square inch of airspace to which they are assigned by air traffic controllers. Thus, the noise levels to which Mercer Island and other communities not immediately adjacement to the Airport are exposed cannot accurately be represented by flight tracks. The the use of flight tracks also ignores the incessant nature of aircraft noise in to which residents of Mercer Island are exposed.

R-6-4

5.1.6.2 Noise Contours Are Extremely Sensitive to Operational Assumptions

R-6-5

The predictions of future noise contours, and the aircraft noise levels to which residents of the ACC, Federal Way and Mercer Island would be exposed are totally dependent on the manner in which the Airport is operated. The projected noise contours and noise levels set forth in the DEIS are, therefore, extremely sensitive to the operational assumptions upon which they are based. This is illustrated through a simple comparison of different sets of noise contours contained in several documents prepared by the Port. (See TABLE 5.1-4).

[21] Noise Office, Denver International Airport, First Quarterly Noise Report (July 1995).

TABLE 5.1-4

Comparison of New Contour Data Prepared by the Port[22]

Source/Document Containing Area Estimate	Acreage within L_{dn} = 75 dB contour	Acreage between L_{dn} = 75 dB and L_{dn} = 70 dB contours	Acreage between L_{dn} = 70 dB and L_{dn} = 65 dB contours
Existing (1991) Noise Contours, Table 4A, page 61, Part 150 Study (dated 1993); also Table D-2, page D-9, Noise Exposure Map Update (dated 15 April 1993)	1,325	3,454	6,657
Existing (presumably November, 1994) "Area Affected by Aircraft Noise," Table IV.1-1, page IV.1-13A, DEIS (dated April, 1995)	256	1,491	4,211
Future (1996) Noise Contours, Table 4B, page 62, Part 150 Study (dated 1993)	324	1,971	4,756
Future (1996) Noise Contours, Table D-3, page D-10, Noise Exposure Map Update (dated April, 1993)	316	1,948	4,766
Future (2000) Alternative 1 (No-Build) Noise Contours, "Area Affected by Aircraft Noise," Table IV.1-1, page IV.1-13A, DEIS (dated April, 1995)	0	403	1,773
Future (2010) Alternative 1 (No-Build) Noise Contours, "Area Affected by Aircraft Noise," Table IV.1-1, page IV.1-13A, DEIS (dated April, 1995)	0	269	1,997
Future (2020) Alternative 1 (No-Build) Noise Contours, "Area Affected by Aircraft Noise," Table IV.1-1, page IV.1-13A, DEIS (dated April, 1995)	6	499	2,035

The discrepancies among these recent estimates of the sizes of aircraft noise contours for the areas surrounding Sea-Tac are attributable to minor differences in airport operational assumptions, and to inconsistencies in the computational algorithms and databases of different generations of the Integrated Noise Model (the "INM") software. Given the discrepancies

R-6-4
R-6-5

[22] All estimates are non-cumulative and exclude Airport property.

among forecasts within the last few years, the likelihood that estimates made today will provide an accurate prediction of the size and shapes of aircraft noise contours a quarter of a century hence is remote.

The issue is not merely that predictive software and probable operational patterns will continue to change over the next twenty-five years. The composition and noise characteristics of the civil air transport fleet also is likely to change in ways that are not now fully predictable. Simply introducing new aircraft types into the civil transport fleet is likely to affect the absolute numbers of operations at Sea-Tac and also to affect operational characteristics of the Airport.

R-6-4

R-6-5

R-6-11

For example, the Boeing 777 (the "B-777"), a heavy twin-jet transport that is predicted to account for increasing amounts of long haul passenger traffic in years to come, entered service only weeks after noise contours were completed for the DEIS. Construction of a stretched variant of the aircraft with different noise characteristics was announced only a few weeks thereafter. Nonetheless, the input specifications for the INM runs conducted for the DEIS do not directly account for the use of the B-777 at Sea-Tac as late as the year 2020. Although the DEIS states that each aircraft selected for modeling in the INM was based on current trends among user carriers,[28] it ignores the fact that United Airlines, a major commercial carrier serving Sea-Tac, was one of the early purchasers of B-777s, and that a number of Asian airlines (some of which already fly into Sea-Tac and others of which the Airport is seeking to attract) also are purchasing B-777s. It is possible that the noise emissions of the B-777 and its variants may not be incorporated in the INM database before the EIS is issued in final form. The aircraft noise exposure databases on which the projection of future noise impacts are based are incomplete, and therefore, inaccurate. As a result, the DEIS fails to provide the residents of the ACC, Federal Way and Mercer Island with an accurate or realistic projection of the noise levels to which they are likely to be exposed if the third runway were constructed. It also fails to provide the planning officials of the affected jurisdictions with sufficient information on which

[28] DEIS at C-16.

R-6-4

to base their final plans required pursuant to the Growth Management Act.[29] It is impossible to plan for Airport-compatible land uses in the absence of plausible predictions of noise exposure levels.

In addition, the DEIS omits a discussion of the effects on noise exposure estimates of uncertainties in projecting historical trends in air transport in the future. Difficulties in anticipating changes in factors as specific as the average seating capacity and load factor of passenger aircraft; as intangible as the future regulatory climate; and as complex as the state of the national economy or the world political situation, all combine to undermine the reliability of the long-term aircraft noise exposure estimates provided by the DEIS.

The DEIS also gives insufficient consideration to the noise generated by aircraft ground runups. The construction of a new air carrier runway on Sea-Tac's western border would expose populations living west of the Airport to significant additional noise due to ground runup activities. The DEIS fails to consider the effect of runup noise and how it would be mitigated.

5.1.6.3 Generic Inputs Compromise the Predictive Value of INM Noise Exposure Modeling

SEPA and NEPA require not only full disclosure of expected consequences of proposed actions, but also use of best available technology for the purposes of predicting those consequences.[30] The manner in which the INM was used to prepare noise contours for the DEIS does not meet either of these requirements. For several years, Sea-Tac has operated an aircraft noise and flight track monitoring system capable of identifying actual (rather than nominal) flight paths and profiles flown by every aircraft operating from the Airport. Instead of using actual flight profiles specific to Sea-Tac for their INM inputs, however, the analysts preparing the DEIS used generic information.

[29] Chapter 36.70A RCW.

[30] See 40 C.F.R. § 1502.24; WAC 197-11-030(b).

The aircraft noise contours contained in the DEIS, therefore, are constructed from simplified representations of actual flight paths and are based on generic information about flight profiles and noise emissions, rather than from Airport-specific flight profiles and aircraft type-specific noise databases compiled from years of operating experience at Sea-Tac. Errors as great as 5 dB in INM-produced contours are likely to result when inappropriate assumptions about actual flight tracks and profiles are made in INM runs.

The DEIS neither discloses the great sensitivity of noise contour sizes and shapes to minor shifts in INM input specifications, nor conducts any systematic error analysis that would inform a reader about the imprecisions in the noise exposure and noise impact analyses based on INM calculations using modeled rather than flight track inputs. The DEIS, thus, is incapable of fulfilling its primary purpose under SEPA and NEPA: to serve the decisionmaking agencies (i.e., the Port and the FAA) and the public by providing an accurate assessment of the environmental effects of the proposed project.

R-6-4

5.1.6.4 The DEIS Omits Adequate Consideration of Health Impacts of Exposure to High Aircraft Noise Levels

Over the past several decades, a substantial and increasingly compelling body of scientific evidence has been accumulated which documents the serious health risks attributable to exposure to airport and aircraft noise. Inasmuch as tens of thousands of individuals in the Puget Sound region would be exposed to high levels of aircraft noise as a result of the proposed Airport expansion, the FAA and the Port were required to include in the DEIS a detailed analysis of the potentially significant risks to human health associated with implementation of the Master Plan Update development actions. The DEIS, however, dismisses the impact of noise on human health with the comment that "[l]iterature pertaining to noise effects on human health are often contradictory."[79]

[79] DEIS at IV.5-7.

Exposure to airplane noise has been linked to a variety of adverse health effects: increased blood pressure, elevated blood cholesterol level, decreased auditory functioning, reduced female fertility, increased risk of birth defects, increased levels of cognitive function disturbances, adverse mental health effects, altered gastrointestinal functions, balance malfunctions, endocrine system abnormalities, musculoskeletal abnormalities and sleep disturbances.

Scientific evidence demonstrates that increased exposure to aircraft noise can affect the human physiological process.[80] These physiological changes generally are nonspecific reactions associated with stress.[81] They normally manifest themselves as cardiovascular, digestive, respiratory and endocrine disorders.

The most severe health impacts of aircraft noise are cardiovascular effects. Chronic exposure to aircraft noise has been associated with increased prevalence of hypertension and other cardiovascular disorders.[82] After interpreting data from over 40 individual studies, one researcher concluded that long-term work under high intensity sound is correlated with a 60 percent increase in cardiovascular disease. These effects particularly were strong for older individuals and for those exposed to unpredictable and intermittent noise (similar to aircraft noise).[83] Studies which assessed the effect of high ambient noise levels on blood pressure in

[80] G. Evans & S. Cohen, Environmental Stress Handbook Envtl. Psychology (1987); B.K. MacLean & A. Tarnopolsky, Noise Discomfort and Mental Health 1 Psychological Med. 19-62 (1977).

[81] A. Glorig, Non-Auditory Effects of Noise Exposure 5 Sound and Vibration 28-29 (1971); H. Selye, The Stress of Life. (1956).

[82] See S. Cohen et al., Behavior, Health, and Environmental Stress (1986); U.S. Envtl. Protection Agency, Rep't No. 550/9-80-101, Noise, General Stress Responses, and Cardiovascular Disease Processes: Review and Reassessment of Hypothesized Relationships (1980); U.S. Envtl. Protection Agency, Rep't No. 550/9-81-103 (A-C), Epidemiology Feasibility Study: Effects of Noise on the Cardiovascular System, Washington, D.C., Office of Noise Abatement Control (1981). Studies performed in industrial setting have had similar findings on the effects of noise on the cardiovascular disease.

[83] Research on animals exposed to industrial noise also found a connection between noise and hypertension. B.A. Peterson et al., Noise Raises Blood Pressure Without Impairing Auditory Sensitivity 211 Science 1450-1452 (continued...)

children demonstrated that children in schools exposed to the high noise levels suffered higher blood pressure than those children in the quieter schools.[64/]

In addition, a number of scientifically recognized studies demonstrate an incidence of other physiological ailments linked with increased exposure to aircraft noise. These ailments include an increase in the number of pregnancy complications and impaired infant health and lower infant survival rate[65/] and an increase in the use of non-prescription drugs.[66/] There also have been reports of noise-related increases in nervous and gastrointestinal diseases;[67/] in the use of sleeping pills and visits to physicians;[68/] and in self-reported increases of various chronic illnesses.[69/]

While physiological impacts of environmental factors are difficult to identify, since a multitude of variables affect human health, it is clear that increased exposure to aircraft noise correlates with increased incidence of adverse physiological ailments. The DEIS neglects to

63/(...continued)
(1981). These studies also found that increased blood pressure was maintained after exposure to noise was terminated.

64/ G. Karsdorf & H. Klappach, The Influence of Traffic Noise on Health and Performance of Secondary School Students in a Large City 14 Zeitschrift fur die Gesamte Hygiene 52-54 (1968).

65/ Y. Ando & H. Hattori, Statistical Studies of the Effects of Intense Noise During Human Fetal Life 29 J. Sound and Vibration 101-110 (1973); Y. Ando & H. Hattori, Effects of Noise on Human Placental Loctogen (HPL) Levels in Maternal Plasma 84 British J. of Obstetrics and Gynecology 1150118 (1977); L.D. Edmonds et al., Airport Noise and Teratogenesis 34 Archives of Envtl. Health 243-247 (1979); P.G. Knopschild et al., Aircraft Noise and Birth Weight The Netherlands: University of Amsterdam, Coronel Laboratory (1977).

66/ G. Watkins et al., Use of Medicine and Health Care Services 11 Physiological Med. 155-168 (1981).

67/ I.L. Karagodina et al., Effects of Aircraft Noise on Populations Near Airports 34 Hygiene & Sanitation 182-187(1969).

68/ E. Grandjean et al., A Survey on Aircraft noise in Switzerland, Proceedings of the International Congress on Noise as a Public Health Problem U.S. Gov't Printing Office (1973).

69/ P. Cameron et al., Sound Pollution, Noise Pollution, and Health: Community Parameters 56 J. Applied Psychology 67-74 (1972).

investigate these impacts, and, therefore, the DEIS fails to satisfy the requirements of NEPA and SEPA that it examine impacts on the human environment.

In addition to physiological health, exposure to aircraft noise can severely affect human psychological health. These psychological problems often result from anger and annoyance caused by noise. The Social Survey found that a significant proportion of residents of the ACC, Federal Way and Mercer Island reported being "highly annoyed" by aircraft noise in the preceding year (i.e., 1994).[70/] A majority of respondents declared that their annoyance attributable to aircraft noise had not changed over the prior two years, and about one-third reported that their annoyance had increased.[71/] Of those indicating annoyance with aircraft noise, more than 50 percent were moderately to extremely annoyed.[72/] The percentage of respondents in the interviewing areas around Sea-Tac found by the Social Survey to be highly annoyed by aircraft noise corresponds closely with percentages of those highly annoyed in other communities with comparable noise exposure.[73/] Moreover, studies in other communities show that the annoyance level of residents does not habituate over time; long-term residents are as bothered as new residents.[74/] In fact, longer-term residents of the ACC, Federal Way and Mercer Island did not notice less aircraft noise over the prior year, many noticed more aircraft noise over the prior year than did shorter-term residents.[75/]

70/ Social Survey at 20, Table 5.

71/ Id. at 21, 24, Figure 10.

72/ Id. at 56, Table 21.

73/ Id. at 33-34.

74/ E. Jonsson & S. Sorensson, Adaptation to Community Noise - A Case Study 26 J. Sound & Vibration 571-575 (1973); N. Weinstein, Individual Differences in Reactions to Noise 63 J. Applied Psychology 104-107, 458-466 (1978).

75/ Social Survey at 21, 25, Figure 11.

Surveys on the effects of exposure to aircraft noise have found connections between exposure to noise and levels of tension, irritability, nervousness, sleep difficulty and headaches.[28/] There is credible scientific evidence of a correlation between the psychological health of a community and the amount of noise to which it is exposed.[29/]

The DEIS dismisses the body of scientific data on the health effects of high exposure to aircraft noise, and it fails adequately to consider what those effects would be if the Master Plan Update development actions were to be implemented.

5.1.7 The Port and the FAA Must Present a More Accurate and Complete Noise Analysis in a Revised DEIS

Inaccuracies, omissions, errors and implausible assumptions pervade the DEIS and frustrate the public's understanding and the Port's and FAA's evaluation of the noise impacts which would be associated with the expansion of Sea-Tac. Aircraft noise impacts are an issue of profound concern to the residents of Burien, Des Moines, Federal Way, Normandy Park, Tukwila and Mercer Island. Noise impacts are omnipresent and intrude in their daily lives in a pervasive manner that is unlike other environmental impacts that would result from the construction of the third runway.

Instead of a straight-forward analysis of the projected noise impacts of the proposed Airport expansion, the Port and the FAA have presented a misleading analysis based upon the implausible assumptions that a third runway would be used only infrequently and would not alter the number of future expected operations at the Airport. In so doing, the Port and the FAA have failed in their primary task: to provide sufficient information to enable the public -- and

28/ Office of Population Census and Survey, Second Survey of Aircraft Noise Annoyance around London (Heathrow) Airport, London, Her Majesty's Stationary Office (1970); E. Grandjean et al., A Survey on Aircraft Noise in Switzerland, see supra n.68.

29/ See, e.g., P. Knipschild & N. Oudshoorn, Medical Effects of Aircraft Noise: Drug Survey 40 Archives of Occupational and Envil. Health 197-200 (1977); C.F. Herridge & B. Chir, Aircraft Noise and Mental Hospital Admissions 6 Sound 32-36 (1972).

themselves -- to make a reasoned appraisal of the environmental impacts of a third runway. As a result, the Port and the FAA have failed to comply with the requirements of SEPA and NEPA. Accordingly, the DEIS noise analysis must be revised and reissued by the Port and the FAA.

5.2 THE ANALYSIS OF CONSTRUCTION IMPACTS IS INCOMPLETE, MISLEADING AND FATALLY FLAWED

5.2.1 SEPA and NEPA Require that the DEIS Adequately Examine the Environmental Impacts Associated with Construction of Projects Recommended in the Master Plan Update

NEPA, as implemented by Order 5050.4A, requires that an EIS examine

> [s]pecific effects during construction which may create adverse environmental impacts includ[ing] noise of construction equipment on the site, noise and dust from delivery of materials through residential streets, creation of borrow pits and disposal of spoil, air pollution from burning debris, and water pollution from erosion.[1]

An EIS prepared pursuant to SEPA also must include consideration of construction impacts attributable to grading, excavation and fill, the location of earth sources or earth disposal sites, impacts to local topography and other specific earth-related impacts.[2]

The magnitude of the construction activities associated with the development of a third runway at Sea-Tac and other proposed Master Plan Update development actions particularly demand thorough scrutiny.

5.2.2 The DEIS Fails to Document Construction Impacts of the Third Runway and Other Master Plan Update Development Actions

Construction of a third runway and associated airside and landside development projects at Sea-Tac is expected to take four years to complete; to require the mining and transportation of 20 to 26 million cubic yards of fill from borrow areas across four counties; to involve more than 2,000 truck trips a day, 6 days per week, 50 weeks per year to haul fill from borrow areas

[1] Order 5050.4A ¶ 47e(20)(a).

[2] See WAC 197-11-444(1)(a).

to construction sites; and to cost hundreds of millions of dollars.[3] Notwithstanding the magnitude of the Port's proposed endeavor, the DEIS dismisses the on-site construction impacts of the proposed Airport expansion by characterizing them as merely "short-term and temporary in nature."[4]

Further, the impacts of the enormous number of truck trips per day necessary to haul fill for the construction of a third runway are dismissed with little consideration of their effects on air quality, surface transportation resources, or land use. The 672 construction truck trips per day necessary to import nearly 5 million cubic yards of fill material from on-site sources are projected not to "cause traffic congestion problems on access routes to the Airport."[5] Despite the fact that most of the potential off-site borrow areas are at least 20 miles from the Airport[6] "construction traffic [from 1,952 truck trips a day] necessary to supply the off-site material requirements of the 8,500 Foot Runway Option is not predicted to cause impacts in terms of congestion or functional use on the roadways."[7]

These statements are such gross understatements as to be deceptive. The DEIS does not contain a meaningful examination of the monumental impacts of the construction of the Master Plan Update projects, and ignores completely the major physical, environmental and regulatory obstacles that would be faced by the Port in attempting to conduct the largest landfill operation in the history of the Puget Sound region.

[3] See DEIS, app. J at 1-7, 11.

[4] Id. at IV.23-1.

[5] Id., app. J at 5, 9.

[6] Id., app. J at 12.

[7] Id., app. J at 11.

> [c]onsiderations regarding site stability, environmental impacts, and permits for borrow extraction [apply to both off- and on-site] sources [of fill materials].[18]
>
> . . . .
>
> Potential environmental impacts include slope stability, soil erosion, changes in surface water runoff, and changes in groundwater recharge and quality . . . . Permitting and environmental issues should be addressed prior to designation of a site as a fill source for the project.[19]

R-18-22

Despite the recommendations of its consultant, no analysis of the environmental impacts of the borrow areas was conducted by the Port or the FAA, either as part of the overall Master Plan Update DEIS, or as a separate document. Moreover, the DEIS fails to discuss requirements for either state or local permits for the operation on the on-site borrow areas and fails to consider the effects of mitigation measures which local governments may impose to address adverse environmental impacts.

R-12-6 R-12-7 R-18-22

The DEIS also fails to address the permit status of proposed off-site borrow areas. At least two of the areas identified for potential use, estimated to be capable of yielding 14 million cubic yards of fill each,[20] presently are not permitted.[21] DNR officials indicate that typically it takes five years to obtain required permits in order to open a new surface mining operation such as those proposed by the Port.[22] The off-site borrow areas that already are

[18] See HNTB Corp., Seattle-Tacoma International Airport Third Dependent Runway, Preliminary Engineering Report ("Preliminary Engineering Report"), vol. 2, app. 1, Geotechnical Borrow Source Report (Draft) at 22 (Mar. 31, 1994).

[19] Id. (emphasis added).

[20] DEIS, app. J at 12, Table C-5.

[21] The Pope Resources Site in Port Gamble currently is not permitted, and some capital expenditures would be necessary to improve barge loading facilities at Port Gamble. Preliminary Engineering Report, vol. 1 at II-9. The City of Dupont currently is negotiating permit operating conditions with Lonestar-Dupont.

[22] Telephone conference between Ronald Pike, City of Des Moines, Dep't of Community Dev., and David Pierce, Washington State Dep't of Natural Resources (June 30, 1995). Mr. Pierce is responsible for processing State Mining Reclamation Permits in King and Pierce Counties.

R-12-6 R-12-7 R-18-22

permitted might be subject to conditions and restrictions with respect to their operations, such as: 1) control over the amount of fill that could be mined during a specified period; 2) hours during which mining would be allowed each day; 3) limitations on haul truck traffic during commuter peak periods; 4) prohibitions on nighttime hauling; 5) weather-based regulations on the mining and transportation of fill material; and 6) requirements for restoring roads damaged by heavy truck traffic.[23] Although these and other restrictions could have a significant effect on the Port's proposed construction schedule (and therefore on the duration and severity of construction impacts), the DEIS improperly excludes any consideration of local permitting requirements.

Although construction of the proposed third runway, the 600-foot runway extension and the improvement of the runway safety areas is dependent on the importation and use of as much as 26 million cubic yards of fill,[24] the DEIS contains no evidence that the Port has identified 1) the areas from which it can expect to get specified quantities of fill; 2) the quality of the fill at each potential borrow area; or 3) the willingness of the mine operator to supply the Port's needs. Consultants participating in the preparation of the DEIS advised the Port that "[r]esource verification will be required for all on-site and off-site sources identified in order to confirm availability, quantity, and quality of fill materials."[25] The DEIS does not provide any indication that the Port has initiated such resource verification.[26]

[23] See, e.g., City of Auburn, Wash. Ordinance No. 3053 (Feb. 10, 1976) (granting special use permit for gravel removal to Mark Land Dev., Inc. for operation of the Segale Pit which has been identified in the DEIS as Borrow Area No. 8); King County, Wash., Dep't of Dev., Grading Permit No. 2791-630 (May 17, 1995) (permitting the Weyerhaeuser North Bend mining site which has been identified in the DEIS as Borrow Area No. 13).

[24] The runway extension and the runway safety area improvements are estimated to require 2.4 million and 980,000 cubic yards of fill, respectively. DEIS, app. J at 4, Table C-2.

[25] Preliminary Engineering Report, vol. 1 at II-8.

[26] For example, the operator of a borrow area identified in the DEIS as potentially available to supply 7 million cubic yards of fill has asserted that he would not be willing to "exhaust his entire supply of dirt to satisfy one customer." Lori Corso, Supplier Doubts Runway Fill Plan, Des Moines News, July 5, 1995 at A1.

5.2.3 The DEIS Ignores State and Local Restrictions on Surface Mining Which Would Affect the Port's Ability to Proceed With its Stated Construction Plans

R-12-5

Surface mining in Washington is regulated both by state law and local ordinance. The state Department of Natural Resources ("DNR") administers the Surface Mine Reclamation Act which requires a permit for most surface mines.[8] Although excavations for on-site construction generally are exempt from DNR reclamation permit requirements,[9] the operations of all mines are subject to regulation by local governments or state and federal agencies, not DNR.[10] Operations specifically include:

- the mining or extraction of rock, stone, gravel, sand, earth, and other minerals;
- blasting, equipment maintenance, sorting, crushing and loading;
- activities that affect noise generation, air quality, surface and groundwater quality, quantity, and flow, glare, pollution, traffic safety and ground vibrations.[11]

Local governments must formally approve mine siting prior to commencement of mining activities, approve the subsequent use of the surface mine site, designate mineral resource lands and determine land-use compatibility.[12]

The eight on-site borrow areas identified in the DEIS are located within the cities of SeaTac and Des Moines,[13] primarily on property acquired by the Port as part of its noise

8. Chapter 78.44 RCW.
9. RCW 78.44.031(17)(i).
10. Id. 78.44.020(3), (4) .031(8), .050. 091.
11. Id. 78.44.031(8).
12. Id. 78.44.091.
13. DEIS, app. J at 7, Figure C-1.

mitigation program. SeaTac and Des Moines would be responsible for issuing permits before the Port could commence mining activities. The proposed mining is neither a permitted nor a conditional use in SeaTac, and an administrative determination would have to be made about whether any of SeaTac's zoning districts are suitable for such a use. If no district is suitable, the use would not be allowed in SeaTac.[14] The same requirements would be applicable to Des Moines. The DEIS fails to analyze the conditions which would likely be imposed on any local permit.

R-12-5

Since it is likely that approval of an application for a surface mining permit would constitute an "action" by a government agency, compliance with SEPA also would be necessary before the Port could obtain the required mining permits from SeaTac and Des Moines.[15] An application by the Port for a permit for surface mining activities at one or more borrow areas on Port-owned property, therefore, is likely to require the preparation of an EIS before it could be approved by the permitting municipality.[16] Such an EIS would have to examine the environmental effects of the proposed mining activities and consider a reasonable range of alternatives to the mining operations.[17]

The consultant studying borrow areas as part of the DEIS preparation process warned the Port and the FAA that

14. City of SeaTac, Wash., Zoning Code ch. 15.12.011 (1994).

15. Washington Div. of Geology and Earth Resources, Washing State Dep't of Natural Resources, Surface Mining in Washington. ("Surface Mining in Washington") Rep't 94-4 at 3 (Jan. 1994). SEPA defines "action" to include "[n]ew and continuing activities . . . entirely or partly financed, assisted, conducted, regulated, licensed, or approved by agencies." WAC 197-11-704(1)(a) (emphasis added). "Project actions . . . involve[] a decision on a specific project . . . located in a defined geographic area. Projects include and are limited to agency decisions to: (1) License, fund, or undertake any activity that will directly modify the environment. . . ." Id. 197-11-704(2)(a)(i).

16. Surface Mining in Washington at 3.

17. WAC 197-11-440(5)(b)(i)-(iii).

214

Since the feasibility of the proposed Master Plan Update development actions vis-à-vis other alternatives largely is based upon the Port's assertions regarding its ability to implement relevant projects in a timely fashion, significant alteration in the construction schedule caused by permitting procedures, permit requirements and environmental review procedures are material factors which could affect the DEIS conclusions. That is, if the Port is unable either to construct the third runway or to implement the associated Airport improvements within the projected timetable, the assumptions in the DEIS about capacity, demand and delay might be altered, and the Do-Nothing or a delayed action alternative would need to be further analyzed, as would other reasonable alternatives not adequately considered in the DEIS.[22]

5.2.4. The DEIS Gives Inadequate Consideration to Construction Impacts Associated With Mining and Fill Operations

The DEIS does not examine the environmental impacts of the mining operations, even though millions of cubic yards of material would be extracted from mines in a number of locations in a four-county area and then would be transported in huge trucks making a combined total of more than 2,000 trips per day over urban roads. (See **FIGURES 5.2-1** and **5.2-2**). For example, one of the on-site borrow areas -- area 3 -- is located near Des Moines Creek Park.[23] It is estimated that this site potentially would generate 2.2 million cubic yards of fill.[24] Although the noise, air pollution and traffic generated by the mining and transportation activities

R-7-13
R-11-4

The operator also indicated that he would be willing to sell "some of his dirt to the port if he could work out some reasonable truck routes," but that he wants to transport the fill over a street that is not a designated truck route. Id. at A2.

[22] See supra § 4.2.

[23] AGI Technologies, Borrow Source Study, Proposed New Runway, Seattle-Tacoma International Airport, SeaTac, Washington ("Borrow Source Study") (Draft) at 14 (Apr. 3, 1995).

[24] Id. at 15.

214

would have major impacts on the use of the park, nowhere in the document are these impacts mentioned, much less analyzed.

R-7-13
R-11-4

Similarly, other impacts of the mining operations and associated transportation activities improperly were excluded from consideration in the DEIS. The DEIS only briefly considers the "social disruption" that would occur in the vicinity of the new runway construction project and recommends acquisition of about 70 residential and commercial properties which would be most substantially affected by mining operations.[25] The effects of the truck routes on other residential or commercial properties, or other land uses, were not considered.

[25] DEIS at IV.23-4.

FIGURE 5.2-1

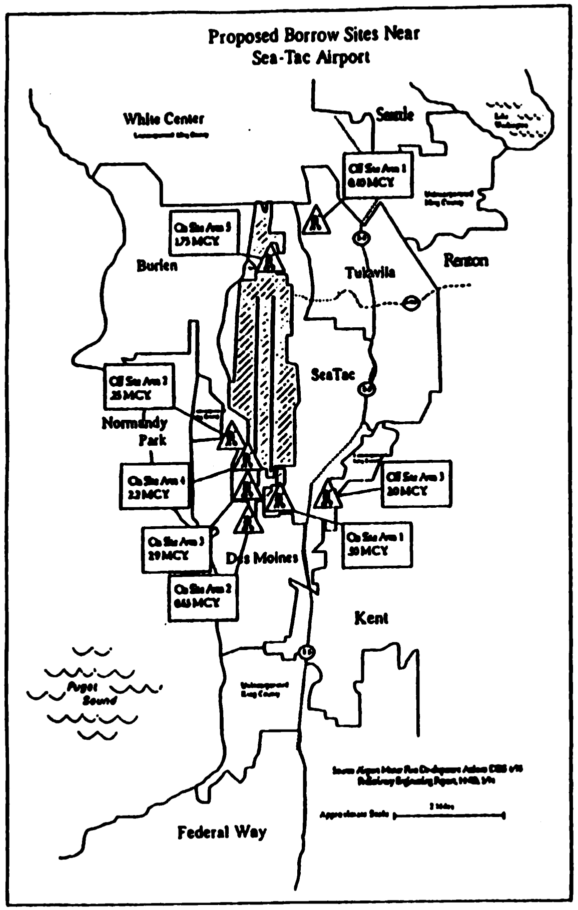
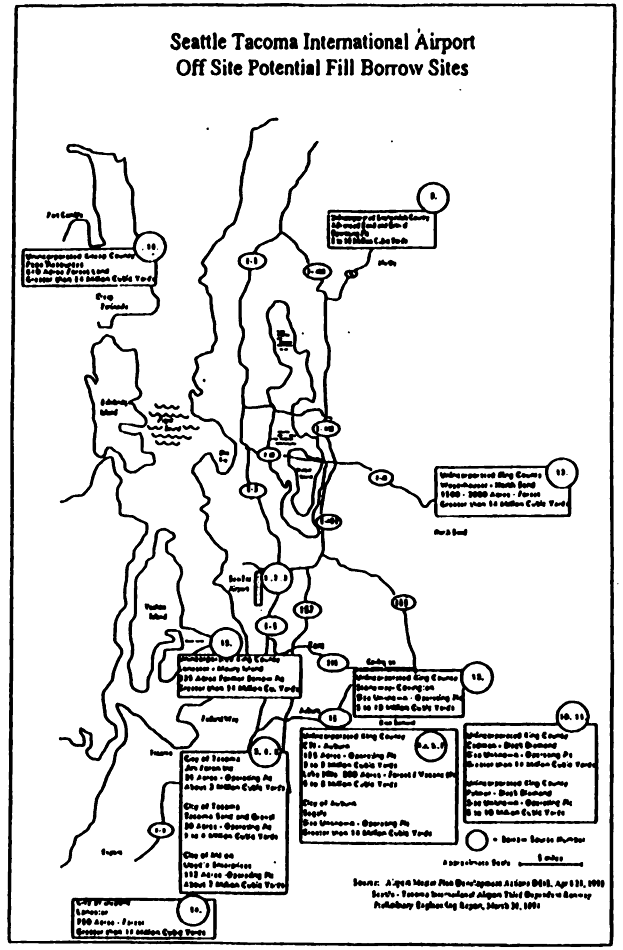


FIGURE 5.2-2



R-12-12

5.2.5 The DEIS Improperly Omits Consideration of the Impacts of Transporting the Fill From the Borrow Areas to the Construction Site

The initial difficulty with the examination of construction impacts in the DEIS is that the document itself presents inconsistent data with respect to the quantity of fill that would be needed for the development actions included in the Master Plan Update (See TABLE 5.2-1).

TABLE 5.2-1

Fill Requirements of Master Plan Update Development Actions[21]

	DEIS App J		DEIS Table IV.19-1	
Earth Movement (in million cubic yards)	Compact	Loose	Compact	Loose
3rd Runway Fill	17.25	19.84	17.25	19.84
Runway 34 Extension			2.40	2.76
Safety Improvements			3.38	1.23
S. 154th Relocation			0.12	0.14
SASA Fill			2.20	2.53
Total Earth Fill	17.25	19.84	22.95	26.40
Less On-Site 'Common'	3.1	3.57	2.9	3.10
Off-Site Borrow Needs (in million cubic yards)	14.15	16.27	20.05	23.30
Near-Site Min.		5.55		2.30
Near-Site Max				8.00
Off-Site Min.				15.30
Off-Site Max.		10.72		21.00

21/ Source: DEIS, app. J at 3, Table C-1, 4, Table 3-2; DEIS at IV.19-13A, Table IV.19-1.

R-12-10

R-12-27

The DEIS assumes that all truck activity would be distributed evenly over 16 hours each day and over 300 days per year for 2.5 years. A constant measured haul operation averaged over 16 hours per day, 6 days per week, 50 weeks per year is highly unlikely and it is an implausible assumption on which to base the measurement of impacts. The DEIS is required to assess the realistic -- not purely theoretical -- effects of peak hour and nighttime haul restrictions and the effects of weather restrictions. For example, it is impossible properly to lay and compact fill material on days of heavy rain and/or freezing weather. It is likely, therefore, that only 250 actual haul days would be available each year. Additional restrictions on hauling hours make it unrealistic to assume that the daily haul period would exceed 12 hours.[22] It is possible that permit conditions might restrict nighttime road usage by trucks, which could increase construction time by as much as one-half. For protection of local roadbeds, local communities may elect to impose weight and speed restriction which could delay significantly each trip, thereby lengthening the construction process.[23] The DEIS should have, but did not, consider such possibilities. Because it is likely that truck peaking[24] would occur within each 12-hour period, a reasonable "peak hour factor"[25] of 1.5 should have been included in the assessment of impacts.[26]

22/ RCW 78.44.020(3), (4), .031(8), .050.

23/ There is no evidence that the Port or the FAA consulted the local community about road usage restrictions or other restrictions that might be incorporated in permits issued to potential suppliers of fill.

24/ Truck peaking refers to the uneven flow of truck traffic (i.e, "bunching") that would occur throughout the normal day resulting in higher truck volumes during some hours and less during others.

25/ The "peak-hour factor" is a measure of traffic demand fluctuation within the peak hour. It represents "the hourly volume during the maximum volume hour of the day divided by the peak 15-minute rate of flow within the peak hour. . . ." Transportation Research Board, Highway Capacity Manual, Special Rep't 209 ("Highway Capacity Manual") (3d ed. 1994).

26/ A peak hour factor of 1.5 would mean that the volume of peak hour traffic is 1.5 times the volume of average hour traffic.

R-12-11

R-12-27

Consideration in the DEIS of the impacts of construction truck traffic also was understated, because the particular impacts of heavy truck traffic were ignored. The haul trucks would be large, and together with trailers, typically would be about 76 feet long. In standing queues and in operating on flat grades, each truck is considered to be equal to three passenger-car-equivalents ("PCE")[11] in terms of the road and intersection capacity it uses. Although level of service calculations require that trucks be considered as at least 3 PCEs,[12] those calculations in the DEIS counted trucks as 1 PCE.[13] The capacity and level of service calculations in Appendix J erroneously treat each truck as 1.0 PCE.[14] Therefore, the DEIS describes peak hour capacity impacts as follows:

> Truck trips to move 16,270,000 cy per average day[15] = 1,972; PCE = 1,972; Peak Hour Trips = 124 = PCE of 124.

An accurate representation of the minimum truck traffic impacts would show:

> Truck trips to move 23,300,000 cy per average day = 3,390; PCE = 10,170; Peak Hour Trips = 423 = PCE of 1,269 (= 3 x 423)

The impacts of truck traffic as presented in the DEIS are compared with more likely impacts in TABLE 5.2-2.

[11] The calculation of PCEs is based on the use of very large truck-trailer combinations capable of hauling 22 cy of fill and is derived from Highway Capacity Manual at A-3, 1-6, 3-12 through 3-15.

[12] Highway Capacity Manual at 3-13.

[13] See DEIS, app. J, app. 3.

[14] See id.

[15] Id., app. J at 3, Table C-1.

R-12-11

R-12-27

TABLE 5.2-2

Impacts of Hauling Fill Required for Expansion of Sea-Tac[16]

Haul Period:	App. J Traffic Analysis		More Likely Scenario		Multiple of DEIS Impact
	Compact	Loose	Compact	Loose	
1 Number of Years		2.5		2.5	
2 Days Per Year		300		250	
3 Total Haul Days (1 x 2)		750		625	
4 Hours Per Day		16		12	
5 Total Haul Hours (3 x 4)		12,000		7,500	
Near-Site Truck Trips: (Impacts on Des Moines Memorial Way S.)					
6 Max Total Cubic Yards[1]		5.55	8.00	1.44	
7 Cubic Yards ÷ Truck		22.0	22.0		
8 Total Truck Trips (6 ÷ 7 x 2)[3]		504,545	727,273		
9 Avg Day Truck Trips (8 ÷ 3)		673	1,164	1.73	
10 PCE Factor[4]		1.0	3.0		
11 Pass Car Equivalents (9 x 10)		6.73	3,491	5.19	
12 Avg Hour Truck Trips (8 ÷ 5)		42	97		
13 Peak Hour "Bunching" Factor[5]		1.00	1.5		
14 Peak Hour Truck Trips (12 x 13)		42	145	3.46	
15 PCE Factor[4]		1.0	3.0		
16 Pass Car Equivalents (14 x 15)		4.2	436	10.38	

[16] Source: DEIS, app J at 3, Table C-1, 4, Table 3-2; DEIS at IV.19-13A, Table IV.19-1; calculations derived from analysis prepared for ACC by Kato & Warren, Inc.

TABLE 5.2-2 (Continued)

Haul Period:	App. J Traffic Analysis		More Likely Scenario		Multiple of DEIS Impact
	Compact	Loose	Compact	Loose	
Off-Site Truck Trips (Converging on SR-509 or S. 160th Street Interchange)[6]					
17 Max Total Cubic Yards		10.72		21.00	1.96
18 Cubic Yards/Truck		22.0		22.0	
19 Total Truck Trips (17 ÷ 18 x 2)[3]	974,545			1,909,091	
20 Avg Day Truck Trips (19 ÷ 3)		1,299			
21 PCE Factor[4]		1.0		3,055	2.35
22 Pass Car Equivalents (20 x 21)		1,299		3.0	
23 Avg Hour Truck Trips (19 ÷ 5)		81		9,164	7.05
24 Peak Hour 'Bunching' Factor[5]		1.00		255	
25 Peak Hour Truck Trips (23 ÷ 24)		81		1.50	
26 PCE Factor[4]		1.9		382	4.70
27 Pass Car Equivalents (25 ÷ 26)		81		3.0	
				1,145	14.10

1 'Near-Site' borrow areas are those south of S. 200th called 'On-Site' in the DEIS.
2 All cubic yards in quantities of millions of cubic yards (mcy).
3 Loaded truck trips times 2 to include the empty truck return trips to borrow sites.
4 One Truck/Trailer combination is equivalent to 3 passenger cars on flat grades and at arterial street intersections, would be equivalent to 10 PCEs on SR-18 uphill grade.
5 Trucks will likely have an uneven rate of approach to the fill site, particularly when hauls are coming from multiple borrow areas.
6 Truck trips to/from the 16 more remote borrow areas identified in the DEIS.

R-12-27

R-12-11

The scenario in the right-hand column would result in an average daily truck impact 72 percent greater than that indicated in the DEIS and a peak hour truck impact 3.25 times greater than that evaluated in the DEIS. On grades, such as SR 518 westbound, each truck should have been estimated to have a PCE of up to 10.[43] The operational and capacity impacts of the earth moving trucks, therefore, is likely to be up to ten times greater than the impacts disclosed in the DEIS.

The significance of this analysis is demonstrated in TABLE 5.2-2 which examines truck traffic impacts on two major roads: Des Moines Memorial Way and SR-509 at S. 160th Street. Des Moines Memorial Way would be burdened with most of the traffic from the near-site borrow areas. The maximum haul is likely to be up to 8 million cubic yards which would result in up to 1,164 truck trips per day and up to 140 peak hour trips. With a PCE of 3.0, this would be the equivalent of adding <u>3,500 auto trips per day</u> to Des Moines Memorial Way, and up to <u>420 peak hour trips</u>. Impacts of this magnitude were completely omitted in the DEIS. In fact, the average number of truck trips per hour on Des Moines Memorial Way was estimated at a mere 41.[44] If the analysis of truck traffic had included a peak hour factor and the appropriate PCE, and if it had been based on the Port's estimate of the maximum amount of needed fill, it would have led to the conclusion that the Master Plan Update development actions would have very serious impacts on traffic and highway conditions and road congestion and operations in the vicinity of the Airport.

The DEIS also does not clearly identify the haul routes over which more than 2,000 truck trips would take place each day, 6 days a week, for at least 2.5 years. A proper DEIS would have delineated clearly the specific site approach routes to be used by the trucks, and would have analyzed the capacity and operations of these routes under truck and PCE loads.

R-12-11

[43] Because truck movement slows appreciably going upgrade, the loss of capacity per large truck increases.

[44] DEIS, app. J at 3, Table C-1.

5.2.5.1 A Case in Point: The DEIS Fails to Examine Adequately the Impacts on the City of Federal Way of Transporting Fill from the Borrow Areas to the Construction Site

The DEIS does not examine impacts at the location of borrow sites. Because of the large number of such sites, these Comments cannot set forth all omitted impacts, but the example of the impacts on the City of Federal Way of one borrow area illustrates why the omission of such impacts in the DEIS is so important.

The DEIS indicates that Borrow Area No. 6 could supply up to approximately 7 million cubic yards of compacted fill material (equal to about 8.05 million cubic yards of loose earth haul),[45] which would amount to about one-third of the 23.3 million cubic yards of loose fill that the DEIS asserts would be needed for the construction of the third runway and the South Aviation Support Area.[46] Moving 8.05 million cubic yards of fill would require 365,909 truck loads and 731,818 round trips.[47]

The DEIS estimates that the hauling of fill would continue for about 2.5 years. If the haul operations were to focus on one borrow area at a time, Borrow Area No. 6 could be mined over a 10-month period. Up to 10 percent of this haul period is likely to be disrupted by intensely wet or freezing weather. It is possible, therefore, that 731,818 truck trips could occur over the equivalent of a 9-month period. Hauling 6 days per week for approximately 4 weeks per month, the hauling activities would take place over 216 days. Likely restrictions on hauling during nighttime hours and during peak commuter periods (6-8 a.m. and 4-6 p.m.) would limit the

[45] Id. at IV.23-3, app. J at 12, Table C-5. The DEIS uses a "loose" haul expansion factor of 15 percent which accounts for 7 million cubic yards of fill equaling 8.05 million cubic yards of loose earth haul. Id. at IV.23-1, app. J at 3, Table C-1.

[46] See id. at IV.19-13A.

[47] Each truck load has an associated empty return trip to the borrow area. See DEIS, app. J at 12, Table C-5.

hauling period to about 12 hours each day. Based on these probable conditions, truck trips between Borrow Area No. 6 and the Airport could be described as follows:

- Total quantity of "loose" haul = 8.05 million cubic yards
- Total truckloads @ 22 cubic yards per truck = 365,909
- Total number of truck trips @ 2 trips per load = 731,818
- Truck trips per day = 731,818 ÷ 216 days = 3,400
- Truck trips per average hour = 3,400 ÷ 12 hours = 282 (141 northbound; 141 southbound)
- Assuming 120-second cycles at signalized intersections and a 1.5 "peaking factor,"[48] truck trips per signal cycle = 14 (7 northbound; 7 southbound)
- Peak single-lane truck signal queue length = 7 x 85 feet[49] = 600 feet.

The most likely truck haul route between Borrow Area No. 6 and the Airport is illustrated on **FIGURE 5.2-3**:

- North on Milton Road and Enchanted Parkway S. (SR-161) through the S. 348th Street signalized intersection;
- East on S. 348th Street to I-5 northbound on-ramp;
- North on I-5 to SR-518[50]
- West on SR-518 to SR-509 (through two signalized intersections);
- South on SR-509 to the S. 160th Street intersection; then east to fill site.

The most significant truck impacts on the Federal Way street system would be felt on the two-lane portion of SR-161, on the SR-161/S. 348th Street intersection, and on the S. 348th

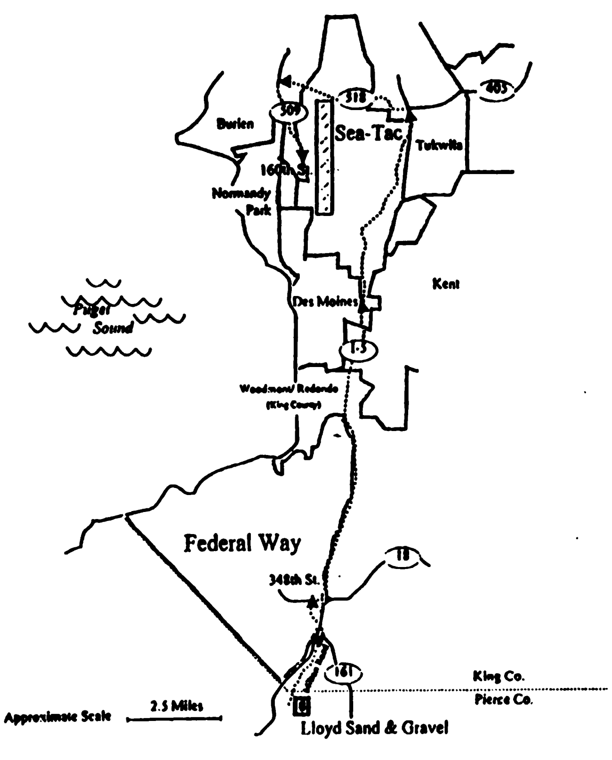
[48] See supra notes 31-33 and accompanying text.

[49] Based upon 75-foot trucks, 10 feet apart in the intersection queue.

[50] The City of SeaTac would likely prohibit truck use on S. 200th and S. 188th Streets and International Boulevard.

FIGURE 5.2-3

Potential Haul Route - Lloyd Sand & Gravel, Milton, to Sea-Tac Airport



R-12-11

Street/I-5 interchange. Since each truck is equivalent to three passenger cars on level grades and in intersection queues,[illegible] 3,400 truck trips per day would be the equivalent of adding 10,200 vehicles each day to these arterial routes, ramps and intersections. Moreover, Federal Way's Traffic and Vehicle Code restricts the use of heavy trucks (such as those that would be used in the fill hauling operation) on S. 348th Street,[illegible] thereby further complicating the Port's construction plans and disrupting its projected construction schedule.

With or without limited heavy trucking on S. 348th Street, the fill hauling operation would have enormous impacts on surface transportation and the general quality of life in Federal Way.

- Currently SR-161 (Enchanted Parkway), carries about 18,000 vehicles each day, straining the capacity of its two-lane sections. The haul-truck trips would add the equivalent of a 60 percent increase in traffic volume over the 10-month haul period, or the equivalent of over 28,000 trips each day. The two-lane sections of SR-161 would experience severe congestion during most of the 12 haul hours each day, and peripheral land access along Enchanted Parkway would become extremely difficult and hazardous as a result.
- The SR-161/S. 348th Street intersection is projected to operate at a level of service D during most hours between noon and 6 p.m. following completion of the current reconstruction work. The haul-truck activity would increase "critical movements" through this intersection from 35 to 55 percent (depending upon truck "peaking" variations), affecting west-to-south left turn movements. The added truck activity would, therefore, reduce the operation of this intersection to a level of service F during most haul hours of each day.
- The SR-161/S. 348th Street west-to-south double left-turn lane would need to be increased in signal queue storage length from 400-600 feet to 700-900 feet. Without such an increase, the left-turn traffic queues would back up to -- and beyond -- the I-5 southbound off-ramp intersection during many of the haul hours, resulting in an extremely difficult "weaving" problem for trucks and traffic moving from the I-5 southbound off-ramp to SR-161 southbound.

R-12-19

The DEIS totally ignores each of these conditions in Federal Way that would result from the transporting of fill from Borrow Area No. 6. The DEIS also fails to consider the deleterious

[illegible] See supra note 38 and accompanying text.

[illegible] Federal Way, Wash., Mun. Code ch. 15 §§ 15-183, 15-184.

effects on air quality, neighborhood tranquility, and community cohesion of the mining and transportation of fill.[23] The specific example of these effects in Federal Way should be multiplied many times over to account for the construction impacts throughout the Puget Sound region that would result from implementation of the Master Plan Update development actions: R-12-19

- Borrow Area No. 16 in Port Gamble which the Port estimates could supply more than 14 million cubic yards of fill is not a permitted site; it is unclear when it would be permitted; and use of the site would require construction of a barge loading facility. The construction of such a facility probably would require the preparation of an EIS in compliance with SEPA.

- Borrow Area No. 15 in Maury Island which the Port estimates could supply more than 14 million cubic yards of fill would require the construction of a barge loading facility for which an EIS probably would have to be prepared pursuant to SEPA. R-12-11

- Use of Borrow Area No. 14 -- which the Port estimates could supply more than 14 million cubic yards of fill -- would require the construction of a barge loading facility for which an EIS probably would have to be prepared pursuant to SEPA.

- Use of Borrow Area No. 13 in unincorporated King County -- which the Port estimates could supply more than 14 million cubic yards of fill -- would require thousands of additional trucks crossing from Mercer Island to Seattle via the I-90 Bridge which already experiences more than 5 hours of afternoon traffic congestion.

- Use of Borrow Area No. 4 in unincorporated King County and No. 7 in the City of Auburn -- which the Port estimates could supply a total of 22 million cubic yards of fill -- would require thousands of additional truck trips on SR-18 and SR-167. Both roads already experience greater than 3 hours of afternoon traffic congestion. In addition, thousands of additional fill-laden trucks also would be required to travel north on I-5 which already experiences 3 to 5 hours of afternoon traffic congestion.

- Use of Borrow Area No. 9 in Maltby -- which the Port estimates could supply 8 to 10 million cubic yards of fill -- would require a parade of thousands of trucks moving west on SR-522 and then south on I-405 through unincorporated Snohomish County to the Airport. SR-522 already experiences 3 to 5 hours of afternoon traffic congestion.

[23] The DEIS also ignores the legal constraints which might make haul routes longer if trucks must avoid roads in borrow site areas or in the Airport vicinity where truck traffic is limited.

- Use of Borrow Area No 13 in North Bend in unincorporated King County -- which the Port estimates could supply more than 14 million cubic yards of fill -- would required thousands of heavy trucks to move west on I-90 to intersect with I-405. The intersection of I-90 and I-405 already experiences more than 5 hours of afternoon traffic congestion. R-12-11

- SR-99 which passes right by the Airport, and on which almost all of the fill-laden trucks would have to travel from near- and off-site borrow areas is a road that already is choking on more than 5 hours of afternoon traffic congestion.

The DEIS is fatally flawed because of its failure to consider and analyze these impacts.

5.2.6 The DEIS Fails to Include Mitigation for the Damage Attributable to Excessive Use of Local Streets and Roads by Trucks Hauling Fill

The DEIS concedes that the enormous amount of truck traffic over more than two years would have a detrimental effect on the condition of local streets and roads. "These truck trips are expected to create wear on these roads, which may require pavement overlay or reconstruction at the end of the haul period."[24] The DEIS does not, however, commit the Port to making the repairs to the roads that would be necessitated by the damage likely to occur to local roads from constant traffic from overloaded trucks. To the contrary, Port officials have explicitly refused even to consider these impacts and have asserted that "[t]he haul routes are something that are permitted locally. If they are a permitted activity . . . no mitigation ([by the Port] should be required)."[25] The DEIS provides no information as to whether the Port even has consulted with local municipalities about which haul routes are permitted locally. R-12-15 R-12-26

[24] Id. at IV.23-3, IV.23-4.

[25] Supplier Double Runway Fill Plan at A2. As explained supra this statement is legally incorrect and fails to acknowledge existing or potential restrictions on use of haul routes by heavy trucks.

1426

214

5.2.7 The Evaluation of Construction Impacts in the DEIS is Completely Deficient and Fails to Comply With the Requirements of NEPA and SEPA

- The DEIS is replete with contradictory and inconsistent data with respect to the amount of fill that would be needed for the third runway and associated Master Plan Update development actions.

- The DEIS ignores legal and environmental review requirements to which its proposed use of near- and off-site borrow areas would be subject.

- The DEIS fails to consider permit status, permitting conditions, surface transportation restrictions and other operational variables which would affect the Port's ability to obtain a sufficient quantity and quality of fill to implement the proposed Master Plan Update development actions in accordance with the schedule set forth in the DEIS.

- The DEIS overestimates the number of truck operations that would be possible each year and underestimates the impacts of those operations, and, therefore it fails accurately to calculate the immense impacts of mining operations and truck traffic on the Puget Sound region.

- The DEIS fails to consider appropriate mitigation measures to address the disruptions caused by mining activities and haul truck traffic.

214

5.3 THE DEIS DOES NOT ADEQUATELY CONSIDER LAND USE PLANS ADOPTED BY NEARBY COMMUNITIES

5.3.1 NEPA, SEPA and the Growth Management Act Require the DEIS to Analyze the Compatibility of the Proposed Airport Expansion With Land Use Plans of Nearby Communities

Federal law and FAA regulations require that the DEIS analyze the compatibility of the proposed Airport expansion plan with the land use plans adopted by nearby local governing authorities.[1] The Master Plan Update development actions proposed for Sea-Tac, therefore, must be examined in the context of the land use plans adopted by the cities of SeaTac, Burien, Des Moines, Federal Way, Mercer Island, Normandy Park, Tukwila and other nearby jurisdictions, including King County.

CEQ regulations require that the DEIS discuss "[p]ossible conflicts between the proposed action and the objectives of . . . local . . . land use plans, policies and controls for the area concerned."[2] These regulations also provide that

> [t]o better integrate environmental impact statements into . . . local planning processes, statements shall discuss any inconsistency of a proposed action with any approved . . . local plan and laws . . . . Where an inconsistency exists, the statement should describe the extent to which the agency would reconcile its proposed action with the plan or law.[3]

For the purposes of the DEIS, land use plans or policies include not only formally adopted rezoning, planning or other regulatory ordinances, but also local general plans and proposed plans which are being pursued actively by local governments.[4]

[1] See 40 C.F.R. §§ 1502.16(c), 1506.2(d); Order 5050.4A ¶ 47e(2).

[2] 40 C.F.R. § 1502.16(c).

[3] Id. § 1506.2(d) (emphasis added).

[4] Questions and Answers About the NEPA Regulations.

The Airport and Airway Improvement Act of 1982[5] also requires a similar determination of the compatibility of the proposed airport development plan with local land use planning. That statute provides that

> (a) [t]he Secretary of Transportation may approve an application . . . for a[n airport development] project grant only if the Secretary is satisfied that --
>
> > (1) the project is consistent with plans (existing at the time the project is approved) of public agencies authorized by the State in which the airport is located to plan for the development of the area surrounding the airport.[6]

The assurance which an airport sponsor is required to give in order to "satisfy" the Secretary of Transportation (or the FAA Administrator, as his designee) must indicate what actions have been taken (or will be taken) to assure that the proposed project is consistent with land use in the vicinity of the Airport.[7] The discussion of land use compatibility in a FAA DEIS is required to include all documentation which must be submitted by an airport sponsor for the FAA to make the required finding under the Airport and Airway Improvement Act.[8]

SEPA also requires that an EIS must include consideration of existing and planned land use.[9] In addition, major projects, such as the proposed Airport expansion, must comply with the complex and detailed requirements of the Washington Growth Management Act.[10]

5/ 49 U.S.C.A. §§ 47101-47129 (West 1995).

6/ Id. § 47106(a).

7/ See Order 5050.4A ¶ 47e(2)(b).

8/ Id.

9/ See WAC 197-11-444(2)(b).

10/ See generally Chapter 36.70A RCW (1994); Chapter 395-195 WAC (1992, 1993).

5.3.2 The DEIS Fails to Satisfy the Requirements of the Washington Growth Management Act

R-7-27

The GMA created an enforceable planning process that 1) requires county and city governments to develop and adopt comprehensive plans and development regulations with specified elements;[11] ensures that county and city comprehensive plans are consistent with one another;[12] 3) makes county and city comprehensive plans binding on all jurisdictions, including the state[13] and regional and special purpose governmental entities (e.g., the Port);[14] and 4) requires that transportation planning, at all jurisdictional levels, be coordinated with local comprehensive plans.[15]

Pursuant to the GMA, comprehensive plans developed by cities and counties must address a wide array of planning concerns.[16] They must designate where new capital facilities will be located and how they will be financed,[17] and must include a process for siting essential public facilities.[18] Essential facilities include those facilities that typically are difficult to site, such as airports.[19]

A fundamental principle underlying the GMA is that the public interest is enhanced through coordination and cooperation among units of government at all levels. Therefore, the

11/ RCW 36.70A.040, .070.

12/ Id. 36.70A.100.

13/ Id. 36.70A.103.

14/ WAC 365-195-340(2)(b)(iv) (1992) -770(2) (1993).

15/ RCW 47.80.010, .023(2), (3), .026, .030(3) (1994).

16/ See RCW 36.70A.020. See also WAC 365-195-800(1).

17/ RCW 36.70A.070(3)(d), .110, .200.

18/ Id. 36.70A.200(1); WAC 365-195-340(2).

19/ RCW 36.70A.200(1).

statute and its implementing regulations mandate a collaborative planning process in which county and city plans are to be coordinated and made consistent with those of other counties and cities sharing (at least, in part) common borders or common interests in regional issues.[20] Even state agencies, regional and special purpose governmental entities -- such as the Port -- are required to comply with local comprehensive plans and development regulations adopted pursuant to the GMA.[21] Regional Transportation Planning Organizations (e.g., the PSRC) must develop and adopt regional transportation plans that are consistent with county and city comprehensive plans.[22] Moreover, the plans under which the Port and other special purpose districts operate to provide essential public facilities must be consistent with the comprehensive plans of the cities and counties whose land uses would be affected by developments at Sea-Tac.[23]

The GMA's consistency requirements extend to the various planning elements adopted by each jurisdiction. For example, GMA plans must identify open space corridors[24] and land useful for public purposes[25] and they must designate critical areas.[26] Development regulations implementing the plans must assure the conservation of critical areas.[27]

R-7-27

[20] Id. 36.70A.100; WAC 395-195-520.

[21] RCW 36.70A.103; WAC 365-195-770(2).

[22] RCW 47.80.023(2).

[23] WAC 395-195-350(2)(b)(iv).

[24] RCW 36.70A.160.

[25] Id. 36.70A.150.

[26] Id. 36.70A.170(1)(a)-(d). Critical areas include wetlands, areas of critical recharging effect on aquifers used for potable water, fish and wildlife habitat conservation areas, frequently flooded areas; and geologically hazardous areas. WAC 265-195-410.

[27] RCW 36.70A.060(2).

The classification and designation of critical areas are intended to assure their long-term conservation and to preclude incompatible land uses or development.[28] Precluding incompatible uses and development means that counties and cities must exercise control over changes in land uses, new activities, or development that potentially adversely affects critical areas, by prohibiting clearly inappropriate activities and restricting, allowing, or conditioning other activities as appropriate.[29]

An evaluation of the consistency of the proposed Airport expansion with the critical areas designations of the communities in the vicinity of Sea-Tac must, therefore, include an assessment of the extent to which the proposed Master Plan Update development actions would be inconsistent with one or more cities' (or the county's) efforts to protect and conserve critical areas.

5.3.2.1 The Proposed Master Plan Update Development Actions are Inconsistent With the Plans and Planning Elements Adopted by Neighboring Jurisdictions

The DEIS claims that the proposed Master Plan Update development actions are consistent with the comprehensive plans adopted by King County, the City of SeaTac and the PSRC.[30] The DEIS also states that, to the extent that plans or planning elements adopted by other cities would restrict or condition the proposed Airport expansion, those plans or planning elements are inconsistent with, and must defer to, City of SeaTac, King County and regional plans.[31] The DEIS, however, provides no support either for its self-serving determination of consistency between the Airport expansion project and other comprehensive plans or for its

R-7-27

[28] WAC 365-190-020.

[29] Id.

[30] See, e.g., DEIS at IV.2-7 through IV.2-9, IV.2-15, IV.2-16.

[31] Id. at IV.2-9 through IV.2-14.

conclusion that plans which would have the effect of restricting the Airport expansion are inherently inconsistent with City of SeaTac and King County plans. To the contrary, the cities submitting these Comments have relied on the Port's only completed planning document -- the 1985 Master Plan -- in drafting their comprehensive plans and their GMA planning elements. Less than four years before it proposed the construction of a third runway at Sea-Tac, the Port issued a Master Plan Update which, inter alia, declared that "no new runways at Sea-Tac would be considered, . . . because (1) the existing runway configurations had previously been determined to provide adequate capacity for the planning period [i.e., for the next 20 years] . . ., and (3) construction of a new runway would have a large environmental impact."[21]

Having been assured by the Port that "[b]ecause of site constraints at Sea-Tac . . ., the existing runway configuration is fixed,"[22] cities in the Airport vicinity proceeded to enact comprehensive plans that did not contemplate the addition of third runway or its consequences: 1) the acquisition of additional residential and commercial property by the Port; 2) increased noise over area not previously exposed to high noise levels; 3) permanent increases in vehicular traffic on already overcrowded state, federal and local roads; 4) the destruction of critical areas; 5) increases in air and water pollution; 6) years of disruptive construction activity -- including the mining and barging of 26 million cubic yards of fill -- and the resulting perpetual gridlock on the highways. The Port now proposes that nearby cities abandon 7 years of planning efforts in order to accommodate fundamentally inconsistent changes in the Port's plan.

Although the DEIS correctly states that the City of SeaTac's Comprehensive Plan has identified the Airport as an "essential public facility,"[23] that city's Plan does not indicate that

R-7-27

[21] 1985 Master Plan at 1, 2-3.

[22] Id. at 4-8 (emphasis added). There is no new Master Plan -- even today -- which would supersede the 1985 Master Plan. The DEIS is supposed to be an analysis of the environmental impacts of development actions recommended in a new Master Plan, but such a plan does not yet exist.

[23] DEIS at IV.2-8, IV.2-9. See also Department of Planning & Community Dev., City of SeaTac, Comprehensive Plan Draft ("SeaTac Comprehensive Plan") at 1-10 (Sept. 1994). The Comprehensive Plan Draft subsequently was adopted as the Comprehensive Plan of the City of SeaTac. City of SeaTac, Wash. Res. 94-047

a third runway and other airside or landside projects at the Airport would be consistent with its provisions. The City of SeaTac's Comprehensive Plan establishes a special siting process to be used by the city for essential public facilities which may apply to certain components of the Master Plan Update. The DEIS, however, disingenuously states that "[i]t is unclear at this time whether or how this process would be applied to the Master Plan Update or to the construction of a new parallel runway. . . ."[24] Moreover, "[a]s a result of the continuing land use planning process for West SeaTac, the compatibility of the Master Plan and new parallel runway with planned future land use for this area cannot be fully assessed until the West SeaTac Subarea Plan is completed and adopted."[25] These statements do not satisfy the Port's obligations under SEPA or GMA. First, the West SeaTac Subarea Plan is not expected to be completed until late 1995 or early 1996. Until it is completed it would be impossible to determine if the proposed Airport expansion is consistent with planned future land use for this area. Under these circumstances, the Port should not issue its final EIS until the future of the West SeaTac Subarea has been determined. Second, the City of SeaTac has established criteria to be used for the siting of essential public facilities. Those criteria include: 1) evaluation of viable alternatives; 2) interjurisdictional analysis; 3) financial analysis; and 4) physical and infrastructure analysis.[26] A special review committee established by the City Council must assess the proposed facility in accordance with the four criteria and must make a recommendation to the City Council.[27]

Although the DEIS acknowledges that the third runway and associated Master Plan development actions could be inconsistent with previously adopted interim planning elements

R-7-27

(Dec. 20, 1994).

[24] DEIS at IV.2-9.

[25] Id. at IV.2-8 (emphasis added).

[26] SeaTac Comprehensive Plan at 1-31, -32, A1-25 through A1-27.

[27] Id. at 1-25 through 1-27, 1-32

established by the cities of Burien, Des Moines and Normandy Park,[39] the inconsistency between these planning elements is dismissed on the grounds that

> to the extent that [a particular planning element] seeks to preclude the expansion of the Airport of regional importance, which has been deemed an essential public facility under the adopted City of SeaTac plan, it may be inconsistent with the essential public facility provisions of GMA, King County's comprehensive plan, PSRC resolutions and VISION 2020 policies.[40]

The DEIS appears to confuse the City of SeaTac's essential public facility designation with approval of the Port's particular plans for construction of the third runway and associated development actions. The characterization of a public facility as "essential," does not necessarily carry with it approval of the precise plans set forth in a major expansion of that facility, particularly if, as is the case with respect to the Airport, there are alternative means by which the facility might resolve its stated capacity problems and continue to serve its role as an essential public facility for the foreseeable future.[41]

R-7-27

Neither the City of SeaTac Comprehensive Plan nor the King County Planning Policies bestows its imprimatur of compatibility on the proposed Airport expansion project.[42] The planned expansion of Sea-Tac would appear to be inconsistent with the City of SeaTac's comprehensive plans in several respects:

- A major portion of the City of SeaTac's industrial area appears likely to be acquired by the Port in all of the "With Project" alternatives;

[39] Id. at IV.2-10 through IV.2-13.

[40] Id. at IV.2-12.

[41] See supra § 4.2.

[42] See, e.g., SeaTac Comprehensive Plan at 1-9, 1-10, 1-33; King County, Wash. Ord. No. 11446, at 52, 56, app. 5 at 90 (Aug 15, 1994) (listing airports as part of the countywide transportation system, and providing that King County, the cities, the Puget Sound Regional Council, the State, Metro, and other transportation providers shall "establish a process for prioritizing and siting the location of transportation facilities.").

- An "L" shaped area north of SR-518, east of 24th Avenue south identified as "Business Park in the City of SeaTac's Comprehensive Plan,[43] would be acquired by the Port under all "With Project" alternatives to be used for airport maintenance.[44] However, "airport support facilities," such as airport maintenance facilities would not be allowed in the City of SeaTac's business park zone.

- It is unclear to what extent further intensive development of the Airport would be compatible with the City of SeaTac's adoption of an "Urban Villages" plan which encourages significant increased growth in the City.[45]

Simply stated, the Port's proposed expansion plan has not been found -- explicitly or implicitly -- to be consistent with a single applicable GMA plan. Therefore, planning elements adopted by the ACC cities, Federal Way, or Mercer Island that could impose restrictions on the expansion of Sea-Tac would be entirely in accord with the GMA. Since the GMA requires the Port to comply with local comprehensive plans and development regulations which already have been adopted pursuant to the GMA,[46] and since the proposed Airport expansion plans could be inconsistent with the planning elements adopted by Burien, Des Moines and Normandy Park, the Port's plans may violate the consistency requirements of the GMA.

R-7-27

To the extent that the proposed Master Plan Update development actions also would not comply with critical areas protection policies adopted by the ACC cities, Federal Way and Mercer Island, the Airport expansion plan appears to violate the consistency requirements of the GMA. For example, the proposed wetlands mitigation plans set forth in the DEIS (which

R-7-28

[43] See SeaTac's Comprehensive Plan at 1-19, "Urban Villages" map. See also City of SeaTac, Wash. Res. 94-047 (enacting Ordinance No. 94-1051 which adopts Urban Villages alternative as modified by Memorandum to D. Scott Rohlfs, SeaTac City Manager from SeaTac Planning Dep't (Nov. 8, 1994)).

[44] DEIS at II-33.

[45] See City of SeaTac, Wash. Res. 94-047 (enacting Ordinance No. 94-1051 which adopts Urban Villages alternative as modified by Memorandum to D. Scott Rohlfs, SeaTac City Manager from SeaTac Planning Dep't).

[46] RCW 36.70A.103; WAC 365-195-770(2).

propose achieving compensatory mitigation outside of the affected drainage basin)[17] would not meet the requirements for mitigation within the same drainage basin contained in the ACC cities' Sensitive Areas Ordinances[18] adopted pursuant to the GMA.

The DEIS misconstrues the requirements of the GMA and ignores the full range of GMA provisions with which the Port must comply. A revision of the DEIS must specifically acknowledge that the Master Plan Update development actions cannot go forth if they are inconsistent with the comprehensive plans, or with specific planning elements adopted by the local governments in the vicinity of the Airport.

R-7-27
R-7-28

5.3.3 The DEIS Fails Properly to Analyze the Impacts of Necessary Property Acquisition

The DEIS fails to account for the purchase of additional West SeaTac properties that would be necessitated by all of the "With Project" alternatives. The DEIS even includes future development maps which erroneously show West SeaTac as an unchanged residential area,[19] which is not only misleading, but also serves to understate the extent of the impacts the "With Project" alternatives would have in comparison with the Do Nothing alternative. The DEIS also does not analyze the impact on the surrounding communities of the acquisition of the large residential area of West SeaTac, or the acquisition of a major portion of the City of SeaTac's industrial area south of S. 188th Street, between Des Moines Memorial Drive and 16th Avenue S.

R-7-2

The analysis of land use impacts in the DEIS, therefore, is deficient.

[17] See DEIS at IV.11-5, IV.11-6. See also id., app. P-A.

[18] See generally Burien, Wash., Mun. Code ch. 12, Des Moines, Wash., Mun. Code ch. 18.86; Normandy Park, Wash., Mun. Code ch. 13.16; Tukwila, Wash., Mun. Code ch. 18.45.

[19] See DEIS at II-46B through II-46D, Exhibits II.3-3 through II.3-5.

5.4 THE DEIS FAILS ADEQUATELY TO EXAMINE AIR QUALITY IMPACTS

The 30 percent increase in aircraft operations projected to occur at Sea-Tac by 2020 and the attendant increase in ground vehicles traveling to, from, and around the Airport would have a detrimental effect on the air quality of the Puget Sound metropolitan region. Additionally, the construction of the third runway and other Master Plan Update development actions -- especially transportation of 23 million cubic yards of fill from over two dozen sites in a four-county area -- would result in the disturbance of particulate matter which would contribute to further air quality degradation. The Port and the FAA legally are required to examine these and other impacts on regional air quality associated with the proposed expansion of Sea-Tac and to use baseline data which reflects seasonal variations in air quality.

The Puget Sound region currently experiences a number of air quality problems. It has been designated as a "high-moderate" non-attainment area for carbon monoxide ("CO")[1] and as a "marginal" ozone non-attainment area.[2] The State Implementation Plan ("SIP") for an area designated marginal non-attainment for ozone[3] must demonstrate that it will achieve a 15 percent reduction below 1990 levels in ozone pollutants by 1996 and must demonstrate ozone attainment by November 15, 1999.

The Washington State Department of Ecology (the "WDOE") previously has identified operations at Sea-Tac as a contributing factor to the Puget Sound area's failure to attain air quality standards. According to WDOE, existing activities at Sea-Tac are the source of approximately 5 percent of all nitrogen oxide ("NO_x") emissions in King County, and about 8

R-10-2

[1] 56 Fed. Reg. 56,846 (1991).

[2] Id. at 56,847.

[3] Id.

percent of all CO emissions.[5] Increased aircraft activity at Sea-Tac, including taxiing, maintenance, and engine testing activities -- as well as aircraft operations -- collectively could increase substantially the emissions of airborne pollutants at the Airport. Further, by increasing the capacity at Sea-Tac, the proposed third runway project also would increase considerably the vehicle exhaust emissions in the Airport vicinity as greater numbers of passengers (forecast in the DEIS to increase by 100 percent over the number of passengers presently using the Airport[6]) travel to the Airport via car, taxi or bus. Thus, construction of a third runway and related Master Plan Update development actions would exacerbate the existing adverse effects of Airport operations on regional air quality. R-10-2

The FAA long has recognized the potential for adverse air quality impacts caused by the many activities associated with the operation of an airport. Therefore, a decision to expand an airport requires that potentially adverse air quality impacts be analyzed thoroughly.[7]

5.4.1 The FAA and the Port Must Comply with the Requirements of the Federal and Washington Clean Air Acts and the Washington State Implementation Plan

The federal Clean Air Act[8] requires each state to submit to the EPA a SIP which includes state and local legislation, regulations and other necessary measures to achieve and maintain the national ambient air quality standards ("NAAQS") in each air quality region (or portion thereof) within the state.[9] Following EPA approval, the SIP, or any approved portion

[5] Flight Plan EIS at D-7.

[6] DEIS at II-8.

[7] Order 5050.4A.

[8] 42 U.S.C.A. §§ 7401-7671q (West 1986 & Supp. 1995).

[9] Id. § 7410(a)(1).

thereof, becomes federally enforceable.[10] The Washington Clean Air Act[11] authorizes the Puget Sound Air Pollution Control Agency to implement the requirements of federal and state clean air statutes on a regional basis.[12]

Section 176(c) of the federal Clean Air Act[13] and its implementing regulations[14] require that no federal agency "shall engage in, support in any way or provide financial assistance for, license or permit, or approve any activity which does not conform to an applicable [state] implementation plan."[15] The EPA has concluded that new airports and airport expansion projects are federal actions likely to be subject to the conformity provisions of the Clean Air Act.[16]

The 1990 amendments to Section 176(c) define conformity to the SIP to mean 1) conformity with the plan's purpose of eliminating or reducing the severity and number of violations of the NAAQS and achieving expeditious attainment of those standards;[17] and 2) a determination that the activity will not "(i) cause or contribute to any new violation of any [air quality] standard in any area; (ii) increase the frequency or severity of any existing violation of

[10] Id. § 7413.

[11] Chapter 70.94 RCW (1994).

[12] See id. 70.94.053.

[13] 42 U.S.C.A. § 7506.

[14] See 40 C.F.R. pt. 51, subpt. W (1994) and 40 C.F.R. pt. 93, subpt. B (1994).

[15] 40 C.F.R. pt. 51, subpt. W § 51.850(a); 40 C.F.R. pt. 93, subpt. B § 93.150(a).

[16] Preamble, 58 Fed. Reg. 63,214, 63,223 (1993). Although airport projects generally are not direct federal undertakings, FAA funding statutes require that grants for airport development or expansion be conditioned on the adoption of mitigation measures to achieve conformity with state SIPs. These grant conditions are incorporated into grant agreements and become part of an enforceable contract between the FAA and the grant recipient. Id. Thus, the FAA's role in airport development or expansion projects makes such projects "Federal Actions" as defined in EPA regulations.

[17] 42 U.S.C.A. § 7506(c)(1)(A).

any [air quality] standard in any area; or (iii) delay timely attainment of any [air quality] standard or any required interim emission reductions or other milestones in any area."[17] The Washington Clean Air Act contains language which has a similar effect on state agencies, metropolitan planning organizations and local governments -- including the Port.[18]

Therefore, in order to advance the purposes of Washington's SIP, the FAA and the Port must determine that emissions from the proposed third runway at Sea-Tac and other Master Plan Update development actions which the FAA and the Port might approve, support or finance, do not impede progress toward expeditious attainment of the NAAQS in the Puget Sound region.

Federal Clean Air Act regulations further provide:

> [n]otwithstanding any other requirements of this section, an action subject to this subpart may not be determined to conform to the applicable SIP unless the total of direct and indirect emissions from the action is in compliance or consistent with <u>all relevant requirements and milestones contained in the applicable SIP</u>, such as elements identified as part of the reasonable further progress schedules . . . .[19]

Moreover, Section 509 of the Airport and Airway Improvement Act prohibits FAA approval of any airport expansion project at Sea-Tac unless the Governor of Washington certifies that the location, design, construction and operation of the project will comply with applicable air quality standards.[20]

[17] Id. § 7506(c)(1)(B)(i)-(iii).

[18] RCW 70-94.037.

[19] 40 C.F.R. 51.858(e) (emphasis added).

[20] 49 U.S.C.A. § 47106(c)(1)(B).

R-10-10

5.4.2 NEPA, Order 5050.4A and SEPA Require that Air Quality Analysis be Included in the DEIS

NEPA, as implemented by Order 5050.4A, requires that the FAA conduct and include in the DEIS an emissions inventory for existing airport conditions and forecast conditions with and without the proposed Master Plan Update development actions.[21] In conducting this assessment, the FAA must use the data requirements and prescribed methodologies set forth in the FAA Air Quality Handbook.[22]

The FAA Air Quality Handbook, which is incorporated by reference in Order 5050.4A, recognizes that

> [t]he assessment of air quality involves two activities: (1) the development of an emissions inventory, and (2) the calculation of the dispersion of these emissions to produce a concentration.[23]

The Handbook prescribes a detailed process for the evaluation of air quality impacts resulting from the expansion of an airport and associated developments, such as the reconfiguration of the airport access roadway network.

The air quality evaluation process requires the involvement of all relevant government agencies mandated by federal and state law to ensure air quality. Order 5050.4A also obligates the FAA to coordinate with state or regional air quality agencies, and requires that these agencies review the results of the air quality assessment in the DEIS.[24]

Evaluation of air quality impacts of a proposed airport expansion project requires the compilation of an emissions inventory as "a first step indication of the magnitude of the project's

[21] Order 5050.4A ¶ 47e(5)(e)(4).

[22] Id. See Fed. Aviation Admin., U.S. Dep't of Transp., Rep't No. FAA-EE-82-21, <u>Air Quality Procedures for Civilian Airports and Air Force Bases</u> ("FAA Air Quality Handbook") (1982).

[23] FAA Air Quality Handbook at III-1.

[24] Order 5050.4A ¶ 47e(5)(c)(4).

potential impact."[25] It must be followed by consultation and coordination with the state or regional air quality agency "to check for conformance with the State Implementation Plan and [to] discuss any requirements for additional analysis."[26]

If, during the consultation process, it is determined that the proposed Airport expansion project would result in air quality impacts which are not consistent with the Washington SIP, the project must be reviewed to develop mitigation or offset measures to "bring the project within conformance" and dispersion modeling must be undertaken.[27]

If dispersion modeling indicates that the project would result in a violation of the NAAQs, "then further consideration must be given to alternative airport designs or operating procedures which will reduce pollutants to the acceptable levels."[28]

SEPA regulations also require that an EIS must include an examination by the Port of the effects of the proposed third runway project on air quality.[29]

R-10-10

5.4.3 The Analysis of Air Quality Impacts Set Forth in the DEIS Fails to Comply With Federal Guidelines and Inaccurately Represents the Impact of a Third Runway on Air Quality in the Puget Sound Region

Air quality modeling for documents issued under NEPA and SEPA must be consistent with EPA's Guideline on Air Quality Models (the "Guideline").[30] The Guideline sets forth, inter alia, the procedures for moving from initial screening for exceedances of air quality

[25] FAA Air Quality Handbook at II-10 through II-12.

[26] Id. at II-4.

[27] Id.

[28] Id. at II-5.

[29] WAC 197-11-441(1)(b)(i).

[30] 40 C.F.R. pt. 51, app. W.

standards to refined modeling[31] and the procedure for the selection of receptor locations.[32] The modeling carried out in the preparation of the DEIS does not conform to this Guideline, and it presents an inaccurate picture of the air quality impacts of the proposed third runway and associated Master Plan Update development actions.

The DEIS relies on the FAA's Emissions and Dispersion Modeling System ("EDMS") to model airport activities and through traffic on roadways adjacent to Sea-Tac for criteria pollutants[33] and to develop an emissions inventory.[34] The EDMS was developed by the FAA and the U.S. Air Force for the assessment of primary air pollutant impacts at airports or air bases.[35] EDMS produces an emissions inventory of all airport sources and calculates concentrations by these sources at specified receptors. It is recommended for use in estimating the cumulative effect of changes in aircraft operations, point source and mobile source emissions at airports or air bases.[36]

In accordance with standard procedures, EDMS modeling is conducted in two steps -- initial screening and refined modeling. Since weather is a variable that influences air quality in any given day, it must be factored into the screening process. A preliminary screening model, therefore, should be applied to determine if any exceedances of the NAAQS might occur during

[31] Id. § 8.2.1.

[32] Id. § 8.2.2.

[33] The five criteria pollutants are ozone, carbon monoxide, nitrogen oxides, particulate matter and sulfur dioxide.

[34] DEIS at IV.9-3.

[35] 40 C.F.R. pt. 51, app. W § 7.2.7.

[36] Id. app. A § A.10.

worst-case meteorological conditions.[27] If the screen analysis indicates an exceedance of the NAAQS then a refined analysis should be performed.[28]

A refined analysis is conducted in two parts. In part one, a coarse receptor grid, such as the 200-receptor grid used in the screening analysis, is modeled with EDMS using 5 years of actual representative meteorological data. In part two, a fine receptor grid with more closely spaced receptors is constructed about the coarse receptor which reported the highest pollutant concentration. The EDMS model is rerun with this fine receptor grid and the one year of actual meteorological data which lead to the highest concentration at the coarse receptor.

R-10-17

The EDMS conducted for the DEIS, however, did not comply with these guidelines. The EDMS included an initial screening on 200 receptors using one set of meteorological conditions, but only 8 of the 15 receptors in the precise locations of the exceedances identified in the preliminary screening model runs were subject to a refined analysis using five-years of representative meteorological data.[29] The 200-receptor coarse grid was probably appropriate for the initial screening study, but at a minimum this 200-receptor coarse grid should have been reanalyzed with the 5 years of actual representative meteorological data. Receptors also should have been placed at sensitive locations, such as at schools, hospitals, childcare centers and nursing homes in order to address the special vulnerability of populations using these facilities.

If the air quality modeling Guideline had been followed, the results would have enabled the Port and FAA to provide maps showing lines of equal pollutant concentration around the Airport for each proposed alternative. The maps would have provided important information for the identification of changes in the NO_x plume from departing aircraft associated with the addition of the third runway. More accurate information about changes in the NO_x plume

[27] Id. § 9.3.1.1. The highest concentrations of air pollutants occur on cold days with calm wind conditions.

[28] Id. § 9.3.1.2.

[29] DEIS at IV.9-10E, Table IV.9-6. Only receptor numbers 1,4,5,6,8,9,10, and Hotel were run with 5 years of meteorological data using EDMS.

particularly is important because aircraft activity during the takeoff/climb-out and approach produces the majority of the NO_x emissions.[30] R-10-7

The fundamental problem with using results from the initial screening analysis used in the DEIS to define receptors for the refined analysis is the difference in meteorology. EPA expressed its disagreement with the approach to air quality modeling used in the DEIS, "[b]ecause the screening procedure proposed is independent of local meteorological conditions, [and, therefore,] locations of concern identified using this technique may not (probably will not) coincide with areas of maximum concentrations identified using a more refined technique with local meteorology."[31] The EPA recommended that

> the screening approach be used to indicate whether the potential for air quality problems exists. If it does, this would trigger the need to conduct a refined analysis. Receptors used in the refined analysis should be selected to divulge maximum air quality impacts in ambient air (independent of locations indicated in the screening assessment) to evaluate compliance with applicable NAAQS. The evaluation of impacts at additional specific "sensitive" receptor locations [such as schools, hospitals, childcare centers, nursing homes] may also be warranted.[32]

The Port and the FAA ignored the EPA's criticism and suggestions and proceeded to use a fundamentally flawed modeling procedure which 1) does not comply with EPA Guidelines; 2) is incapable of providing accurate data by which compliance with applicable NAAQS could be assessed; and 3) does not reveal the air quality impacts of the third runway on sensitive receptor locations.

[30] 40 C.F.R. § 9.3.1.2.

[31] Letter from Joan Cabreza, Chief, Environmental Review Section, U.S. Envtl. Protection Agency, Region 10, to Barbara Hinkle, Port of Seattle at 1 (commenting on proposed air quality modeling protocol for the Master Plan Update at Sea-Tac), reprinted in, DEIS, app. A at A-15 (emphasis added).

[32] Id. at A-15, A-16.

Assessments of the air quality impacts of the Master Plan Update development actions are only as reliable as the data upon which they are based. Because faulty modeling procedures were used, the evaluations based on those procedures similarly are flawed. The air quality analysis, therefore, does not comply with the requirements of NEPA and SEPA for disclosure of the air quality attributable to the proposed action, and cannot be the basis for a legally sufficient conformity determination required by the federal and state clean air statutes.

5.4.4 The DEIS Analysis of Air Quality Impacts From Increased Airport Related Vehicular Traffic is Faulty and Incomplete

The DEIS used EPA's CAL3QHC model to measure CO emissions from vehicular traffic at two critical intersections near the Airport, and CALINE3 to model construction truck traffic. The intersections modeled were International Boulevard and South 188th Street and International Boulevard and South 170th Street.[43] Both intersections are in the City of Sea-Tac. Although appropriate models appear to have been used, application of the models to projected air quality impacts of the third runway and associated Master Plan Update development actions were seriously deficient.

- Afternoon peak rush hour traffic data were used for modeling rather than peak airport terminal traffic hours. These times may not necessarily coincide.

- Receptors were improperly located around critical intersections. It is normal practice to locate receptors 3 to 4 meters from the edge of the traveled roadway, unless there are obstructions to access by the public, such as a fence, thick groundcover, or a structure. Receptors were placed from 10 to 15 meters from the edge of the roadway at the intersections of International Boulevard and 188th Street and International Boulevard and 170th Street. At the intersection of International Boulevard and 170th Street, one receptor (receptor 12) was placed inside a building,[44] which clearly is inappropriate unless an air intake vent is being modeled. In the case of long approaches to an intersection, additional

[43] DEIS, app. D at D-51 through D-53.

[44] Id. at IV.9-10N, Exhibit IV.9-5.

receptors should have been, but were not, located 25 to 50 meters from the intersection, in accordance with the federal Guideline.[45]

- Modeling should have been done at additional intersections or at freeway ramp junctions identified in the DEIS as potentially affected by congestion attributable to an increase in capacity at Sea-Tac.[46]

- The DEIS fails to analyze the impacts on air quality that would occur when employee parking is relocated from South 170th Street to north of SR-518.[47]

- There is no commitment to undertake identified measures to mitigate potential exceedances of the ambient air quality standards for CO likely to result from the development of either the Centralized Terminal or the South Unit Terminal.[48]

5.4.5 The DEIS Fails to Account for Likely Air Quality Emissions From Airport Construction Activities

The DEIS fails adequately to consider the air quality impacts attributable to the construction of the third runway and other Master Plan Update development actions.

- The modeling of routes to be used by trucks hauling fill and other construction materials improperly omits consideration of truck traffic peaks[49] which would occur during the course of the 16 hours a day, 6 days a week that fill would be hauled to the construction site.[50] The modeling, therefore, appears to underestimate expected concentrations of CO and fine particulate matter (PM_{10}) along the haul routes.

[45] U.S. Envtl. Protection Agency, Guideline for Modeling Carbon Monoxide from Roadway Intersections, EPA-454R-92-005, § 4.7.4 (Nov. 1992).

[46] DEIS at IV.15-4, IV.15-5.

[47] Id. at IV.9-8.

[48] See id. at IV.9-7.

[49] See supra § 5.2.5.

[50] DEIS at IV.23-1, IV.23-2.

- The NO_x emission factor from a heavy duty diesel-powered vehicle is approximately 8 times greater than for a light duty gasoline-powered vehicle. The Airport development project is estimated to take at least 2.5 years to complete, and the diesel construction vehicles are significant sources of NO_x and PM_{10}. However, NO_x was not modeled for vehicular traffic emissions.

- Receptors were inappropriately placed too far away -- 19 meters -- from the travel lanes, rather than at the normal 3 to 4 meters from the edge of the traveled roadways where the public has access for the hours under consideration. Many receptors were placed behind residential structures.[20/] As a result, the pollutant concentrations in Table D-20[21/] significantly underestimate the air pollutant levels to which people living, walking, or playing adjacent to the roadway would experience.

- Construction vehicles, such as cement trucks, bulldozers, scrapers, rollers, dump trucks and diesel generators were not included in the emissions inventory, thereby inaccurately minimizing CO and PM_{10} concentrations.

- On-site fugitive dust emissions during construction were not included in the dispersion model. A screening level calculation prepared for the ACC, Federal Way and Mercer Island indicates that violations of the 24-hour annual ambient air standard for PM_{10} would take place during construction. At a distance of 1 kilometer from the Airport, there would be an annual average PM_{10} concentration of 11,864 $\mu g/m^3$, although the annual average air quality standard for PM_{10} only is 50 $\mu g/m^3$.[22/] At 1 kilometer from the Airport, the estimated 24-hour concentration of PM_{10} would be 218 $\mu g/m^3$ compared with the 24-hour standard of 150 $\mu g/m^3$.[23/] In a worst case scenario, fugitive dust exceedances were projected to extend over 50 kilometers from the construction site.[24/] Even with

R-10-27

20/ Id., app. D at D-70, D-71, D-73, Exhibits D-9 through D-11.

21/ Id. at D-74.

22/ WAC 173-470-100(4).

23/ Id. 173-470-100(3)(a).

24/ Envirometrics, Inc., Review of the Air Quality Sections in the Draft Environmental Impact Statement for Sea-Tac Master Plan Update Development Actions (June 1995).

assumed mitigation reducing fugitive dust by 80 percent,[25/] a minimum release of 11,194 tons per year would occur, which would result in exceedances of the 24-hour and annual standards for PM_{10} at distances between 400 and 800 meters from the site. Although the area around Sea-Tac is attainment for PM_{10}, there are nearby non-attainment areas along the Duwamish in south Seattle and Kent which could be adversely affected.

R-10-27

5.4.6 The DEIS Contains Inadequate Information About Air Toxics Emissions

The DEIS contains insufficient information to serve as the basis for an adequate evaluation of the risk assessment analysis for air toxics emissions. Data presented in the DEIS does, however, show an increase in the incidence of cancer associated with formaldehyde emissions at levels in excess of the WDOE target levels. Above these levels, the WDOE requires additional study to further clarify the expected risk. If the risk cannot be shown to be less than one in 100,000, WDOE cannot issue an approval for the project until the Port has met several conditions, and then only with special review and public proceedings.[26/] It is unclear from the data in the DEIS whether the estimated risk at the receptors is less than one in 100,000.

R-10-36

R-10-35

5.4.7 The Analysis of Air Quality Impacts in the DEIS is Fundamentally Flawed

Errors, omissions, and miscalculations pervade the DEIS analysis of air quality impacts. The analysis, therefore, is fundamentally flawed. It cannot serve as the basis for a legally sufficient conformity determination under the federal and Washington Clean Air Acts. The analysis results in an incomplete and poorly developed emissions inventory, and therefore, it also is insufficient to comply with the requirements of NEPA, SEPA and Order 5050.4A.

25/ DEIS at IV.23-8.

26/ WAC 173-460-100(3).

5.5 THE DEIS FAILS TO ANALYZE ADEQUATELY THE IMPACTS OF MASTER PLAN UPDATE DEVELOPMENT ACTIONS ON WATER QUALITY AND HYDROLOGY IN THE PUGET SOUND REGION

5.5.1 The Requirements of the Federal Clean Water Act Must be Addressed in the DEIS

NEPA and SEPA regulations mandate consideration in the DEIS of the water quality impacts of the proposed expansion of Sea-Tac.[1] Moreover, the DEIS must examine the water quality impacts of the Master Plan Update development actions in the context of the substantive requirements of the Federal Water Pollution Control Act, as amended by the Clean Water Act of 1977 ("Clean Water Act").[2]

The proposed Master Plan Update development actions would result in the release of pollutants from various sources into Miller Creek, Des Moines Creek, their tributaries, and Puget Sound.[3] Releases of pollutants into these water bodies are comprehensively regulated by the Clean Water Act. Washington also has adopted several comparable statutes for the protection of surface water bodies.[4]

The goal of the Clean Water Act is to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters."[5] The ultimate objective of the statute is to

[1] See Order 5050.4A ¶ 85f; WAC 197-11-444(1)(c).

[2] 33 U.S.C.A. §§ 1251-1387 (West 1986 & Supp. 1995).

[3] DEIS at IV.10-1, IV.10-7 through IV.10-10.

[4] See, e.g., Chapter 90.48 RCW (Water Pollution Control Act; Chapter 35.67 RCW (Sewage Systems); Chapter 90.70 RCW (Puget Sound Water Quality Authority); Chapter 35.88 RCW (Protection from Water Pollution); RCW 36.70A.060 (Protection of Critical Areas).

[5] 33 U.S.C.A. § 1251(a).

eliminate completely the discharge of pollutants into navigable waters.[6] In light of the Clean Water Act's remedial nature, the courts uniformly have given it a broad interpretation.[7]

The Clean Water Act uses two principal devices to establish and enforce standards to abate and control water pollution. First, through the National Pollutant Discharge Elimination System ("NPDES") permit program, the Clean Water Act attempts to quantify maximum "effluent limitations" on the discharge of "pollutant[s][8] into the "navigable waters"[9] from point sources"[10] and from stormwater runoff.[11] Essentially, the Clean Water Act places a

[6] See American Paper Inst. v. Train, 543 F.2d 328, 333 (D.C. Cir. 1976), cert. dismissed, 429 U.S. 967 (1976). See also Quarles Petroleum Co. v. United States., 551 F.2d 1201, 1206 (Ct. Cl. 1977); Quivira Mining Co. v. EPA, 765 F.2d 126, 129 (10th Cir. 1985), cert. denied, 474 U.S. 1055 (1986).

[7] See Kennecott Copper Corp. v. EPA, 612 F.2d 1232, 1236 (10th Cir. 1979) ("[I]n construing the [Clean Water Act], 'the guiding star is the intent of Congress to improve and preserve the quality of the Nation's waters. All issues must be viewed in the light of that intent.'" (quoting American Petroleum Inst. v. EPA, 540 F.2d 1023 (10th Cir. 1976), cert. denied, 430 U.S. 922 (1977))).

[8] The Clean Water Act defines the term "pollutant" to mean:

> dredged spoil, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal, and agricultural waste discharged into water.

33 U.S.C.A. § 1362(6).

[9] The Clean Water Act defines the term "navigable waters" to mean "the waters of the United States." 33 U.S.C.A. § 1362(7). The term has been very liberally construed by the courts to include, for example, rivers, streams, lakes, man-made canals or ditches, dry arroyos, wetlands, swamps, marshes, and sloughs. See, e.g., Avoyelles Sportsmen's League, Inc. v. Marsh, 715 F.2d 897, 923 (5th Cir. 1983); National Wildlife Fed'n v. Gorsuch, 693 F.2d 156 (D.C.Cir. 1982).

[10] The Clean Water Act defines the term "point source" to mean:

> any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged.

33 U.S.C.A. § 1362(14).

limit on the quantity of each pollutant that a pollution source may generate during a period of time. Each discharger's performance must be measured against strict technology-based "effluent limitations" to which it must conform.[13] It is unlawful for any "person"[14] to "discharge"[15] any "pollutant" without a NPDES permit.[16]

The second means of regulating discharges is the water quality standards program. Under Sections 402 and 301 of the Clean Water Act, the NPDES permitting agency must include in each permit "any more stringent" effluent limitations "necessary" or "required" to meet applicable state-adopted water quality standards.[17] These limitations are in addition to the required technology-based effluent limitations prescribed by the NPDES program. Water quality standards are developed by state governments pursuant to Section 303 of the Clean Water Act.[18] Those standards must protect public health and welfare, enhance the quality of water and "serve the purposes" of the Clean Water Act.[19]

11/(...continued)

12/ EPA regulations define "stormwater" as "storm water runoff, snow melt runoff, and surface runoff and drainage." 40 C.F.R. § 122.26(b)(13) (1994).

13/ 33 U.S.C.A. § 1311.

14/ The term "person" means "an individual, corporation, partnership, association, State, municipality, commission, or political subdivision of a State, or any interstate body." Id. § 1362(5).

15/ The term "discharge of a pollutant" is defined, in relevant part, to mean "any addition of any pollutant to navigable waters from any point source." Id. § 1362(12)(A).

16/ Id. § 1311(a).

17/ Id. §§ 1342(a), 1311(b)(1)(C).

18/ Id. § 1313(a).

19/ 33 U.S.C.A. § 1313(c)(2); 40 C.F.R. § 131.2. To "serve the purposes" of the Clean Water Act water quality standards should, wherever attainable, provide water quality for the protection and propagation of fish, shellfish and wildlife and for recreation in and on the water and take into consideration their use and value of public water supplies, propagation of fish, shellfish, and wildlife, recreation in and on the water, and agricultural, industrial, and other purposes including (continued...)

Washington has established water quality standards for state surface waters.[21] Of the waters affected by operations at Sea-Tac, Puget Sound has been designated Class AA.[22] Class AA is Washington's most protective classification, and it is intended to protect the highest quality waters. Although Des Moines Creek and Miller Creek are not specifically classified by the state's regulations, under Washington law they are given the water quality classification assigned to the water body into which they flow, that is, the Puget Sound. Consequently, Miller Creek and Des Moines Creek each carry the Puget Sound's classification of Class AA.[23]

Section 402 of the Clean Water Act makes the EPA the NPDES permit-issuing authority unless the state has applied for, and received, authority from EPA to administer its own NPDES permit program.[24] Washington, acting through its Department of Ecology ("WDOE"), operates an EPA-approved NPDES permit program,[25] and thus, regulates discharges for Port facilities at Sea-Tac into state water bodies.

The Clean Water Act and EPA regulations also require facilities to apply for stormwater discharge permits for runoff associated with industrial activity.[26] In addition to the Port's stormwater permit for normal Airport operations, the Port also would have to comply with the stormwater permitting requirements for the construction activities involved in the implementation

---

19/(...continued)
navigation. 40 C.F.R. § 131.2.

21/ Chapter 173-201 WAC (1990).

22/ WAC 173-201-085(21).

23/ Id. 173-201-070(6).

24/ 33 U.S.C.A. § 1342(a), (b).

25/ See Chapter 90.48 RCW; Chapter 172-220 WAC.

26/ 40 C.F.R. § 122.26(b)(14)(x).

of the Master Plan Update development actions, including the development of comprehensive management practices designed to protect against excessive sedimentation and erosion during construction.[29]

5.5.2 The DEIS Fails to Describe Adequately Water Quality Issues Associated With Existing Operations at Sea-Tac

The DEIS's description of the existing conditions, construction impacts and future conditions of operations at Sea-Tac is inadequate to make an informed decision on the true impacts of the proposal on water quality.

The existing conditions discussion fails to identify the current fragile condition of Des Moines Creek and Miller Creek. Both creeks suffer from urbanization which has destroyed valuable habitat and degraded water quality. Any development in the watersheds will contribute to the future degradation of the creeks by: 1) reducing low flows; 2) increasing total runoff volume; and 3) providing for an efficient means for pollutants to enter the creek systems.

Much of the water quality mitigation relies on an existing Industrial Waste System (IWS) treatment plant, and perhaps more specifically, the capacity of the existing plant outfall pipe. The capacity of this outfall pipe is already under question and is an integral part of the SASA project proposal mitigation. The DEIS inadequately describes the capacity of the IWS to accept all proposed flow.

Analysis of water quality implications of construction activities is inadequate in the DEIS. Major projects of this nature need project-specific analysis to determine impacts and the effectiveness of the proposed mitigation. The DEIS is grossly deficient in this area. For example, borrow site construction impacts on water quality are not identified. Major excavation from borrow sites could destroy shallow aquifers and impact low flows in the creek systems, and could contribute to erosion and sediment loading in the receiving bodies of water. The sediment

[29] Id. § 122.26(c)(1)(ii).

loading on the creeks by the dependent third runway proposal could be 15,000 tons or more with the currently proposed mitigation. This type of loading could destroy habitat and may increase the likelihood of additional washouts by altering the course of the streams.

The discussion of construction impacts mitigation also is deficient. To imply that Best Management Practices would be adequate[30] is not acceptable. The scale of the proposal warrants the issuance of a project-specific NPDES. A project-specific NPDES would allow for effluent discharge standards to be set and enforcement capabilities to be put in place.

The DEIS fails to demonstrate that the Airport expansion project's negative impacts would be substantially mitigated. Proper analysis would show the cumulative impacts of the construction and implementation of the Airport expansion could irreparably damage the Miller Creek and Des Moines Creek habitats by adding runoff volume and increasing pollutant loadings. There is no clear analysis of the proposed mitigation of impacts to surface water and ground water in the DEIS. What mitigation is proposed in the DEIS is too generic, and severely understates the potential damage to the environment.

Proper analysis would show the need for a longer construction period, project-specific erosion control which may include surface water treatment, permanent surface water treatment to reduce dissolved pollutants, and a major expansion to the IWS plant, including a new outfall.

[30] DEIS at IV.10-11.

5.6 THE DEIS FAILS ADEQUATELY TO EXAMINE IMPACTS TO WETLANDS AND PRESCRIBES INADEQUATE MITIGATION

5.6.1 The FAA Must Comply With Federal Requirements for the Protection of Wetlands

Every federal agency is obligated "to minimize the destruction loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agency's responsibilities for . . . providing Federally undertaken, financed, or assisted construction and improvements."[1] Federal agencies, including the FAA, are prohibited from providing funding or other assistance for the construction of projects in wetlands unless they find "(1) that there is no practicable alternative to such construction, and (2) that the proposed action includes all practicable measures to minimize harm to wetlands which may result from such use."[2] Each of the Master Plan Update "With Project" proposed alternatives identified in the DEIS would affect existing wetlands.[3] "Impacts on these wetlands would include: placement of fill material, dredging, removal of existing vegetation, and changes in hydrologic regimes as a result of increase impervious surface area and stormwater management system restructuring."[4]

Section 404 of the Clean Water Act requires that anyone proposing to discharge dredged or fill material into navigable waters must first obtain a permit from the U.S. Army Corps of

[1] Exec. Order No. 11,990 § 1(a)(2), 42 Fed. Reg. 26, 961 (1977), amended by Exec. Order No. 12,608, 52 Fed. Reg. 34,617 (1987), reprinted in, 42 U.S.C.A. § 4321 (West 1995).

[2] Id.

[3] DEIS at IV.11-1.

[4] Id.

Engineers ("Corps").[5] "Navigable waters" are defined as "waters of the United States,"[6] which have been interpreted by the Corps to include "wetlands."[7]

R-14-11

Since construction of the proposed third runway and associated Master Plan Update development actions would affect wetlands, these projects could not be undertaken unless the FAA has affirmatively determined

- that there is no practicable alternative to such construction; and
- that the proposed action includes all practicable measures to minimize harm to wetlands which may result.[8]

The DEIS is required to contain a discussion of the basis for any such findings, along with a discussion of the various alternatives which have been considered.[9] As discussed in detail elsewhere in these Comments,[10] the DEIS fails to consider a reasonable range of alternatives which would satisfy the Port's purpose and need for the proposed Airport expansion project. The DEIS, therefore, cannot legally serve as the basis for a determination that there is no practicable alternative to the use of wetlands. In particular, the failure to consider alternatives which would reduce or eliminate the use of fill would prevent the FAA from making a legally sufficient finding.

[5] 33 U.S.C.A. § 1344(a).

[6] Id. § 1362(7).

[7] This interpretation was upheld by the Supreme Court as consistent with the broad statutory grant of authority to the Corps to regulate "waters of the United States." United States v. Riverside Bayview Homes, Inc., 474 U.S. 121, 131 (1985). See also United States v. Akers, 785 F.2d 814, 818 (9th Cir.), cert. denied, 479 U.S. 828 (1986).

[8] Order 5050.4A ¶¶ 47e(11)(b)2, 83e.

[9] Id. ¶ 85.

[10] See supra § 4.1.

If a legally sufficient finding were to be made, the Port would then be required to obtain a permit pursuant to Section 404 of the Clean Water Act[11] in order to dredge or fill the affected wetlands.[12] Corps regulations state that "a permit will be granted unless the district engineer determines that it would be contrary to the public interest."[13] The public interest review requires the Corps' District Engineer to evaluate all probable impacts of the proposed activity, including cumulative impacts. The factors to be considered include:

> conservation, economics, aesthetics, general environmental concerns, wetlands, historic properties, fish and wildlife values, flood hazards, floodplain values, land use, navigation, shore erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, food and fiber production, mineral needs, considerations of property ownership and, in general, the needs and welfare of the people.[14]

Other factors to be considered include the need for the project, the practicability of using other alternatives and the extent of permanent damage to the environment from the project.[15]

In addition to complying with Corps regulations, the District Engineer must apply EPA standards for issuance of a wetlands permit.[16] Notwithstanding Corps administrative control over the application process, EPA may veto any permit approved by the Corps if the project "will have an unacceptable adverse effect on municipal water supplies, shellfish beds and fishery areas (including spawning and breeding areas), wildlife, or recreational areas."[17]

11/ 33 U.S.C.A. § 1344.

12/ Id.

13/ 33 C.F.R. § 320.4(a)(1) (1994).

14/ Id.

15/ Id.

16/ 40 C.F.R. § 230.10

17/ 33 U.S.C.A. § 1344(c).

EPA's veto authority particularly is important in the context of its ability to demand an evaluation of alternatives to the issuance of a wetlands permit. EPA regulations prohibit the issuance of a wetlands permit if there exists a "practicable" alternative to the proposal.[18] "An alternative is practicable if it is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes."[19] EPA Guidelines[20] also require that where non-water dependent activities are involved (e.g., an airport) the Corps must determine whether a "practicable" alternative site exists which would cause less environmental harm to wetlands.[21] The Guidelines further provide that, if a project is not water dependent, practicable alternatives are 1) "presumed to be available;" and 2) presumed to have less adverse impact on the aquatic ecosystem.[22]

R-18-22

5.6.2 The Port Must Comply With State and Local Wetlands Protection Measures

In addition to complying with federal permitting requirements, the Port also will have to obtain a wetlands permit from the Washington State Department of Ecology ("WDOE") and the Washington Department of Fisheries and Wildlife. GMA provides supplemental protection to wetlands by requiring cities and counties to designate critical areas -- including wetlands -- and to issue development regulations to protect these designated areas.[23] The GMA requires cities and counties to exercise control over changes in land uses, new activities, or development

18/ 40 C.F.R. § 230.10(a).

19/ Id. § 230.10(a)(2).

20/ Id. pt. 230 (Guidelines for Specification of Disposal Sites for Dredged or Fill Material).

21/ Id. § 230.10(a).

22/ Id. § 230,10(a)(3) (emphasis added).

23/ RCW 36.70A.170, .060(1); WAC 365-190-040.

that potentially could adversely affect critical areas. The GMA also requires cities and counties to prohibit clearly inappropriate activities, and restrict, allow or condition other activities, as appropriate.[24]

— R-18-22

The cities of Normandy Park and Des Moines have adopted ordinances dealing with environmentally sensitive areas which regulate and restrict development activities.[25] Each of these ordinances includes wetlands in the definition of environmentally sensitive areas.[26] Both cities restrict development in areas where "significant and important wetlands and their buffers" are located.[27] The cities also require that where development is allowed, buffers of 100 feet and 35 feet must be maintained for significant and important wetlands, respectively.[28] The cities also regulate wetlands mitigation activities, specifying the replacement ratio and the replacement location.[29] A similar regulatory regime is found in Tukwila's Sensitive Areas Overlay Zone.[30]

TABLE 5.6-1 sets forth the requirements adopted by the ACC cities and the City of SeaTac with which the Port will have to comply.

— R-7-28

[24] WAC 365-190-020.

[25] See Normandy Park, Wash., Mun. Code ("NPMC") ch. 13.16; Des Moines, Wash., Mun. Code ("DMMC") ch. 18.86.

[26] NPMC 13.16.030(14); DMMC 18.86.252.

[27] NPMC 13.16.060(a)(1); DMMC 18.86.060(a). Significant and important wetlands are defined in the NPMC 13.16.030(52)(A), (B) and in the DMMC 1.04.663(1), (2).

[28] NPMC 13.16.070(a)(2)(A), (B); DMMC 18.86.070(2)(A), (B).

[29] For example, Des Moines adopted a goal of no net loss of wetlands within a particular drainage basin and requires 1:1 replacement or enhancement/restoration. DMMC § 18.86.107. Normandy Park adopted a goal of no net loss of wetlands within a particular drainage basin. NPMC § 13.16.120.10.(B).(ii). The City of SeaTac has adopted a goal of no net loss of wetlands within a sub-basin and requires a 2:1 replacement ratio for Class 1 and 2 wetlands and a 1:1 replacement ratio for Class 3 wetlands. City of SeaTac, WA., Mun. Code § 15.30.320F.

[30] Tukwila, WA., Mun. Code Chapter § 18.45.089(c)(2)(ii).

TABLE 5.6-1

Requirements for Wetlands Mitigation

City	Wetlands Types	Buffers (Feet)	Required Location of Mitigation
Burien	Class 1,2,3	100, 50, 25	Section 480F. "...that the off site location is in the same drainage sub-basin as the original wetland..."
Des Moines	Significant, Important	100, 35	18.86.107 "...if the compensation project is within the same subwatershed as the wetlands or stream to be altered..."
Normandy Park	Significant, Important	100, 35	13.16.120.10.(B).(ii) "...if the compensation project is in the same sub-watershed within Normandy Park city limits as the wetlands to be altered."
Tukwila	Type 1, 2, 3	100, 50, 25	18.45.089(c)(2)(ii) "Off-site compensation shall occur within the same watershed where the wetlands loss occurred."
SeaTac	Class I, II, III	100, 50, 35	15.30.320F. "...that the off-site location is in the same drainage sub-basin as the original wetland..."

Because the local wetlands requirements would affect the Port's proposed Airport expansion plans, the DEIS must discuss how the Port proposes to address those wetlands requirements.

— R-7-28

R-14-3 R-14-7

5.6.3 The DEIS Fails Adequately to Examine Impacts on Wetlands and to Prescribe Appropriate Mitigation

The biological components sections of the DEIS contain insufficient analyses to support assumptions relative to either wetlands mitigation or potential impacts to federal and state-listed wildlife species. The wetlands section provides data that is inconsistent with original wetlands delineation reports and lacks any discussion of why the initial premise of the FAA Draft Advisory Circular 150/5200, Wildlife Attractants on or Near Airports ("Advisory Circular 150/5200") was bypassed. Without additional studies and more accurate data, the analyses provided in the DEIS cannot be relied on by a responsible official evaluating the proposed Airport expansion project.

The DEIS does not explain the rationale behind assumptions and decisions made relative to Advisory Circular 150/5200. Wetlands are considered major attractants to wildlife species that are assumed to be safety hazards to airport operations. The DEIS does not discuss how the existing wetlands habitat conditions effect past, ongoing or future Airport operations. There are currently 102 acres of wetlands habitat, including open water, that will remain within 4,000 feet or less of existing runways and the proposed third runway location. Strict adherence to the Draft Advisory Circular would preclude development of additional facilities at any location within 10,000 feet of existing wildlife attractants.

Ordinances enacted by Des Moines and the City of SeaTac regulating wetlands habitat modification require there be no net loss within the drainage basin of impact.[21] In place of the DEIS's proposed 26.5-acre wetlands mitigation in the Kent Valley, creation of 19.2 acres of palustrine forested, scrub/shrub and emergent wetlands would be required if mitigation was performed under affected city jurisdictions. The assumption that insufficient land to perform wetlands mitigation is available within the drainage of impact completely overlooks availability of over 400 acres of undeveloped land within the project boundary. The DEIS particularly

[21] See supra § 5.6.2.

R-14-3 R-14-7

overlooks Borrow Areas 1, 2, 3 and 5 for which reclamation plans, if they exist, are not disclosed in the DEIS. Use of Borrow Areas 1, 2 or 3 for wetlands mitigation would place mitigation sites 6,000 to 8,000 feet away from the planned new runway. This would be a distance factor of two to five times further away than existing wetlands habitats.

A second unsupported assumption is that wetlands mitigation in the drainage or subbasin of impact cannot be accomplished without creating additional wildlife hazards. The FAA already has approved a SASA at Sea-Tac which includes on-site mitigation.[22] The DEIS fails even to acknowledge the FAA's Record of Decision for the SASA project. The approved SASA mitigation plan commits to relocate Des Moines Creek and create forested and scrub/shrub wetlands within 1,000 feet of Runway 34R.[23]

The discussion of wetlands in the DEIS is a tangled mass of inconsistent statements:

- The total acreage values presented do not agree with summation values provided for the 54 wetlands in the Table IV.11-1 in the DEIS.[24] The DEIS states that 9.7 acres of wetlands would be lost,[25] but data presented in DEIS tables and appendices and original wetlands delineation reports indicate this value is closer to 10.7 acres.[26]

[22] See Fed., Aviation Admin., U.S. Dep't of Transp. Northwest Mountain Region, Record of Decision for the South Aviation Support Area, Sea-Tac International Airport at 8-9 (Sept. 13, 1994)

[23] Id. at 11.

[24] DEIS at IV.11-6A, Table IV.11-1.

[25] See Id. at IV.11-1. See also Port of Seattle, South Aviation Support Area ("SASA") Final Environmental Impact Statement at 4-152.

[26] Id. at IV.11-6A, Table IV.11-1. See generally id., app. H.

R-14-3 R-14-7

- Acreage on 19 of 32 wetlands described by the Port's consultant as delineated wetlands have different values presented in the DEIS[37] than are provided in the individual descriptions found in the Jurisdictional Wetlands Delineation Report.[38]

- One map in the DEIS shows that there would be no impact to Wetland 3 in Borrow Area 8 but that Wetland 27 would be filled,[39] while a table indicates that Wetland 3 is to be filled and Wetland 27 would be unaffected.[40]

In addition to contradictory data, the intermediate-level wetlands delineations of Wetlands 1 to 32 prepared by consultants to the Port,[41] do not appear to comply with directions in the Corps' manual.[42] Specifically, paired-plot wetlands versus upland analysis was performed at each site. Also, because of a lack of formal land survey, there appears to be no basis for assuming that the wetlands acreage provided in the DEIS are more than rough estimates.

R-14-13

The wetlands mitigation and stream location plans provided as appendices to the DEIS are conceptual in nature.[43] The detail provided in them is inadequate to assess the ability of the plans to mitigate for impacts of the proposed project. Stream relocation and mitigation plans should have explored the removal of downstream barriers to anadramous fish. Monitoring plans outlined for these projects are inadequate to assure successful creation of habitats as complex and long-lived as forested wetlands and riparian zones.

[37] Id. at IV.11-6A, Table IV.11-1.

[38] Id., app. H.

[39] DEIS at IV.11-6B, Exhibit IV.11-2.

[40] Id. at IV.11-6A, Table IV.11-1.

[41] See id., app. H.

[42] See Federal Interagency Comm. for Wetland Delineation, Federal Manual for Identifying and Delineating Jurisdictional Wetlands, at 35-39 (1989).

[43] See DEIS, apps. P-A, P-B.

R-5-3

The DEIS's cumulative effects analysis for all wetlands impacts is inadequate pursuant to the requirements of NEPA. There was no analysis of past or foreseeable future impacts to wetlands or threatened and endangered wildlife habitats in a cumulative effects area larger than the proposed project site. At a minimum, the analyses should have evaluated past, present and future expected impacts within the total watershed for both Miller Creek and Des Moines Creek.

An analysis of wetlands impacts that would satisfy the requirements of NEPA and SEPA would have found that:

- The project violates the FAA Draft Advisory Circular that recommends new facilities not be located in the vicinity of existing wetlands or other wildlife attractants.

- Sufficient land is available such that wetlands mitigation could be located in the drainage of impact as required by local ordinances.

- Wetlands mitigation could be designed that does not create an undue wildlife hazard to airport operations. The lack of a prior history of wildlife hazard problems at Sea-Tac would indicate that existing wildlife habitats do not attract species hazardous to flight operations.

- Due to cumulative effects of past projects, a high proportion of wetlands habitat that existed in the two watersheds 20 to 50 years ago have been filled by Port and by commercial and residential construction. Further loss of wetlands in the Miller and Des Moines Creek drainage basins will add to degradation of water quality and changes to stormwater runoff regimes. These conditions would contribute to existing downstream erosion/mass wasting problems in both drainages.

- An alternative that would have no impacts on wetlands exists, and legally it must be selected pursuant to section 404[44] and EPA regulations.[45]

[44] 33 U.S.C.A. § 1344(a).

[45] 40 C.F.R. § 230.10(a).

5.7 THE DEIS DOES NOT ADEQUATELY EXAMINE TRANSPORTATION INFRASTRUCTURE AND TRAFFIC IMPACTS

5.7.1 The DEIS Does Not Satisfy the Requirements of SEPA or NEPA

Sea-Tac is a major regional traffic generator. Approximately 87,600 vehicles per day enter, leave, and pass through the Airport.[1]

SEPA requires an EIS to include an analysis of the impacts of proposed projects on transportation,[2] including transportation systems, vehicular traffic, waterborne, rail, and air traffic, parking, the movement of people or goods, and traffic hazards.[3]

FAA regulations require that the agency include in the DEIS a detailed analysis of the alteration in surface transportation patterns associated with the proposed project. Further, the DEIS must "document, to the extent applicable, measures taken to avoid significant disruption by such means as rerouting, street widening, or changes in land use patterns to minimize the effects of the project."[4]

R-3-7
R-8-21

5.7.2 The DEIS Makes Unsupported Assumptions About Projected Increases in Airport-Related Traffic, With or Without Airport Expansion

The DEIS asserts that total Airport-related surface traffic is expected to increase from approximately 87,500 vehicles per average day in 1994 to 161,500 vehicles per average day in the year 2020, with or without the implementation of the proposed Airport improvements: "In

1/ DEIS at IV.15-2.

2/ WAC 197-11-444(c).

3/ Id.

4/ Order 5050.4A ¶ 47e(3)(d). See also id. ¶ 85(c).

R-3-7
R-8-21

each future year, the Do-Nothing and 'With Project' alternatives would experience the same quantity of Airport-related surface traffic."[5]

There is no credible evidence -- either in the DEIS or elsewhere -- to support the assertion that Airport-related surface traffic would nearly double over the next 25 years if the third runway and other capacity-enhancing projects were not developed. Quite the contrary, the Port's own studies conclude that the Airport as presently configured would reach maximum capacity of about 380,000 annual operations and 21.6 million enplanements shortly after 2000.[6] The additional 100,000 operations and 21 million enplanements projected for 2025 would result directly from the capacity-enhancing development of a third runway and associated airside and landside improvements included in the Master Plan Update.

If operations and enplanements do not increase to the level projected in the DEIS, then Airport-related traffic also is unlikely nearly to double. Because the Port estimates that without the proposed project, the Airport would reach capacity in 2000, the year 2000 Do-Nothing alternative Airport traffic and parking forecasts should be established as a ceiling against which the impacts of the additional traffic associated with the "With Project" alternatives must be measured; the additional traffic that would be generated must be attributed to the proposed actions to increase Airport capacity.

R-8-13

5.7.3 The Analysis of Airport-Related Transportation and Traffic Impacts is Impermissibly Limited

R-8-26

The analysis of Airport-related surface transportation impacts in the DEIS is limited to a study of off-Airport traffic operations only. It fails to consider on-Airport traffic circulations,

5/ DEIS at IV.15-1.

6/ See supra § 2.1.1.

on- and off-site public and private transit services and mode splits, and on- and off-site parking generation, seasonal variations, and parking overflows.[7] R-8-13

Although use of Annual Average Daily Traffic ("AADT") values in the DEIS generally is acceptable for evaluating non-Airport background traffic data, the Airport itself experiences substantial seasonal variations in activity that more appropriately are considered by addressing design day conditions. Design levels should be defined for Airport traffic and parking activity (e.g., an average August weekday), including the estimated number of days each year the design levels would be exceeded. All subsequent operations analyses should be carried out for the designated design conditions, not for the average day of the year as reflected in the use of AADT. Just as Airport airfield capacity is supposedly designed for IFR conditions, and not "average" air traffic conditions, traffic must be analyzed using the same principle.

An estimate of the year 2000 design day Airport traffic generation and distribution on the freeway and arterial system in the vicinity of the Airport also should have been prepared to compare the effects of future Airport traffic for the "With Project" alternatives. The year 2000 cumulative traffic estimates and the level of service analyses should have reflected the design day Airport traffic generation estimates. R-8-14

The data in the DEIS does not provide sufficient information from which to distinguish Airport traffic volumes from background traffic growth forecasts. The data shows only cumulative traffic estimates for each forecast year and for each alternative that is evaluated.[8] An appropriate level of analysis also would have presented exhibits which would show Airport-only traffic distributions and would include Airport traffic volumes on streets in neighboring cities. There currently are severe operating limitations along the Airport's upper (enplanement) drive system during the 7 to 8 a.m. peak period as well as during the 11 a.m. to 1 p.m.

[7] Significant impacts on surface transportation facilities that would result from construction of the third runway and related Master Plan Update development actions is discussed in another section of these Comments. See supra § 5.2.

[8] See DEIS at IV.15-3, Table IV.15-1. See also id. at IV.15-6C, Exhibit IV.15-1.

combined drive system peak period. The DEIS should have included an assessment of the capacities of the terminal drives and level of service analyses should have been developed for the on-Airport road system.

The DEIS also does not adequately consider impacts of increased levels of truck traffic that would result from projected increases in cargo operations and potential decentralization of cargo operations including relocation of those operations to the SASA site south of the Airport after 2010.[9] The forecasted 131 percent increase in cargo tonnage from 381,000 tons in 1993 to 880,000 tons in 2020[10] is likely to result in a significant increase in truck traffic on the Airport access roads and on the internal Airport road network. The DEIS ignores this increase in truck traffic and the environmental impacts of such an increase, including additional road congestion, level of service degradation on a number of roads, and air quality impacts. R-8-17

5.7.4 The DEIS Ignores Regional Transportation Planning

The analysis of surface transportation and traffic impacts in the DEIS ignores comprehensive planning activities and transportation planning being undertaken by municipalities in the vicinity of the Airport. R-8-4

The City of SeaTac completed a comprehensive transportation plan study in 1993 using detailed land use/transportation forecasting models. The same models were used in preparing a comprehensive transportation plan for the City of Des Moines, and they are being used in the development of a transportation plan for the City of Burien. The surface transportation studies in the DEIS did not use the City of SeaTac's travel forecasting models, or coordinate the off-Airport traffic forecasts with the more detailed traffic forecasts developed by the City of SeaTac. Additionally, the City of SeaTac is pursuing the development of a grade-separated automated personal rapid transit system ("PRT") to serve the Airport and nearby communities. The DEIS R-8-23

[9] See id. at I-9, I-10, II-31.

[10] Id. at I-9.

ignores the PRT system plans; none of the "With Project" alternatives demonstrate how terminal access systems could be integrated with such a system. Pursuant to the GMA, the Port must provide evidence of consistency of the Airport expansion plan with the City of SeaTac's plans.[11]

R-8-4

R-8-12

Construction of the SR-509 extension to I-5 (the South Access Road) is a critical element of traffic mitigation for the Airport's expansion plans. The SR-509/South Access projects are the subject of detailed studies by the City of SeaTac. The DEIS does not adequately address the issues of Airport ingress and egress from South 188th Street and avoids the issue of south access from SR-509. A proposed new southern Airport entrance would be inconsistent with Comprehensive Plan policies adopted by the City of SeaTac.[12] The South 188th Street intersection already is at level of service F. Sea-Tac's Comprehensive Plan indicates that traffic volumes which would be generated by normal population growth combined with the projected increase in the number of passengers using the Airport would result in an unacceptable increase in traffic volumes on the local street network.[13] The DEIS does not address how a 40 percent growth in southbound Airport trips could be accommodated over the next 20 years. Since the South Access Project presently has no local or state commitments for funding or implementation, the DEIS must demonstrate how this project could be implemented before 2020.

The DEIS lists five major transportation improvement projects included in the City of SeaTac Comprehensive Transportation Plan[14] that "would significantly improve the operational

[11] See supra § 5.3.

[12] See Department of Planning & Community Dev., City of SeaTac, Comprehensive Plan Draft at 3-8, 3-9 (Sept. 6, 1994). The Draft Comprehensive Plan subsequently was adopted as the Comprehensive Plan of the City of SeaTac with no changes to the transportation policies. City of SeaTac, Wash. Res. 94-047 (Dec. 20, 2994).

[13] See Comprehensive Plan Draft at 3-8, 3-9.

[14] DEIS at IV.15-3, 15-4. See also Department of Public Works, City of SeaTac, Comprehensive Transportation Plan at 31-35 (1991).

performance of the surface transportation system . . . ."[15] However, the DEIS never acknowledges that many of these projects are dependent upon the Port for funding and construction, nor does it examine the impacts of the Airport expansion on local roads if the Port fails to implement one or more of these projects.

R-8-24

R-8-4

R-8-21

5.7.5 The Superficial Analysis of Surface Transportation Conditions Attributable to Master Plan Update Development Actions Does Not Satisfy the Requirements of NEPA and SEPA

The DEIS makes the incredible assertion that development of a third runway and associated airside and landside improvements at Sea-Tac would not affect roadway traffic levels or noticeably alter the surface transportation system.[16] The DEIS fails to document or analyze the bases for this assertion. The DEIS, therefore, does not satisfy the requirements of NEPA and SEPA for a full discussion of the impacts of the proposed Airport expansion project on local traffic and surface transportation resources.

[15] DEIS at IV.15-3.

[16] Id.

5.8 OTHER ENVIRONMENTAL IMPACTS

5.8.1 The DEIS Does Not Comply With Requirements of Section 4(f), the National Historic Preservation Act and the Airport Act

The National Historic Preservation Act[1] provides that every federal agency, prior to approving the expenditure of any federal funds on an airport project, must "take into account the effect of the undertaking on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register" of historic places.[2] The FAA must consider the impacts which a project may have on both eligible and listed historic sites, and must engage in consultation with the appropriate state historic preservation officer[3] prior to an attempt to avoid or mitigate such impacts. The Port also is required by SEPA to consider the effects of the proposed Airport expansion project on historic and cultural preservation activities and on historic and cultural resources.[4]

Historic or archaeological sites may be disturbed by exposure to severe noise levels or by being subjected to the effects of noise vibration. It is, therefore, necessary for the DEIS to examine not only the impacts of noise, but also the impacts of vibrations which fall outside the range examined in the noise analysis.

[1] 16 U.S.C.A. §§ 470a-470w (West 1987 & Supp. 1995).

[2] Id. § 470f.

[3] Washington law designates the Office of Archaeology and Historic Preservation, within the Department of Community, Trade and Economic Development, as the State office with principal responsibility for protecting the State's historic and archaeological properties. RCW 27.34.210-.220. An employee of that office is designated as the "preservation officer" for the State. Id. 27.34.210.

[4] WAC 197-11-440(6)(d)(iv), -444(2)(b)(vi).

5.8.1.1 The Assessment of Impacts to Archaeological, Cultural, and Historical Resources in the DEIS is Inadequate

R-7-14

The assessment of impacts to archaeological, cultural, and historical resources in the DEIS is wholly inadequate because of fundamental deficiencies in the identification and evaluation of those resources. An analysis of direct and indirect impacts to archaeological, cultural and historic properties must be based upon a comprehensive inventory, covering the full range of property types and areas of significance.

Although a "General Study Area," encompassing the L_{dn} 60 dB noise exposure contour was identified, the consultants assisting in the preparation of the DEIS considered only previously-inventoried properties within the 65 dB L_{dn} noise contour, and they conducted a survey to locate additional properties only within the property acquisition area.[5] In so doing, the Port's consultants failed to examine the comprehensive inventories prepared for the ACC in 1994 and submitted to the Washington State Office of Archaeology and Historic Preservation.[6]

The survey methodology used in the preparation of the DEIS itself was flawed. The review of historic, cultural and archaeological properties was limited to properties constructed before 1945,[7] based upon the National Register criterion that a property be at least fifty years old to be considered eligible for listing under most circumstances.[8] However, it is standard

[5] See DEIS at IV.3-1, IV.3-2. See also id. app. E. The acquisition area is the area to be acquired for the construction of the "With Project" alternatives. Id. at IV.3-1.

[6] See apps. 8-11 to these Comments.

[7] See DEIS app. E at 2.

[8] 36 C.F.R. § 60.4 (1994).

practice in the field of historic preservation to survey and evaluate properties which are approaching the fifty-year mark to ensure that the inventory remains valid for the near future.[9]

The inventory based upon the limited survey is deficient in several additional respects:

- The inventory appears to have been based solely on visual qualities and it does not address potential historic or cultural significance.
- Property types other than residential and public buildings were ignored. For example, the Des Memorial Way, a landscape feature with historic significance, Qah-wells, a traditional cultural property associated with Native Americans, and commercial structures, such as Del's Station and the Pacific Highway Signs were not even considered or analyzed.
- The inventory dismissed vernacular properties, and the consultants appear to have been uninformed about local building traditions.
- No attempt was made to develop a historic context for the properties identified in the inventory, nor were comparisons made to similar properties elsewhere in the region.

R-7-14

The State Historic Preservation Officer's concurrence with the assertion in the DEIS that none of the properties identified in the inventory were eligible for listing in the National Register,[10] is not particularly probative. The Historic Preservation Officer is required to review only those sites submitted for his consideration. Although none of the 67 sites on the consultant's inventory were found to satisfy the criteria for eligibility for listing in the National Register, there are many other sites in the vicinity of the Airport that might so qualify, had they been included on the list provided to the Historic Preservation Officer.

[9] For example, the Des Moines Theatre, built in 1947, will reach the fifty-year mark by the time the Airport expansion project -- if approved -- would be implemented. The DEIS contains no discussion of this property's eligibility for historic listing.

[10] See Letter from Gregory A. Griffith, Comprehensive Planning Specialist, State Dep't of Community, Trade and Economic Dev., to Dawn Neeley, Shapiro Assocs., (Mar. 8, 1995), reprinted in, DEIS app. A at A-29.

The identification of properties in the DEIS, therefore, was incomplete, and the evaluation of the properties that were identified was insufficient. The conclusions reached regarding the impacts of the proposed Airport expansion project on historic, cultural and archaeological resources, therefore, are unreliable, and fail to satisfy the requirements of the National Historic Preservation Act, NEPA or SEPA.

R-7-14

5.8.1.2 The Assessment of Impacts to Properties Protected by Section 4(f) is Inadequate

Section 4(f) of the Department of Transportation Act prohibits the Secretary of Transportation from approving any transportation project (including an airport improvement project) which requires the "use of publicly owned land of a public park, recreation area, or wildlife and waterfowl refuge of national, State, or local significance, or land of an historic site of national, State or local significance"[11] unless there is "no prudent and feasible alternative to using that land"[12] and the proposed project "includes all possible planning to minimize harm to the park, recreation area, wildlife and waterfowl refuge, or historic site resulting from the use."[13] Thus, Section 4(f) grafts substantive environmental considerations onto the procedural aspects of NEPA.

[11] 49 U.S.C.A. § 303(c) (West 1995). Properties protected by Section 4(f) hereinafter will be referred to as "Section 4(f) properties."

[12] Id. § 303(c)(1).

[13] Id. § 303(c)(2).

The proposed use of federal funds to support construction of the proposed Master Plan Update development actions also triggers the applicability of Section 509(b)(5) of the Airport and Airway Improvement Act[14] which imposes obligations with respect to resources similar to those protected in Section 4(f).[15]

An alternative is "feasible" if it can be built as a matter of "sound engineering."[16] An alternative is "prudent" unless there are "truly unusual factors present in a particular case or the cost or community disruption resulting from alternative[s] . . . reach[] extraordinary magnitudes," or the other alternatives themselves "present unique problems."[17]

The requirements of Section 4(f) can be triggered by activities which do not result in the actual "taking" of protected lands, but which nonetheless "impair substantially the value of the site in terms of its environmental, ecological, or historical significance."[18] Consequently, the effect that the proposed project would have upon the utility or importance of Section 4(f) properties, rather than only the physical distance between the proposed project and the Section

[14] 49 U.S.C.A. §§ 47106(c)(1)(C).

[15] Courts invariably have looked to the Supreme Court's interpretation of Section 4(f) in Citizens to Preserve Overton Park, Inc. v. Volpe, 401 U.S. 402 (1971) for guidance in interpreting the Airport Act. See, e.g., Citizens Against Burlington, Inc. v. Busey, 938 F.2d 190, 203-04 (D.C. Cir. 1991); Life of the Land v. Brinegar, 485 F.2d 460 (9th Cir. 1973), cert. denied, 416 U.S. 961 (1974); Citizens Airport Comm. v. Volpe, 351 F. Supp. 52, 60-61 (E.D. Va 1972).

[16] Overton Park, 401 U.S. at 411; See also Druid Hills Civic Ass'n v. Federal Highway Admin., 772 F.2d 700, 715 (11th Cir. 1985), cert. denied, 488 U.S. 819 (1988).

[17] Overton Park, 401 U.S. at 413.

[18] See Citizen Advocates for Responsible Expansion, Inc. (I-CARE) v. Dole, 770 F.2d 423, 441 (5th Cir. 1985). See also Allison v. Dep't of Transp., 908 F.2d 1024, 1028 (D.C. Cir. 1990); Ringsred v. Dole, 828 F.2d 1300, 1301 (8th Cir. 1987); Stop H-3 Ass'n v. Dole, 740 F.2d 1442 (9th Cir. 1984), cert. denied, 471 U.S. 1108 (1985); Adler v. Lewis, 675 F.2d 1085, 1092 (9th Cir. 1982); Louisiana Envtl. Soc'y, Inc. v. Coleman, 537 F.2d 79, 84-85 (5th Cir. 1976); D.C. Fed'n of Civic Ass'ns v. Volpe, 459 F.2d 1231, 1239 (D.C. Cir. 1971), cert. denied, 405 U.S. 1030 (1972).

4(f) property, should have been the determining factor in the analysis.[19] For example, increased noise and air pollution can be substantial enough to constitute a use of a Section 4(f) property that triggers the protections afforded by the statutory provision.[20] Aircraft noise can constitute a "use" of Section 4(f) properties, if future noise impacts would exceed current noise levels.[21]

R-7-16

As discussed elsewhere in these Comments, full use of a third air carrier runway at Sea-Tac likely would result in noise exposure contours that are longer than those included in the DEIS.[22] As a result, parks in Des Moines and Federal Way to the south, and in Burien, Tukwila and the City of SeaTac to the north, could be exposed to noise levels -- as measured using the L_{dn} metric -- which are greater than the noise levels to which they presently are exposed. Further, the unduly narrow focus of the survey of historic, archaeological and cultural properties may have excluded a number of sites from the analysis of noise and other environmental impacts with respect to the protection afforded by Section 4(f).

R-7-13

The use of borrow sites adjacent to Des Moines Creek Park[23] from which about 8 million cubic yards of fill may be mined[24] is likely to increase that park's exposure to noise and air pollution and other environmental degradation that would be attributable to a mining site. The DEIS inadequately considers the impacts on Des Moines Creek Park, and on all Section 4(f) properties, of the massive mining and fill-transporting operations that construction of the third runway would require.

[19] Adler, 675 F.2d at 1091-92.

[20] Coalition Against a Raised Expressway, Inc. v. Dole, 835 F.2d 803, 811-12 (11th Cir. 1988).

[21] Allison, 908 F.2d at 1028; Sierra Club v. United States Dep't of Transp., 753 F.2d 120, 128 (D.C. Cir. 1985).

[22] See supra § 5.1.

[23] See supra § 5.2.

[24] See DEIS, app. J at 6-7.

The DEIS's incomplete analysis of the potential impacts of the proposed Master Plan Update development actions on Section 4(f) properties is compounded by the failure to consider a number of prudent and feasible alternatives to a third runway.[25] The DEIS, therefore, does not comply with the requirements of Section 4(f).

R-8-11

5.8.2 The DEIS Does Not Consider Adequately Social Impacts

Major airport development programs have the potential for affecting the social and economic life of a community by causing residential and commercial displacement, promoting industrial development and contributing to changing surface transportation patterns. The DEIS should have described the impacts of the proposed third runway and associated Master Plan Update development actions on the social and economic life of the Puget Sound region.[26] The DEIS did not adequately identify the impacts of the Airport expansion project:

R-8-15

- The DEIS does not include a map of the projected acquisition area associated with each runway length, making it impossible to compare the social impacts of the 7,000 and 7,500 foot runway with the 8,500 runway alternatives.
- The DEIS fail to consider the loss of neighborhood cohesion that would result from the acquisition of residential and commercial properties.

R-8-20

- The DEIS fails to evaluate how many units of affordable housing would be lost as a result of the Airport expansion project and to consider when, where and how affordable housing units could be replaced.

[25] See supra § 4.2.

[26] See Order 5050.4A ¶ 47e(3); WAC 197-11-444(2).

R-8-5
R-8-10

5.8.3 The DEIS Does Not Consider Adequately Induced Socio-Economic Impacts

A major passenger and cargo transportation facility, such as Sea-Tac, affects the surrounding community in many positive and negative ways. While the aggregate economic gains associated with Airport activities may be very large, these gains usually are widely dispersed -- typically experienced across a large number of households and businesses located in the entire region. Offsetting these positive regional considerations, however, are economic losses and social costs which often are incurred as a result of the impacts on residential and commercial areas of aircraft noise and the increased frequency of aircraft flights over those areas. The negative social and economic consequences of an airport's operations are burdens which often are borne by only the communities located near the airport. The combined population of the ACC cities, Federal Way and Mercer Island is 168,098. The DEIS paints a generally rosy picture of the positive economic benefits that would redound to the Puget Sound region as a result of the expansion of Sea-Tac.[27] For those individuals residing near Sea-Tac, however, the Airport expansion will bequeath a legacy of high levels of aircraft noise; constant traffic jams resulting from the transportation of 26 million cubic yards of fill for at least 2.5 years;[28] air and water quality degradation; the loss of environmentally sensitive areas;[29] and overall increases in vehicular traffic on already crowded streets and highways.

R-8-22

The process of localized economic and social deterioration which often results from a major airport expansion program can be summarized generally as follows: Increased aircraft noise exposure and other adverse impacts to the local environment from increased airport operations would result in economic losses which lead, over time, to reduced property values

[27] See generally DEIS at IV.8.

[28] See supra § 5.2.4.

[29] See supra § 5.6.3.

in the community. The local property tax base deteriorates with the decline in property values, and the existing housing stock is transferred to lower-income residents. Decreased property tax revenues for the local communities results in decreased services, at the same time that the demand for such services increases in deteriorating neighborhoods. Lower per capita income levels compromise the economic ability of the community to support existing local businesses and results in decreases in retail sales and sales tax revenues.

The spiralling process of economic and social deterioration attributable to the expansion of an airport can have devastating impacts upon the fiscal and social well-being of communities in the vicinity. Previously stable neighborhoods become blighted in an accelerated period of time, thus placing enormous strains on the financial integrity of those local governments and school districts charged with the primary responsibility for educating the community's children and ensuring the basic public wel[illegible]

R-8-22

The DEIS was required to analyze these socio-economic impacts that would result from the proposed Airport expansion project. It failed to do so and must be revised.

R-8-10

R-8-5

5.8.3.1 The DEIS Did Not Examine Adequately the Effects of Airport Noise on Property Values

The connection between airport noise levels and real estate prices has been explored a number of times.[10] Calculations that have been done in different cities at different times on the impacts of noise effects on residential housing markets exhibit a great deal of similarity.

R-16-9

[10] See, e.g., J.P. Nelson & J. Seneca, Housing Values, Census Estimates, Disequilibrium, and the Environmental Cost of Airport Noise: A Case Study of Atlanta, 12 J. Envtl. Econ. & Mgmt. 169-78 (1985); J.P. Nelson, Airport Noise and Property Values, J. Transp. Econ. & Policy 37 (May 1982); J.P. Nelson, Airport Noise, Location Rent, and the Market for Residential Amenities, 6 J. Envtl. Econ. & Mgmt. 320-21 (1979); J.P. Nelson, Measuring Benefits of Environmental Improvements: Aircraft Noise and Hedonic Prices, 1 Advances in Applied Microeconomics 51-75 (1981).

"Aviation noise appears to reduce prices of otherwise similar houses between 0.5 and 0.6 percent for each [Noise Exposure Forecast] decibel."[11]

> It is well understood that the sale price of a house in a competitive housing market depends on its characteristics, and that this relationship can reveal the effects of "quality" differences when it is estimated . . . . [A] house at a noisy location will sell for less than the same house at a quiet location.[12]

A recent study of the housing market in Winnipeg found that houses exposed to higher number of events exceeding 75 EPNL[13] sell at a discount in comparison with homes exposed to a lower EPNL.[14] "[M]easures of loudness and event frequency correlate significantly with residential housing prices."[15]

A study of the effect of aircraft noise on residential housing values in the vicinity of the Dallas/Fort Worth International Airport revealed that the average value for a single-family residence would drop 17 percent if a house with no noise became subject to occasional minor noise.[16] The drop would increase to 27 percent when the house is subject to severe noise and

R-16-9

[11] David Gillen & Terrence J. Levesque, Modelling the Effects of Airport Noise on Residential Housing Markets, Working Paper, School of Business and Economics, Wilfred Laurier University, Waterloo, Ontario, Canada 2 (Feb. 1994) (emphasis added).

[12] Id. at 4.

[13] EPNL is the Effective Perceived Noise Level at the location produced by aircraft using a particular flight path. Id. at 3. "EPNL measures loudness in terms of sound pressure levels, the duration of the event, and the presence of pure tones like the whine of a jet engine. It is particularly suited to measure the human response to aircraft noise." Id. (citation omitted).

[14] Id. at 9.

[15] Id. (emphasis added).

[16] Apogee Research, Inc., Negative Economic Effects of Proposed Expansion of Dallas-Fort Worth International Airport on Euless, Grapevine, and Irving, Texas at 9 (Nov. 1990).

occasional overflights, and to 35 percent when severe noise is coupled with frequent overflights.[27] There is a similar drop in tenants' valuations of their rental properties.[28]

A 1991 study of the appraised value of houses located near the Los Angeles International Airport determined that dwellings in moderately-priced quiet neighborhoods were worth 18.6% more than comparable homes in moderately-priced noisy neighborhoods. Thus, each decibel of "additional quiet" added 1.33% to the value of the house.[29]

It is likely that, as the price of housing declines, new buyers would have a lower average household income than the preceding owners, and neighborhoods would deteriorate. This, in turn, would threaten the stability of family-oriented neighborhoods. If long-term residents move away from the community and are replaced by families who do not have a long history of commitment to the community, there may be cascading effects on the level of personal income which would have an impact on the earnings of local businesses and on local property tax collections.

Thus, there is considerable credible evidence from the experience of other communities that additional exposure to persistent aircraft noise in the ACC cities, Federal Way and Mercer Island would have a negative effect on the price of residential housing stock, and would have a generally negative effect on their economies. Even a modest decline in property values would increase dramatically the net cost of providing local government and educational services. The DEIS, however, ignores completely the effects of aircraft noise on property values.

R-16-9

27/ Id.

28/ Id.

29/ Fed. Aviation Admin., The Effect of Airport Noise on Housing Values: A Summary Report (prepared for the FAA by Booz Allen & Hamilton, Inc.) at 21 (Sept. 1994).

R-8-1

5.8.3.2 The DEIS Does Not Adequately Consider the Economic Effects of the Proposed Airport Expansion

The DEIS addresses the regional increases in taxes and jobs that would result from the construction of a third runway and associated Master Plan Update development actions.[40] It dismisses, however, the impacts of the proposed Airport expansion on local revenues.[41] In fact, the cities and local school districts in the Airport vicinity rely heavily on local property tax collections. The DEIS fails to consider the impact of decreased tax revenues on those cities or on the Highline school district.

The DEIS fails to address the fact that lower property values might result in areas adjacent to the proposed buyout areas in the cities of Burien, Des Moines and SeaTac. Lower property values also would result in decreased property tax receipts. The DEIS is quick to claim credit for projected salutary effects of the proposed Airport expansion on the economy of the, including the generation of additional sales tax revenue generated by additional passengers, additional property taxes resulting from increased Airport employment and the development of new non-residential with Burien and the City of SeaTac, in addition to a large number of construction-related jobs during the development of the third runway and associated facilities.[42] Since DEIS is premised on the assumption that with or without Airport development, the number of passengers and operations at the Airport would be the same, then the long-term benefits of the increased number of operations and passengers would redound to the benefit of Burien, the City of SeaTac and other neighboring jurisdictions in the region, without suffering the substantial impacts that would be attributable to the Airport expansion.

40/ DEIS at IV.8-10A, Table IV.8-3.

41/ Id. at IV.8-7.

42/ Id. at IV.8-7, IV.8-9, IV.23-7.

The DEIS improperly assumes that cities surrounding the Airport would gain sufficient economic benefit from the expanded Airport to offset property taxes lost because of the buyout and because of greater noise impacts. If the Port's assumption of equal use of the Airport in 2020, with or without facility expansion were accurate, development would come to the neighboring communities regardless of the expansion, and no additional revenues would accrue to the cities because of the expansion.

The DEIS does not identify any mitigatory measures for properties outside the buyout area which would experience increased levels of noise or traffic.

R-7-9

5.8.4 The DEIS Does Not Consider Adequately the Impacts of Noise on Education

An efficient education system is essential to the development and protection of every community. The quality of education in a community is reflected in the morale and productivity of its citizenry and in the property values in its neighborhoods. Deterioration of the quality of education can erode the foundation of a community as the students cease to learn the skills necessary to become a valuable member of that, or any other, community.

The Highline School District is the ninth largest in the state. It is justifiably proud of the quality public education it offers its citizens. The quality of its educational program, however, is threatened by the expansion of Sea-Tac. A growing body of research indicates that exposure to aircraft noise both in and out of the classroom can have serious adverse effects on student performance. Nonetheless, the DEIS dismisses these impacts by failing to discuss them.

There is convincing evidence that chronic exposure to aircraft noise can negatively affect school performance. These performance effects have been shown to occur both when children are tested inside their noisy school and when children from noisy schools are tested in quieter

settings.[43/] Additionally, children who are exposed to noisy home environments tend to perform worse than those who are not, even when both types of children attend quiet or noise-abated schools.[44/]

R-7-9

The primary explanation for the negative effect of noise on performance in the classroom is that noise consistently interferes with the teaching and learning processes, resulting in a cumulative loss of available teaching time. For example, periodic, intense noise events interrupt classroom routines and decrease productive classroom time by causing instructors to cease teaching temporarily or by making it impossible for teachers and students to hear one another.[45/] Thus, in comparison with students in a quiet environment, students in classrooms exposed to noise will spend less time learning.

Several studies verify this effect. An examination of 362 elementary schools surrounding two major New York City airports found a positive dose-response relationship between aircraft noise levels in the classroom and the percentage of elementary school students reading at substandard grade levels.[46/] As the aircraft noise increased, the percentage of sub-par readers

---

43/ A. Moch-Sibony, <u>A Study of the Effects of Noise on the Personality and Certain Psychomotor and Intellectual Aspects of Children, After Prolonged Exposure</u> (French), 47 Travail Humain 155-165 (1984); S. Cohen et al., <u>Physiological, Motivational, and Cognitive Effects of Aircraft Noise on Children: Moving from the Laboratory to the Field</u>, 35 Am. Psychologist 231-243 (1980); B.L. Kyzar, <u>Noise Pollution and the Schools: How Much is Too Much?</u> 14 CEFP Journal 10-11; G. Karsdorf & H. Klappach, <u>The Influence of Traffic Noise on Health and Performance of Secondary School Students in a Large City</u>, 14 Zeitschrift fur die Gesamte Hygiene 52-54 (1968).

44/ S. Cohen et al., <u>Aircraft Noise and Children: Longitudinal and Cross Sectional Evidence of Adaptation to Noise and the Effectiveness of Noise Abatement</u>, 40 J. Personality and Soc. Psychology 331-345 (1981).

45/ M.A. Crook & F.J. Langdon, <u>The Effects of Aircraft Noise in Schools Around London Airport</u>, 34 Sound and Vibration 221-323 (1974).

46/ K.B. Green et al., <u>Effects of Aircraft Noise on Reading Ability of School Children</u>, 37 Archives Envtl. Health 1, 24-31 (1982).

increased. This effect became even stronger in the higher grades. These results have been confirmed in other published studies.[12/]

Another study concluded that reading scores of children in classrooms on the side of a school building exposed to noisy elevated trains were significantly lower than the reading scores of children in classrooms on the other -- quieter -- side of the building.[13/] The study inferred that, because of the periodic noise disturbances, more than 10 percent of teaching time was lost both as a result of direct interference and because of the need to redirect the students' attention once the trains passed. The reading scores of children in the lower grades on the noisier side of the building lagged behind the other children by 3-4 months. This gap widened to as much as 11 months by the time the subject children were in the sixth grade.

Other research demonstrates that significant classroom disruption begins when interior noise reaches 60 dBA.[14/] At levels of 78 dBA, interruption occurred half of the time, and at levels of 82 dBA, continuous interruption was inevitable.[15/] One report also noted that even a highly motivated adult observer was unable to hear the teacher from the back of the classroom half of the time when flights produced noise levels of 78 dBA.[16/]

R-7-9

12/ See J.S. Lukas et al., Effects of Noise on Academic Achievement and Classroom Behavior, California Dep't of Transp., Rep't No. FHWA/CA/DOHS-81/01 (1981); A.L. Maser et al., Effects of Intrusive Sound on Classroom Behavior: Data from a Successful Lawsuit, Paper presented at the Annual Meeting of Western Psychological Association, San Francisco (1978) (study also found that low aptitude children were particularly susceptible to the detrimental effects of noise on low reading scores).

13/ A. Bronzaft & D.P. McCarthy, The Effect of Elevated Train Noise on Reading Ability, 7 Envtl. and Behaviour 517-527 (1975).

14/ M.A. Crook & F.T. Langdon, The Effects of Aircraft Noise in Schools Around London Airport, 34 J. Sound and Vibration 221-234 (1974); R.D. Kryter, The Effects of Noise on Man (2d ed. 1985).

15/ The Effects of Aircraft Noise in Schools Around London Airport at 227.

16/ Id.

Little research has been done to determine the appropriate noise level in a classroom. The EPA has identified an $L_{eq(24)}$ of 45 dBA as the maximum appropriate noise level.[17/] Other scientific studies which have sought to ascertain the appropriate sound level using data based on children also have found the 45 dBA level to be the maximum noise level for classrooms.[18/]

The adverse effects of noise upon the learning process are not limited to noisy classroom atmospheres. Living in noisy homes also can impede the educational process. Studies have shown that children exposed to severe noise in the home show greater impairment in auditory discrimination and in reading ability than those living in quieter homes.[19/] Also, children living in homes exposed to noise showed inferior performance in memory tasks and imitative and sensorimotor development.[20/] Noise in the home environment may affect the amount of conversation between parents and children, the amount of reading aloud parents do for their children and even the amount of time parents spend correcting their children's speech.[21/] All of these factors affect development of a child's reading and auditory skills. Thus, excessive

R-7-9

17/ U.S. Envtl. Protection Agency, Rep't No. 550/9-74-004, Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety (March 1974).

18/ J.S. Lukas et al., Effects of Noise on Academic Achievement and Classroom Behavior, California Dep't of Transp., Rep't No. FHWa/DOHS-81/01 (1981); D. DeJoy, Environmental Noise in Children: Review of Recent Findings, 23 J. Auditory Res. 181-194 (1983).

19/ S. Cohen et al., Apartment Noise, Auditory Discrimination, and Reading Ability in Children, 9 J. Experimental Soc. Psychology 407-422 (1973); S. Cohen et al., Behavior, Health and Environmental Stress, New York: Plenum (1986); H. Heft, Background and Focal Environmental Conditions of the Home and Attention in Young Children, 9 J. Applied Soc. Psychology 47-69 (1979); K. Green et al., Effect of Aircraft Noise on Children's Reading and Hearing Levels, 68 J. Acoustical Soc. Am. (Supp. 1 1980).

20/ T.D. Wachs et al., Psychological Dimensions of the Infants Physical Environment, 2 Infant Behavior Dev. 155-161 (1979); T.D. Wachs, Relation of Home Noise-Confusion to Infant Cognitive Development, 6 (Paper presented at the Annual meeting of the American Psychological Association) (1982), T.D. Wachs et al., Cognitive Development in Infants of Different Ages and from Different Environmental Backgrounds, Merrill-Palmer Q. of Behav. and Dev. 288-317.

21/ U. Bronfenbrenner, Toward an Experimental Ecology of Human Development, 32 Am. Psychologist 513-531 (1977).

noise levels can do considerable damage to the cognitive potential of children even before they begin their formal schooling.

Several studies have artificially increased "short-term" classroom noise levels and measured the effects of such noise levels on student performance.[37] Specific impacts which were observed included decreased student participation, increased tension, decreased auditory discrimination, decreased visual motor skills and visual discrimination, and a decreased ability to perform recognition memory tests. These studies indicate a correlation between noise and decreased academic performance.

Young children and children with low aptitudes particularly are susceptible to the speech interference caused by exposure to aircraft noise because of their less precise speech, more limited vocabulary, and lower familiarity with language.[38] Since such interference occurs while school children still are acquiring speech, language and listening skills, noise may significantly affect the development of these skills, which, in turn, will affect reading and other areas of academic performance which depend on these skills.[39]

R-7-9

37/ L.M. Ward & P. Suedfeld, Human Responses to Highway Noise, Envtl. Res. 306-326 (1973); McCroskey & Devens, Effects of Noise Upon Student Performance in Public School Classrooms, Proceedings of the Technical Program, Natural Noise and Vibration Control Conference, Chicago, Ill. (1977); D. Wyon, Studies of Children Under Noise and Heat Stress, 13 Ergonomics 598-612 (1968); P.J. Hambrick-Dixon, Effects of Experimentally Induced Noise on Task Performance of Black Children Attending Day Care Centers near Elevated Subway Trains, 22 Dev. Psychology 159-264 (1985); B. Slater, Effects of Noise on Pupil Performance, 59 J. Educ. Psychology 239-243 (1986); H. Kassinove, Effect of Meaningful Auditory Stimulation on Children's Scholastic Performance, 63 J. Educ. Psychology 526-530 (1972); J.E. Turnure, Children's Reactions to Distractors in a Learning Situation, 2 Dev. Psychology 115-122 (1970). Generally, all of these studies found decreased performance in students exposed to noise.

38/ A.L. Maser et al., Effects of Intrusive Sound on Classroom Behavior: Data from a Successful Lawsuit, Paper Presented at the Annual Meeting of Western Psychological Association, San Francisco (1978); S. Cohen, et al., Behavior, Health and Environmental Stress, New York: Plenum (1986); A. Moch-Sibony, A Study of the Effects of Noise on the Personality and Certain Psychomotor and Intellectual Aspects of Children, After Prolonged Exposure (French), 47 Travail Humain 155-165 (1984).

39/ D. DeJoy, Environmental Noise and Children: Review of Recent Findings, 23 J. Auditory Res. 181-194 (1983).

Research on the effect of aircraft noise abatement in schools on student performance demonstrates that design-related changes in noisy schools that abate noise result in enhanced student performance.[40] These studies show that efficient noise abatement can minimize the effects of extreme classroom noise exposure.[41] Nevertheless, if children live in noisy areas, they still may show school performance deficits, even if they attend a noise-abated school.[42]

Airport noise has also been shown to cause increased blood pressure levels in children,[43] which may increase their level of physiological arousal and/or stress, and which has been shown to inhibit learning of certain types of material.[44]

Thus, it is likely that increased noise levels from the operation of Sea-Tac would affect negatively the learning ability of children in nearby communities. Scientific studies indicate that increased noise levels in both the classroom and home would seriously impair the academic performance of these children. The DEIS must address these important impacts before an

R-7-9

40/ While these studies show that noise abatement designs in noisy schools often lower the detrimental effects of noise when compared to non-abated high noise schools, they do not compare the performance in either type of school with that in non-noisy schools.

41/ S. Cohen et al., Aircraft Noise and Children: Longitudinal and Cross Sectional Evidence of Adaptation to Noise and the Effectiveness of Noise Abatement, 40 J. Personality and Soc. Psychology 331-345 (1981); A. Moch-Sibony, A Study of the Effects of Noise on the Personality and Certain Psychomotor and Intellectual Aspects of Children, After Prolonged Exposure (French), 47 Travail Humain 155-165 (1984); A. Bronzaft & D.P. McCarthy, The Effect of Elevated Train Noise on Reading Ability, 7 Envtl. and Behavior 517-527 (1975).

42/ J.S. Lukas et al., Effects of Noise on Academic Achievement and Classroom Behavior, California Dep't of Transp., Rep't No. FHWA/CA/DOIS-81/01 (1981).

43/ G. Karsdorf & H. Klappach, The Influence of Traffic Noise on Health and Performance of Secondary School Students in a Large City, 14 Zeitschrift fur die Gesamte Hygiene 52-54 (1986); I.L. Karagodina et al., Effects of Aircraft Noise on Population Near Airports, 34 Hygiene & Sanitation 182-187 (1969); S. Cohen et al., Physiological, Motivational, and Aircraft Noise on Children, Moving From the Laboratory to the Field, 35 Am. Psychologist 231-243 (1980); S. Cohen et al., Aircraft Noise and Children: Longitudinal and Cross Sectional Evidence of Adaptation to Noise and the Effectiveness of Noise Abatement, 40 J. Personality and Soc. Psychology 331-345 (1981); S. Cohen et al., Behavior, Health and Environmental Stress, New York: Plenum (1985).

44/ S. Cohen et al., Physiological, Motivational, and Cognitive Effects of Aircraft Noise on Criterion, from the Laboratory to the Field, 35 Am. Psychologist 231-343 (1980).

informed decision can be made and before the public can be fully informed on the impacts of the proposed Airport expansion.

5.8.4.1 The DEIS Does Not Consider the Magnitude of the Impact of the Airport Expansion on the Highline School District

The Highline School District serves 17,835 students in kindergarten through twelfth grade who live in the cities surrounding Sea-Tac: Burien, Des Moines, Normandy Park, SeaTac and the unincorporated areas south of Seattle. Every year over 6,000 students attend school with unacceptable noise levels.

Earlier this year, the Highline School District commissioned a study on the impact of aircraft noise levels on standardized test scores achieved by students attending Highline public schools.[22] The study investigated the effect of noise exposure on reading, language and math test scores of Highline School District student in grades two through seven. It found that the combined effects of the noise levels to which students were exposed in school and at home had a significant effect on test scores in most grade levels. Students in grades three through six appear most negatively affected by noise levels to which they were exposed at home and in school.

The high noise levels experienced by many students and teachers, both at home and in school, have a continuing adverse impact on the Highline School District's ability to provide its students with an educational environment and programs which allow all students to achieve to

R-7-9

[22] See Renay Greenmun, Impact of Aircraft Noise Levels on CTBS Test Scores in Highline School District (June 1995) (attached to these Comments as app. 12).

the best of their ability. The School District already has expended a considerable amount of its capital funds to remodel its schools for noise attenuation. The School District also has diverted basic educational funds and maintenance and operating levy funds to provide remedial support to students whose learning ability has been impaired by noise attributable to operations at Sea-Tac.

The construction of a third runway at Sea-Tac and associated development actions would only exacerbate the noise impacts of the Airport on educational conditions in nearby schools (See TABLE 5.8-1). The DEIS assumes that only four schools "may be mitigated by insulation that would allow their uses to be compatible with noise associated with overflights from a new parallel runway."[23] While noise insulation can decrease interior noise levels, it has no effect on the noise levels to which students are exposed during outdoor recreation periods. Noise insulation will not have maximum impact unless windows are kept closed at all times. Schools which cannot open their windows must be air conditioned. Air conditioning will require added capital costs and recurring operating and maintenance costs. Nowhere does the Port commit to defray these major costs to the School District.

R-7-9

[23] DEIS at V-2 (emphasis added).

TABLE 5.8-1

Schools Projected to be Exposed to Average Noise Levels of 60 L_{dn} or Greater[67]

School	Address	School District	Projected 2020 Noise Level (L_{dn})
Cascade View Elem.	13601 - 32nd South	South Central	<60
Cedarhurst Elem.	611 South 132nd	Highline	<65
Des Moines Elem.	22001 - 9th South	Highline	60-65
Hilltop Elem.	12250 - 24th South	Highline	60-65
Holy Innocents Elem.	2530 South 298th	Private	<60
Madrona Elem.	3030 South 204th	Highline	60-65
Mark Twain Elem.	2450 S. Star Lake Rd.	Federal Way	<60
Midway Elem.	22447 - 24th South	Highline	60-65
New Life Christian Academy	21650 - 24th South	Private	60-65
North Hill Elem.	19835 - 8th South	Highline	60-65
Olympic Elem.	615 South 200th	Highline	<60
Parkside Elem.	2104 South 247th	Highline	60-65
Riverton Hts. Elem.	3011 South 148th	Highline	<60
St. Philomena Elem.	1815 South 220th	Private	65-70
Seattle Christian	19835 - 8th South	Private	60-65
Southern Hts. Elem.	11249 - 14th South	Highline	65-70
Sunnydale Elem.	15631 - 8th South	Highline	60-65

[67] Source: DEIS at IV.2-16B through IV.2-16G, Table IV.2-2.

R-7-9

TABLE 5.8-1 (Continued)

School	Address	School District	Projected 2020 Noise Level (L_{dn})
Wildwood Elem.	2405 South 300th	Federal Way	<60
Cleveland Elem.	5511 - 15th Street	Seattle	<60
Woodmont Elem.	26454 - 16th South	Federal Way	60-65
Pacific Middle School	22705 - 24th Place S.	Highline	60-65
Evergreen Lutheran High School	2021 South 260th	Private	<60
Mount Rainier High School	22450 - 19th Street	Highline	65-70
Satellite Alternative High School	440 South 186th	Highline	60-65
Seattle Christian High School	19639 - 28th South	Private	60-65
Sea-Tac Occupational Skills Center	18018 - 8th South	Highline	65-70
Hamlin Robinson	10211 - 12th South	Private	60-65
Dominion College	21024 - 24th South		65-70
Highline Community College	2400 South 240th		60-65

Moreover, in accordance with the recommendation of the Expert Arbitration Panel appointed by the PSRC,[68] the impact of Airport noise on schools should be measured by the

[68] *See supra* § 2.2.

R-7-9

extent of speech interference, rather than by reference to noise exposure contours.[19] The goal of appropriate mitigation measures should be the elimination of speech interference.

The DEIS also fails to consider the effect on the Highline School District of the loss of tax revenue that would result from the acquisition of residential and commercial properties that would be necessitated by the construction of the proposed Master Plan Update development actions, by the development of SASA, and by the implementation of mitigation measures.[20]

R-7-9

5.8.5 The DEIS Does Not Consider Adequately Impacts to Plants or Animals

The DEIS was required to address the impacts of the proposed Airport expansion proposal on plants and animals, in general, and on endangered or threatened species, in particular. The DEIS fails to provide sufficient analysis of these issues.

- The DEIS fails to consider the impacts of the proposed Airport expansion on wildlife and their habitat.
- Species and critical habitat surveys were not conducted for several federally-listed species (e.g., the western pond turtle and the red-legged frog) and for several state-listed species (e.g., the pileated woodpecker and the great blue heron). The extent of nonwetlands habitat disturbance is not disclosed in enough detail to ascertain whether there would be potential impacts to individuals of these species.
- The DEIS fails to mention Bald Eagle sightings around Angle Lake.
- The DEIS does not address actions that would be taken by the Port to minimize wildlife in the vicinity of the Airport.

R-15-1

R-15-2

[19] See Order on Phase I Noise Issues at 8. Reliance on the L_{dn} metric particularly is misleading for analyzing the effects of noise on schools. For example, the L_{dn} metric penalizes nighttime noise by adding 10 dB to each single-event between the hours of 10 p.m. and 7 a.m. The L_{dn} measurement includes this penalty to reflect the increased annoyance that individual would feel from nighttime noise in their home. Schools, however, are not in session during those hours. Moreover, the L_{dn} metric provides no indication of when overflights would occur. If the conjunction of peak demand and IFR conditions occurs during school hours, the effect of aircraft noise on nearby schools would increase significantly.

[20] DEIS at IV.6-1, IV.6-4D through IV.1-4N, Tables IV.6-3, IV.6-4.

5.8.6. The DEIS Does Not Consider Adequately Hazardous Substance Issues

The DEIS erroneously assumes that operational impacts associated with hazardous substances would be similar under the Do-Nothing and all "With Project" alternatives, because such impacts would be related to a similar increase in aircraft operations. As discussed elsewhere in these Comments,[21] there is no evidence to support that assumption. The additional operations associated with the expansion of Sea-Tac likely would result in increased on- and underground spills of fuel and increased impacts from fuel and de-icing chemicals discharged to Miller and Des Moines Creeks. Moreover, cross-connections between the Airport storm drainage and industrial wastewater systems have not been resolved.

R-3-7

[21] See supra § 2.1.1.

6.0 MITIGATION MEASURES

The Mitigation Plan outlined in the DEIS fails to comply with NEPA and SEPA requirements for mitigation. It is important to note that the Commenters do not believe that it is possible adequately and sufficiently to mitigate the impacts of the proposed third runway and associated Master Plan Update development actions. The Port and the FAA nonetheless are obligated by federal and states statutes to propose a detailed and thorough mitigation program that, at least, attempts to mitigate the effects of the actions they are proposed to undertake. The discussion of mitigation in the DEIS clearly falls far short of satisfying this obligation.

6.1 NEPA REQUIRES A THOROUGH DISCUSSION OF MEASURES TO MITIGATE THE IMPACTS OF THE PROPOSED AIRPORT EXPANSION

A critical component of a DEIS is the discussion of measures that would be implemented to mitigate adverse environmental consequences flowing from the proposed federal action. CEQ regulations define "mitigation" to include:

(a) Avoiding the impact altogether by not taking a certain action or parts of an action.

(b) Minimizing impacts by limiting the degree or magnitude of the action and its implementation.

(c) Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.

(d) Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.

(e) Compensating for the impact by replacing or providing substitute resources or environments.[1]

[1] 40 C.F.R. § 1508.20.

FAA's legal obligation under NEPA to set forth a detailed discussion of mitigation measures derives from the language of NEPA and from the CEQ regulations. Because of NEPA's mandate that an agency prepare a DEIS on "any adverse environmental effects which cannot be avoided should the proposal be implemented,"[2] the FAA has an affirmative obligation in the DEIS to discuss how such adverse effects could be avoided through the implementation of mitigation measures.

The CEQ regulations require expressly that the FAA discuss mitigation measures in the DEIS in several specific contexts. The agency must discuss mitigation measures in defining the scope of the DEIS:

> To determine the scope of environmental impact statements, agencies shall consider 3 types of action, 3 types of alternatives, and 3 types of impacts. They include: ... (b) Alternatives, which include: (1) No action alternative. (2) Other reasonable courses action. (3) Mitigation measures (not in the proposed action).[3]

The FAA also must identify mitigation measures in its discussion of alternatives to the proposed action:

> This section is the heart of the environmental impact statement.... In this section agencies shall: ... (f) Include appropriate mitigation measures not already included in the proposed action or alternatives.[4]

The FAA must analyze mitigation measures in discussing the environmental consequences of the proposed action:

> The discussion will include the environmental impacts of the alternative including the proposed action.... This section ... shall include discussions of: (h) Means

[2] 42 U.S.C.A. § 4332(C)(ii).

[3] 40 C.F.R. §1508.25(b).

[4] Id. § 1502.14(f).

to mitigate adverse environmental impacts (if not fully covered under § 1502.14(f)).[5]

Finally, the CEQ regulations obligate the FAA to discuss mitigation measures in explaining its ultimate decision on whether to approve the proposed project:

> At the time of its decision ..., each agency shall prepare a concise public record of decision. The record ... shall:
>
> (c) State whether all practicable means to avoid or minimize environmental harm from the alternative selected have been adopted, and if not, why they were not. A monitoring and enforcement program shall be adopted and summarized where applicable for any mitigation.[6]

The Supreme Court has explained that

> omission of a reasonably complete discussion of possible mitigation measures would undermine the "action-forcing" function of NEPA. Without such a discussion, neither the agency nor either interested groups and individuals can properly evaluate the severity of the adverse effects.[7]

The Court has articulated the NEPA obligation of federal agencies to discuss mitigation measures in every DEIS as "a requirement that mitigation be discussed in sufficient detail to ensure that environmental consequences have been fairly evaluated...."[8]

[5] Id. § 1502.16(h).

[6] Id. § 1505.2(c).

[7] Robertson v. Methow Valley Citizens Council, 490 U.S. at 352.

[8] Id.

The CEQ has explained that the mitigation measures in a DEIS "must cover the range of impacts of the proposal."[9] The range of impacts for which mitigation must be discussed include, at a minimum,

> design alternatives that would decrease pollution emissions, construction impacts, aesthetic intrusion, as well as relocation assistance, possible land use controls that could be enacted, and other possible efforts. Mitigation measures must be considered even for impacts that by themselves would not be considered "significant."[10]

The discussion of mitigation actions cannot be limited only to those actions which are within the authority of either the FAA or the Port to implement.[11] With respect to mitigation outside the authority of the FAA, the DEIS must discuss explicitly the likelihood that such measures actually would be implemented by the responsible agencies.[12]

6.2 SEPA REQUIRES A THOROUGH DISCUSSION OF MEASURES TO MITIGATE THE IMPACTS OF THE PROPOSED AIRPORT EXPANSION

SEPA requires that the DEIS discuss "reasonable mitigation measures" that would significantly mitigate the impacts identified.[13] The DEIS must "clearly indicate those mitigation measures . . . that could be implemented or that might be required,"[14] and the intended environmental benefits of each.[15]

[9] See Questions and Answers About the NEPA Regulations.

[10] Id.

[11] Id.

[12] Id.

[13] WAC 197-11-440(6)(a).

[14] Id. 197-11-440(6)(c)(iii).

[15] Id. 197-11-440(6)(c)(iv).

Alternatives and mitigation measures are addressed in the same section of the SEPA rules because they are considered to be essentially the same. Consistent with NEPA, SEPA defines "mitigation" to mean: (a) avoiding an impact by not acting;[16] (b) minimizing an impact by reducing the scale or modifying the design of the action;[17] (c) rectifying an impact by repairing, rehabilitating or restoring the affected environment;[18] (d) progressively reducing or eliminating an impact over time by preservation and maintenance operations;[19] (e) compensating for an impact by replacement or enhancement actions;[20] and (f) monitoring an impact in order to take appropriate corrective action.[21]

Since, in the SEPA rules, "mitigation" is avoidance and amelioration of environmental harm, and a "reasonable alternative" is an action which would attain or approximate a proposal's objective with less environmental harm,[22] the terms substantially are functionally interchangeable.

[16] Id. 197-11-768(1).

[17] Id. 197-11-768(2).

[18] Id. 197-11-768(3).

[19] Id. 197-11-768(4).

[20] Id. 197-11-768(5).

[21] Id. 197-11-768(6).

[22] Id. 197-11-786.

6.3 THE DEIS FAILS TO SET FORTH ADEQUATE MITIGATION MEASURES

The analysis of environmental impacts forms the basis for considering mitigation measures. As discussed elsewhere in these Comments,[23] the discussion of impacts in the DEIS is incomplete, misleading, fundamentally flawed and fatally contaminated by the assumption that most environmental impacts would be the same with or without the implementation of the proposed Airport expansion projects. That assumption rests on the equally erroneous assumption that, with or without the third runway and other contemplated improvements, aviation demand at Sea-Tac would increase as a consequence of regional population and economic growth; specifically that the number of aircraft operations would increase by 30 percent and the number of passengers would increase by 100 percent by 2020.

The assessment of impacts essentially underestimates the "With Project" impacts, because the Do-Nothing alternative improperly is used as the baseline.[24] The extent of mitigation similarly is minimized. A proper assessment of environmental impacts in the DEIS would have attributed all the "With Project" impacts to the construction of a third runway and related Master Plan Update development actions and the resulting major increase in aircraft operations and passenger traffic projected over the next 25 years. The DEIS then should have considered a range of mitigation measures -- including a delayed action alternative -- which would have been more suitable to the magnitude of the environmental impacts attributable to the implementation of the proposed Airport expansion plan.

[23] See supra § 2.1.3.

[24] See id.

214

Appendices 1-7

COMMENTS ON THE
DRAFT ENVIRONMENTAL IMPACT STATEMENT
FOR PROPOSED MASTER PLAN UPDATE DEVELOPMENT ACTIONS
AT SEATTLE-TACOMA INTERNATIONAL AIRPORT

Submitted By

THE AIRPORT COMMUNITIES COALITION

CITY OF FEDERAL WAY, WASHINGTON

CITY OF MERCER ISLAND, WASHINGTON

August 3, 1995

214

LIST OF APPENDICES*

Volume 1

1. State of Washington, Puget Sound Regional Council, In the Matter of: Expert Arbitration Panel's Review of Noise and Demand/System Management Issues as Sea-Tac International Airport, Order on Phase I Noise Issues (Jan. 9, 1995)

2. State of Washington, Puget Sound Regional Council, In the Matter of: Expert Arbitration Panel's Review of Noise and Demand/System Management Issues at Sea-Tac International Airport, Final Phase I Order on Demand/System Management Issues (July 27, 1995)

3. Fed. Aviation Admin., Seattle-Tacoma International Airport, Airport Capacity Enhancement Update, Data Package No. 11 (Apr. 1995).

4. Puget Sound Regional Council Resolution A-93-03, A Resolution of the General Assembly of the Puget Sound Regional Council Amending the 1988 Interim Regional Airport System Plan (RASP) for Long-Term Commercial Air Transportation Capacity for the Region (Apr. 1993)

5. State of Washington, Puget Sound Regional Council, In the Matter of: Expert Arbitration Panel's Review of Noise and Demand/System Management Issues at Sea-Tac International Airport, Procedural Order (Sept. 22, 1994)

6. Aviation Simulations International, Inc., Impact of Boeing Field Interactions on the Benefits of a Proposed New Runway at Seattle-Tacoma International Airport (Prepared for the Fed. Aviation Admin., Northwest Mountain Region) (July 1992)

7. Sanford Fidell, et. al., Social Survey of Community Response to Noise Exposure Near Seattle-Tacoma International Airport (1995)

* These Comments contain a considerable number of citations to documents. All documents cited are incorporated herein by reference. The preponderance of the citations are to (a) documents to which the FAA and the Port of Seattle must take official notice (e.g., laws, regulations, ordinances and records of proceedings or official actions by governmental bodies such as the Puget Sound Regional Council and its authorized boards and panels); (b) documents which the Commenters have obtained from the Port or the FAA (through applicable open records statutes) and hence are already in the agencies' possession; (c) materials which the Commenters believe to be already in the record of this proceeding; and (d) materials to which the agencies have ready access and which the Commenters otherwise would have to obtain from the agencies or another government agency. In the interest of brevity, the Commenters have attached as appendices hereto only those cited materials which the Commenters believe are not within those four categories. In the event that any cited material is not available to the FAA or the Port, the Commenters will make such material available immediately to the agencies upon request.

STATE OF WASHINGTON
PUGET SOUND REGIONAL COUNCIL

In the Matter of:

Expert Arbitration Panel's Review of Noise and Demand/System Management Issues at Sea-Tac International Airport

ORDER ON PHASE I NOISE ISSUES

January 9, 1995

The Expert Arbitration Panel on Noise and Demand/System Management Issues (the "Panel") has carefully considered the arguments and evidence with respect to what we have termed Phase I of the Noise Issues. Written and oral submissions on these issues have been presented to us by the Port of Seattle ("POS"), the Puget Sound Regional Council ("PSRC"), the Washington State Department of Transportation ("WSDOT"), the Federal Aviation Administration ("FAA"), the Coordinating Committee and by a variety of groups and individuals representing residents of communities affected by Airport noise, including the Regional Commission on Airport Affairs ("RCAA"), the Airport Communities Coalition ("ACC"), the Airport Noise Group ("ANG") and many individuals who appeared before the Panel to offer their comments to us. On December 2, 1994, we announced our decision on the scope of the Panel's inquiry on Noise Issues and indicated that a written order was soon to follow. Thereafter, we received some additional written submissions by the POS, the RCAA, the Federal Way Chapter of the RCAA, the ACC, the ANG and Air Washington. This is the written order containing our decision on the scope of the Panel's inquiry on Noise Issues.

We have concluded that our role under PSRC Resolution A-93-03 is to determine whether the POS has scheduled, pursued and achieved a reduction in measurable, real on-the-ground noise impacts. To meet its burden under the Resolution, as we interpret it, the POS must offer us reliable evidence, based upon actual measurements of on-the-ground noise, that by 1996 there has been an objectively measurable, meaningful reduction in aircraft noise impacts in the affected communities surrounding the Airport.

Under the Resolution, it is not enough for the POS to show that it has met the goals of the Noise Budget and the Nighttime Limitations Program (or the goals of additional programs specified by the Mediated Noise Agreement). Rather, the POS must establish that through whatever means, it has reduced the impact of on-the-ground noise in a way that residents of the affected communities could appreciate. In our view, therefore, proof of compliance with the Mediated Noise Agreement is useful, but not necessarily sufficient, to establish that the noise reduction requirement of the Resolution has been met.

We are convinced that the Resolution was intended to condition the approval of the third runway upon a showing that the noise impacts of the existing Airport have been reduced in a significant way. This means, to us, that it is not enough only to show that there has been a measurable reduction in average sound levels as determined by the Day-Night Level (DNL) metric using the existing Airport Noise Monitoring System. A measurable reduction of that sort might be so small, or have such a character, that even by objective standards, it could not be expected to make a material difference to the communities that surround the Airport. The 11 remote monitoring sites (RMS) of the existing Noise Monitoring System may also not be sufficiently representative of the locations of significant on-the-ground noise impacts generated by aircraft using the Airport.

The question we must decide is whether there has been a reduction in real noise impacts that by objective measures is significant and meaningful. We are not persuaded that the deletion of the words "reasonable, meaningful" from the description in the PSRC's Implementation Steps of the reduction in on-the-ground noise to be validated is of any consequence. We do not believe that either an "unreasonable" (i.e., unreachable or infeasible) or a "meaningless" (i.e., inappreciable or trivial) reduction in noise was contemplated by the Resolution.

The POS has not demonstrated that the Noise Validation Methodology (NVM) presented in *Noise Validation Methodology in Compliance with PSRC Resolution A-93-03* ("the NVM Report"), as it exists today, would be a valid method of determining whether the required reduction in on-the-ground noise has occurred even if it were a valid method of measuring success in meeting the ANEL goals of the Noise Budget. The Panel does, however, note several important points about the proposed NVM:

- The proposed NVM is based, as it should be, on measured, not predicted, on-the-ground sound levels.
- The proposed NVM, as it should, measures on-the-ground noise from *all* Airport noise sources, not just landing and departing domestic commercial aircraft that are subject to the noise budget.[1]
- The proposed NVM, however, depends entirely upon sound levels that have been and will be measured only at the 11 existing RMS around the Airport.
- The POS has not demonstrated that the 11 RMS will adequately reflect the levels experienced by a representative sample of the impacted population.[2]

---

[1] These sources include nighttime as well as daytime flights, cargo flights, international flights, military flights and general aviation flights, plus all noises made by aircraft or auxiliary equipment while on the ground (including taxiing and ground run-up during maintenance and repair). Thus, the proposed NVM measurements include actual noise that was excluded from the Noise Budget calculations. The proposed NVM measurements would also likely include noise from aircraft operating at nearby airports.

[2] There are sites in areas where no people live, and no sites are in areas where the 1989-90 annual average DNL used in the NVM baseline calculation was below 71 dB. Sites would seem to be needed that are representative of the impacted population, not just the severely impacted population; sites are needed where the DNL are in the 55-70 dB ranges, as well as where the DNL exceeds 70 dB. Because the current Noise Monitoring System is limited to sites very close to the Airport, the average NVM DNL of 74 dB, observed at the 11 RMS, does not reflect the lower levels of noise that are experienced by most of the impacted population.

- The POS has not demonstrated that data from the 11 monitoring sites are sufficient to confirm whether the ANEL noise reductions in the Noise Budget will be achieved.[3]

- The POS has not demonstrated that the arithmetic average of a set of monitored data (as used in the NVM) will give the same target reduction as an energy summation of the same data (energy summation is used in the Noise Budget).[4]

As a result, a revised NVM will be required.

We recognize, however, that the Resolution contemplates that objective measurements of on-the-ground noise will be used. This means that the POS will not be required to conduct surveys of residents in the affected communities to ascertain their subjective perceptions of Airport noise. This is not to say that such survey results would not provide useful information to the POS and the public, and to this Panel. We also acknowledge that the Resolution does not require the POS to reduce Airport noise to "acceptable" levels, whatever they may be. Rather, the Resolution only requires that the POS achieve a significant reduction in the real noise impacts. Busy jet airports, such as Sea-Tac, are inherently noisy, and it is unrealistic to expect that nearby communities would ever find the noise impacts generated by such airports to be "acceptable."

The question therefore becomes (a) what measures of noise impacts should be used (that is, what noise "metrics" should be selected), (b) where should the measurements of noise be made, and (c) how much reduction in noise, by these measures, must be achieved, and over what time period, to satisfy the requirements of the Resolution?

We turn first to the choice of metrics. We recognize, as the POS has urged, that DNL is a valuable tool, and we intend to give significant weight to reductions in DNL that are shown by the POS. However, we have concluded that the use of the DNL metric, by itself, is inadequate to show the required reduction in noise impacts because, taken alone, as an aggregate value it does not permit us to review the intensity, duration or frequency of single noise events or to consider when, during the day or night, they occur (even though all of these attributes contribute to the measured DNL).[5] As a result, we

---

[3] The ANEL includes calculation points at +60,000 and +90,000 feet from the start of take-off roll (as well as +30,000 from take-off roll and -20,000 feet from landing touchdown). However, the most distant RMS is only 29,000 feet from the start of take-off roll, and most of the 11 RMS are closer than the shortest distance in the ANEL (20,000 feet). Thus, assertions about differences among aircraft in arrival or departure noise at greater distances out from the Airport remain untested.

[4] The proposed NVM DNL goal is the arithmetic average of the annual energy-average DNL at the 11 RMS. The ANEL in the Noise Budget is the level of the sum (not the average) of the sound energies at four other points. If the NVM were to use the sum of the sound energies at the 11 RMS instead of the arithmetic average, the results will change slightly from what is currently shown in the NVM Report. While the difference would normally be of little consequence, the POS is presenting its ANEL goals with year-to-year reductions in the range of 0.2 to 0.4 dB. Also, as previously noted, the POS has not demonstrated that the reductions at the relatively close-in 11 RMS represent the reductions at more distant, yet impacted, sites.

[5] For example, a 3 dB reduction in DNL would occur if either (i) there were a 50% reduction in the noise energy generated by each aircraft using the Airport (but no change in the frequency of operations) or (ii) there were (continued...)

encourage the POS to develop a method that supplements the use of DNL observations with various additional metrics (including sound exposure level (SEL), Time Above (TA) an appropriate sound level threshold, and unweighted sound pressure levels). The revised method should also explicitly report changes in the total number, as well as in the composition and day/night mix, of aircraft operations at the Airport. Unless the reduction in sound levels is more fully characterized than the use of only DNL allows, we will be unable to find that there has been a meaningful reduction in real on-the-ground noise impacts, as required by the Resolution.[6]

We turn next to the location of noise monitors. We have concluded that the use of measurements of on-the-ground noise from the existing Noise Monitoring System at Sea-Tac is, without more evidence, insufficient to show the required reduction in noise impacts because these measurements do not capture

---

[5](...continued)
no change in the noise energy generated by each aircraft, but a 50% reduction in operations in operations at the Airport. While these two changes would be equivalent in DNL terms, the impacts on the surrounding communities would be very different.

[6] Additionally, we have concerns over the manner in which DNL is currently measured. The currently installed 11 RMS report a DNL attributable to aircraft alone as well as a DNL capturing all the noise at a site. The proposed NVM has left open the option to use either of these levels. The Panel believes that the NVM should include both the total DNL and aircraft DNL, because of the following concerns.

First, the "total DNL," by definition, captures all noise at a site. Improper placement of an RMS hydrophone (or loss of its windscreen) could cause the RMS to measure high levels of nonaircraft noise that are not truly representative of what the people are experiencing on the ground. It is possible that the total DNL in the base period could be slightly, artificially and incorrectly high. Elimination of this problem in a subsequent evaluation year could result in a different (and lower) measured level that is not due to a reduction in aircraft noise. If nothing else, the background level will appear to be artificially high, making the increase over background artificially low and making the impact of aircraft noise seem less than it is in reality. Our visits to several of the RMS gave us the clear impression that some of the "community DNL" measured by the Noise Monitoring System and shown in the NVM Report were too high. We have already expressed concern in the hearings that the hydrophone noise floors are too high for accurate measurement of the background levels, which is of particular importance when computing the nighttime contribution to DNL. We raise these issues because we note that the difference between background and aircraft levels has been cited in several studies and by the public in the hearings as one influence on annoyance.

Another concern is that placement of a monitor could result in the capture of a high level of actual nonaircraft noise. If this noise is indeed representative of the ambient noise experienced by nearby residents, it should be measured. However, the goal of the Resolution is to show a reduction in *aircraft* noise. A very high level of actual background noise would make it difficult, if not impossible, for the POS to demonstrate future reductions in aircraft noise using the "total DNL" measure. On the other hand, if the nonaircraft noise measured by an RMS is not representative of what the nearby residents hear, the "total DNL" that is reported could be higher than what the people actually experience. This could occur, for example, if the RMS is on a pole at a height that exposes it to traffic noise from which residents at ground level are shielded due to terrain features. As a result, the POS might not be able to show the full extent of the reduction that has occurred where the people live.

A final concern is that we have not been convinced that the algorithms used by the Noise Monitoring System to assign noise to the "aircraft" noise category rather than the nonaircraft or "community" noise category are sufficiently reliable. Of particular concern is noise generated while the aircraft are on the ground, such as from taxiing, reverse thrust on landings and engine run-ups of all kinds. This problem would suggest that it is more appropriate to base an evaluation on the total noise measured at the RMS.

significant aircraft-generated on-the-ground noise beyond the immediate periphery of the Airport. We encourage the POS to expand the Noise Monitoring System so that it is capable of collecting on-the-ground noise measurements at a variety of additional locations throughout the affected communities. At a minimum, we would like to see the POS to collect on-the-ground noise measurements at six additional remote monitoring sites. These should include sites beyond the boundaries of the predicted 65 dB DNL contours (with the most recent available Noise Exposure Map input data being a reasonable guide), both farther out along major flight corridors and farther out to the east and west of the Airport.[7] As part of a revised NVM process, the POS should propose a detailed measurement plan that demonstrates a measurement sampling strategy which produces statistically acceptable representations of the annualized DNL and any other descriptors developed for the revised NVM. We feel that it is important for the POS to show us that noise impacts have been reduced where the affected population lives and where noise sensitive land uses, especially schools, are located.[8]

We turn last to the required reduction in noise impacts. This is the most difficult question. We have determined that under the Resolution, the POS has the burden of showing that whatever reduction it has achieved by 1996 is significant and meaningful in the sense that residents of the affected communities could, or should, appreciate it. It is not for us to say exactly what metrics the POS should use, or precisely how large a reduction in sound levels it must prove. Rather, the POS must show us (i) that it has articulated an appropriate standard for judging whether the reduction in noise impacts is sufficient, and (ii) that by that standard, the POS has achieved the required reduction. We do note, however, that we are not convinced that the FAA threshold for considering increases in sound levels to be significant for certain regulatory purposes (+1.5 dB increase in annual average DNL) is a satisfactory benchmark for our use in judging whether the *reduction* in real on-the-ground noise impacts achieved by the POS satisfies the requirements of the Resolution.[9]

---

[7] We note that the POS' *FAR Part 150 Noise Compatibility Program Amendments of 1993* already call for evaluating the adequacy of the monitoring system. This work was to be initiated in 1994, yet we heard nothing about its progress at the hearings. We note, however, that both the POS and various representatives of the public mentioned in the hearings and in the written submittals a variety of potential new sites that warrant consideration.

[8] We also feel that it would be useful if the revised NVM included a plan for periodic, independent spot-check sound level monitoring and for more frequent visual verification of RMS condition. It would be useful if the spot checking included comparisons with the RMS data on an event-by-event-basis to determine any discrepancies in the RMS measurements of aircraft-only noise, background noise, and maximum level or SEL of events. It would also be useful if the spot-check equipment was capable of accurately measuring the minimum background noise levels at each site. Additionally, it would be desirable for the POS to file with the PSRC monthly monitoring results reports, complete with statistics on the data and annotation of all potentially spurious data. Finally, an independent review of the records of the past field visits to the RMS that could identify the extent and effect of any recorded problems, as well as an evaluation of the current sites and the RMS' condition, would also be useful.

[9] The purpose of the FAA's threshold (in areas where the DNL is already above 65 dB) is to determine when further analysis is necessary; not to deem that a significant impact has automatically occurred. A 1.5 dB DNL increase could result from an imperceptible 1.5 dB increase in the SEL of each aircraft or a very perceptible 40% increase in the number of operations. Likewise, an introduction of operations to an area previously without them could raise the DNL by 1.5 or more dB and generate substantial community reaction. A good local example of the latter was the reaction to the Four-Post Plan in areas beyond the 65 dB contour, where 3 dB increases in DNL were predicted by the POS noise consultant. The FAA threshold for further analysis is a signal to investigate the cause of the DNL increase, and to ascertain whether that cause has significant impact.

(continued...)

We have also determined that 1993 is the appropriate base year for purposes of the measuring whether the reduction in noise impacts required by the Resolution has been achieved. Nothing in the Resolution speaks to noise reductions that occurred before the Resolution was enacted.[10] Thus, as we read it, the Resolution requires the POS to show that there has been a significant reduction in on-the-ground noise impacts from 1993 to 1996, when the construction of the third runway may be authorized by the PSRC.

We are not insensitive, however, to the practical problems our interpretation of the Resolution may create for the POS. Most prominently, the requirements that the POS employ additional noise metrics and monitoring stations, and that it show a reduction in noise from 1993, will inevitably require the POS to back-calculate or otherwise estimate some of the required inputs. While this may introduce some imprecision into the exercise, we have concluded that it is preferable to using only DNL data from the existing Noise Monitoring System for past years or limiting the analysis entirely to future noise reductions. The Panel believes, however, that the significance of the 1993-96 data will be best understood in the context of as much earlier data as the POS can make available to us.

---

[9](...continued)

We also note that the 1992 FICON *Federal Agency Review of Selected Airport Noise Analysis Issues* submitted to us by the POS compiles a variety of other thresholds articulated by various people for various purposes. FICON suggests that "percent of people highly annoyed" (%HA) is a good indicator of environmental quality, with reference to Finegold's work and the revised Schultz curve. In the hearings, the POS noise consultant also referred to %HA citing values from the curves in the 1992 FICON review. He noted that the POS' proposed 4.4 dB reduction in average DNL by 2001 would reduce %HA by 40 or 50%. We note somewhat different values: a 50% reduction in %HA (such as from 20% to 10%) would actually require a 6 dB reduction in DNL according to the curves. The POS consultant also referred the Panel to the 1991 Fidell article (*JASA*, 89/1, pp. 221-233), which presents the "revised Schultz curve;" this curve shows that a 4.4 dB decrease in DNL would reduce the %HA by about 25%; to achieve a 50% reduction in %HA, according to the revised Schultz curve, a 9 dB decrease in DNL would be required.

We also note that A. Harris in a December 23, 1994, letter to the Panel and in his 1990 *Review of Community Responses to Changes in Noise Exposure*, submitted to us by the ACC, suggests that determination of differences in the number of impacted people represented by each study point is key to assessing the effectiveness of a change in the noise climate, coupled with changes in noise exposure and single event levels.

Further, the POS consultant noted that Fidell had reaffirmed the idea that the use of a single curve representing all transportation sources was valid. A. Suter, in her review prepared for RCAA for the hearings, disagreed, citing many recent references not addressed by Fidell or by FICON. She pointed to data that would raise the %HA for 70 dB DNL from the 20-30% range to over 70%. Also, a second Fidell article provided to us by the POS consultant (*JASA*, 89/1, pp. 234-243) showed a 5 dB "shift" in tolerance of aircraft exposure compared to nonaircraft exposure (people being less tolerant of aircraft noise, and so, more likely to be highly annoyed by a given aircraft DNL than by nonaircraft sources such as road traffic).

We believe all of these references offer insight into the significance of changes in noise exposure and DNL.

[10] It seems implausible to us the Resolution would be satisfied if a meaningful reduction in noise impacts occurred between 1989 and 1993, but noise impacts were aggravated from 1993 to 1996.

As we have said, we do not believe that it is our responsibility to specify exactly how the POS should meet its burden of showing that the required reduction in on-the-ground noise impacts has occurred. Rather, it is our role to indicate, in general terms, why the Noise Validation Method, as it has been proposed by the POS, is not adequate, and what sorts of additional considerations should be taken into account. We have attempted to do so in this Order. We leave it to the POS, and its consultants, to develop and articulate a new method of making the required showing to us.

We do not believe that we have any authority to compel the POS to adopt any particular approach to the reduction of on-the-ground noise impacts. We do feel, however, that it might be useful for the POS (in conjunction with the FAA, where appropriate) to consider a variety of measures for both noise abatement (reduction of total sound energy at the source) and noise mitigation (reduction of noise impacts). With regard to the programs that were deemed to be "responsive" in Part III.A of the Implementation Steps adopted by the Executive Board of the PSRC, we offer these comments:

- Acoustical insulation program: Based on testimony at the hearings (and subject to our reevaluation after review of the data requested in the Attachment to this order), we are concerned that the acoustical insulation program does not appear to be meeting at least one of its stated goals, which is a 5 dB reduction in A-weighted DNL in the treated houses. The POS also appears not to be meeting its design goals for each individual house for additional Noise Level Reduction after insulation. Additionally, a 5 dB reduction in overall A-weighted DNL may be too modest a goal for meaningful reduction in interior noise due to aircraft, especially in the lower frequencies.[11] Meaningful noise reduction due to sound insulation may need to address this low frequency noise. Independent, periodic and statistically supportable measurements of a representative sample of the insulated homes before and after treatment would be useful.

- Run-up noise reduction program: Based on our review of the data provided by the POS, we are concerned that the nighttime engine run-ups may regularly violate the King County Noise Ordinance, and perhaps by substantial amounts. Full POS compliance with the King County

[11] Wyle Research notes on page 2-5 of its *Guidelines for the Sound Insulation of Houses Exposed to Aircraft Noise*, provided to the Panel by the POS, "Modest improvements . . . (e.g., less than 5 dB) may not provide a noticeable improvement to the homeowner and hence are not cost effective." Further, on page 2-6, Wyle Research notes, ". . . the FAA has recognized that in order for a homeowner to perceive any improvement . . . there must be a *minimum* of 5 dB improvement in noise reduction in each room" (our emphasis). Wyle Research also notes that interior SEL goals of 60-65 dB may also be appropriate in areas within the 65 dB exterior DNL zone.

Additionally, as the POS noise consultant indicated in the hearings, the reduction in A-weighted DNL is caused solely by a reduction in maximum A-weighted levels (and SEL) of individual aircraft. We suspect that this reduction is probably driven by a reduction in the more easily attenuated frequencies near and above 1000 Hz, with perhaps little or no reduction in the more difficult-to-reduce lower frequencies (which are heavily attenuated in the A-weighted calculation). It is these lower frequencies that seem to be the cause of much of the complaints about interior noise impacts (including window rattle). A 5 dB reduction in overall A-weighted level from an individual flyover may not be sufficient to be viewed by residents as a meaningful improvement. Even an 8-10 dB reduction in overall A-weighted level, which would typically considered as substantial, may not adequately solve the low frequency noise, vibration and rattle problems.

Finally, POS data provided to the Panel by the Port Patrol (*Final Project Report, Summary of Test Results, AIP 3-53-0062-13*) shows many cases where the actual measured "additional sound reduction after insulation" was less than the "designed additional sound reduction".

Noise Ordinance for all run-up activities covered by the Ordinance would seem to be appropriate. In addition, whatever abatement measures the POS uses to reduce regulated run-up noise (such as a hush facility) might usefully be applied to the exempt daytime and nighttime operations as well. We would suggest that the POS demonstrate compliance with the Ordinance through measured data at appropriate measurement points in the residential areas surrounding the boundaries of the Airport. We would further suggest that independent measurements be made by trained County staff or by an independent consultant hired by the PSRC. We would encourage the POS to include in the revised NVM a plan to use measures other than mere compliance with the Ordinance and the run-up noise reduction program, such as sound level measurements and operational data, to demonstrate that meaningful reductions in ground run-up noise have occurred.

With regard to other programs or measures that were not listed in Part III.A of the Implementation Steps, we would suggest that the following be considered:

- Evaluate and, if feasible, implement alternative flight paths designed to minimize the population exposed to maximum noise levels or to redistribute the burden of maximum noise levels throughout the surrounding communities.[12]

- Consider and, if feasible, implement revised flight operating procedures to increase the angle of ascent/descent for jet aircraft at the Airport, to reduce on-the-ground noise levels along the flight paths and at the corner posts.

- Implement a high-priority program to install, by the end of CY 1996, sound insulation in all elementary and secondary schools within the 65 dB DNL contour sufficient to reduce sound levels in classrooms due to aircraft to a maximum level and duration that will eliminate speech interference.[13]

[12] We note that in Resolution A-93-03, the PSRC specifically requested "consideration by the FAA of modifying the Four-Post Plan to reduce noise impacts . . ." We also make note of the discussions in the December hearings that the FAA has invited the local communities to be involved in the process of evaluating flight path shifts. While such involvement has the potential to pit one community against another, we feel that careful examination of shifting the "posts" and perhaps narrowing the approach and departure corridors outside the posts could produce a worthwhile net benefit in noise exposure. It is clearly in the best interest of the POS, the PSRC and the citizens to pursue vigorously this option.

[13] We note, according to the 1992 FICON airport noise analysis review, that 60 dB is given as the level above which "there will be interference with speech communication." We also note that in the FAR Part 150 Amendments of 1993, the POS called for a planned pilot program on sound insulation of two churches, one private school, one convalescence home and one multi-family structure. We suggest that there is enough evidence nationwide of successful noise insulation activities that a pilot program is unnecessary and that full implementation of a public use/multi-family structure noise insulation program could begin immediately. We also believe that special emphasis should be put on schools and convalescence facilities in this program.

At a minimum, we believe that it would be very useful for the POS to complete the pilot program by mid-1995, as the POS anticipated in the Part 150 Amendments, and that a regular public use/multi-family structure insulation program could be well underway by April 1996, with a detailed schedule for completion, including documentation of which facilities are eligible, which are not (and why not), and the insulation goals.

- Further accelerate the residential sound insulation program.[14]
- Evaluate the feasibility of new technologies to reduce ground noise generated by jet engine run-ups and, if feasible, adopt new methods of doing so.
- Evaluate the feasibility of setting a cap on total nighttime operations and, if feasible, implement such a cap.
- Evaluate the feasibility of shifting nighttime operations to earlier in the evening or later in the morning and banning all operations for a core period in the middle of the night; and, if feasible, implement these measures.
- Evaluate the feasibility of setting a maximum noise limit (SEL or L_{max}) for aircraft operating during the nighttime hours, and, if feasible, implement such a limit.[15]

—

We recognize that in its efforts to limit and reduce the impact of aircraft-generated noise on its neighbors, the POS has been a leader within the airport industry. The POS has expressed confidence that through its innovative Noise Budget and Nighttime Limitations Program, and various other efforts, it is in fact significantly reducing the impact of on-the-ground noise. We invite the POS to show us why the community should share the POS's confidence in the significance of its on-going noise abatement and mitigation programs.[16]

The POS should submit a revised noise validation method to the PSRC, for delivery to us and for public inspection, by March 31, 1995. Any member of the Coordinating Committee or of the public who wishes to offer comments on the revised method submitted by the POS should submit written comments to the PSRC, for delivery to us, by April 14, 1995. We expect to convene a public hearing, to consider the POS's submission and responses from the Coordinating Committee and the public, during the first week of in May 1995. We will, in due course, issue an order specifying the time and place of such a hearing.

In anticipation of our review of a revised noise validation method, the Panel believes that it would be helpful if the POS could provide us with the technical information specified in the attached Information

[14] We note that the POS FAR Part 150 Amendments of 1993 indicate that 7,500 single family residences are eligible for sound insulation and that the POS has accelerated the program to 100 houses per month. Even with this acceleration, completion of the program will take until 2001.

[15] We note that Section 4.C of the Nighttime Limitations Program calls for the POS to specifically determine, after 1997, "with input from the carriers and the public whether [such a limit] . . . is appropriate and consistent with its obligation as an airport proprietor." We see no reason why this decision should be put off so long.

[16] We note that the data in Table 17b of the POS response to our September 1994 data request shows a 2.9 dB drop in measured DNL at the 11 RMS from 1991 to 1994 YTD (and a corresponding 2.7 dB drop in the related ANEL), which already exceeds the *1998* DNL goal in the NVM Report (and the 1999 goal in the Noise Budget). The NVM Report showed that from 1991 to 1994, the DNL had to drop 1.0 dB, corresponding to a 0.76 dB decrease in ANEL.

Request to the Port of Seattle by submitting the requested information to the PSRC, for delivery to us, by February 28, 1995.

We want to reiterate here a final comment that we offered on the Noise Issues at the conclusion of the hearing on December 2. Throughout this proceeding, the public has attempted to draw to our attention the consequences — particularly the noise impacts — that might occur if a third runway were built at the Airport. We again observe that this Panel cannot and will not undertake a review of the potential environmental consequences of building the third runway. Our responsibility, with respect to the Noise Issues, is limited to determining whether the POS has scheduled, pursued and achieved a meaningful reduction in real noise impacts at the existing Airport.

—

We will soon issue a separate order laying out the next steps for our consideration of Demand/System Management Issues.

Scott P. Lewis, Chair

William Bowlby

Martha J. Langelan

Date: January 9, 1995

STATE OF WASHINGTON
PUGET SOUND REGIONAL COUNCIL

In the Matter of:

Expert Arbitration Panel's Review of Noise and Demand/System Management Issues at Sea-Tac International Airport

FINAL PHASE I ORDER ON DEMAND/SYSTEM MANAGEMENT ISSUES

July 27, 1995

The Expert Arbitration Panel on Noise and Demand/System Management Issues (the "Panel") has held three rounds of hearings on Demand/System Management Issues. We announced, at the close of our May 1995 hearings, that the Panel would soon issue its Phase I decision on Demand/System Management Issues. This is that Order.

Background.

On August 12, 1994, we heard preliminary presentations by Claire Barrett of Claire Barrett & Associates, consultant to the Port of Seattle ("POS") on Demand Management, and from Brian Ziegler, speaking for the Washington State Department of Transportation ("WSDOT"), on the System Management option of "high-speed rail." A few comments from the public, both oral and written, were then also received. On December 2, 1994, we returned to these issues. The WSDOT, through Mr. Ziegler, presented its "Final Report on The Impact of Intercity Passenger Rail on Operations at SeaTac Airport." The POS, through Michael Feldman, Manager of Aviation Planning for the POS, Claire Barrett, and Ronald Ahlfedlt of P&D Aviation, presented a "progress report" on their review of the feasibility of two kinds of demand management programs: congestion pricing and gate controls. We also received oral comments from Alaska Airlines and Horizon Airlines, and both written and oral comments from various members of the public.

On February 24, 1995, the Panel issued its Preliminary Order on Demand/System Management Issues. Our Preliminary Order laid out the framework of the Panel's consideration of Demand/System Management Issues. We summarized the pertinent provisions of Resolution A-93-03 adopted by the Puget Sound Regional Council ("PSRC"), the PSRC's "Implementation Steps" for the Panel, and the Memorandum of Understanding ("MOU") among the PSRC, the Federal Aviation Administration ("FAA"), the POS and the WSDOT. The Resolution, which we have considered to be the controlling document, provides that "the region should pursue vigorously ... a third runway at Sea-Tac" and that the third runway "shall be authorized by April 1, 1996 ... [a]fter demand management and system management programs are pursued and achieved, or determined to be infeasible, based on independent evaluation ...."

In our Preliminary Order, the Panel addressed some basic questions about the scope and nature of our inquiry. After careful consideration of the Resolution, the Implementation Steps and the MOU, we concluded that the Resolution must be interpreted to require the Panel to consider whether any demand or system management options are "feasible" in the sense that they could be implemented in a way that they could be expected to obviate or defer the need to construct the third runway. With this understanding, we announced that we would address the Demand/System Management Issues in two phases. We said that in Phase I, we would continue to focus our attention on the existing capacity constraints, the current and expected levels of demand, and the existing and expected levels of delay at Sea-Tac if the third runway is not built, and would address the determinative questions raised by each of the three methods of demand or system management that had, at that time, been offered to us:

1. When could a method of congestion pricing (for the use of the airfield) be implemented at Sea-Tac, and what impact would it be expected to have on the level of aircraft operations or the amount of delay at Sea-Tac?

2. When could a method of gate controls be implemented at Sea-Tac, and what impact would it be expected to have on the level of aircraft operations or the amount of delay at Sea-Tac?

3. Could a system of true high speed rail be put in operation before 2020, and if so, what impact would it be expected to have on the level of aircraft operations or the amount of delay at Sea-Tac? What is the greatest reduction in the level of aircraft operations or the amount of delay at Sea-Tac that could be expected to result from more readily achievable improvements in existing rail service connections to the principal short-haul air destinations (for example, Seattle - Portland)?

We emphasized that we felt that it was essential, for the Panel responsibly to discharge its duties and for the public to appreciate what motivates the proposal to build a new runway, that the POS present us with a succinct, but well-documented statement of the capacity and delay problems that justify the construction of the third runway, including a reasonable estimate of when the new runway is likely to be put in use if the PSRC gives its approval in April 1996. We went on to underscore that if the POS and WSDOT wished us to find that the implementation of demand management or system management options cannot reasonably be expected to obviate or defer the need to construct the third runway, they should show us why, relating their analysis of the timing and impact of such options to the justifications they offer for constructing the runway. We invited comments from the PSRC, the FAA and the public on these matters.

Finally, we noted that if the Panel determined, in its Phase I decision, that any methods of demand or system management could reasonably be expected to obviate or defer the need to construct the third runway, we would then turn in Phase II, sometime later, to the question of whether such feasible methods were being pursued and achieved as required by the Resolution. We observed, however, that if we determined that no feasible demand or system management options would obviate or defer the need for a third runway within the foreseeable future, the POS and WSDOT would have satisfied the demand/system management condition of the Resolution and our inquiry on Demand/System Management Issues would come to an end.

In an effort to elicit as much pertinent evidence as we could, we established a formal comment period and then, by our Information Requests of March 3, 1995, we solicited a variety of detailed information on these issues from the POS, the WSDOT, the FAA, the airlines and the public.

We held our third round of hearings on Demand/System Management Issues on May 3 and 4, 1995. The POS, mainly through Michael Feldman, Manager of Aviation Planning for the POS, Claire Barrett of Claire Barrett and Associates, and Ronald Ahlfedlt of P&D Aviation, presented evidence and arguments that the two "demand management" programs for which the POS is the "lead agency" under the MOU — congestion pricing and gate controls — are not "feasible" within the meaning of the Resolution. The WSDOT, through Charles Howard, Planning Manager for WSDOT, and Brian Ziegler, revisited its "Final Report on The Impact of Intercity Passenger Rail on Operations at SeaTac Airport" and asserted that the system management option of "high-speed rail" — assigned to the WSDOT as "lead agency" — was not feasible. The FAA, represented by Carolyn Read and Sarah Dalton of its Regional Office, offered a few of its own comments, submitted its Draft Environmental Impact Statement ("DEIS") with respect to the Proposed Master Plan Update Development Actions at Sea-Tac, including the proposed third runway, and offered some useful data on delays at Sea-Tac. Mary Vigilante of Landrum & Brown, Incorporated, who helped prepare the DEIS for the FAA, engaged in limited dialogue with the Panel. During the May hearings, we also received both written and oral comments from the public, including a formal presentation on demand management from Stephen Hockaday, who testified for the Airport Communities Coalition ("ACC"), and on the rail option from Hal B.H. Cooper, Jr., who testified for the Regional Commission on Airport Affairs ("RCAA"). We also heard from representatives of Air Washington and the Airport Noise Group. Regrettably, no representatives of any of the airlines serving Sea-Tac submitted any comments or appeared before the Panel. On June 26, 1995, long after the close of the Phase I hearings and while the Panel was considering its present decision, the RCAA submitted to the Panel a study by G.H. Bogan of G. Bogan & Associates, Inc., which suggested that the use of Localizer Directional Aid ("LDA") procedures might obviate or defer the need for the third runway.

Introductory Comments.

Before turning to our conclusions, we want to comment on the quality of the evidence and to explain why our decision has been difficult, and time-consuming, for us to make.

The Panel does not believe that it has been charged with generalized responsibility for determining whether there is a need to build the proposed third runway. Rather, as we interpret the Resolution, it is our responsibility to determine whether particular methods of demand or system management presented to us could reasonably be expected to defer or obviate the need to construct the new runway. As we said in our Preliminary Order, in order to make that assessment on a sound basis, we felt that it was important (a) for the POS to provide us with a succinct, well-documented statement of the delay and capacity problems that justify the construction of the new runway *and* (b) if they claimed that congestion pricing, gate controls or high-speed rail were not "feasible," for the POS and the WSDOT to show us why, relating their analysis of the timing and impact of such options to the justifications they offer for constructing the runway.

The evidence offered to us during the hearings has not satisfied our desire for rigorous analysis of these admittedly difficult technical issues. The capacity and delay problems that precipitated the proposal to build the third runway are complex and dynamic. There appears to be no dispute, however, that the effective capacity of the airport has been increased in recent years through the introduction of a variety of technological and operational improvements, and that the occurrence of significant delays has been reduced. We have not found in the evidence presented to us a succinct, well-documented statement of the delay and capacity problems that have led the POS to seek approval of the third runway.

More disturbing to us is the failure of both the POS and the WSDOT to justify their positions that the alternatives are not "feasible" by relating the timing and impacts of these methods to the justifications they rely upon for the construction of the new runway. The potential impacts of the various demand or system management methods under consideration are difficult for us to assess on the basis of the evidence offered during the hearings. Neither the POS nor the WSDOT has offered a fully developed analysis that shows, for example, how much of the delay at Sea-Tac (either experienced in the past or forecast for the future) is attributable to the coincidence of peak demand and poor visibility, and how sensitive the resulting delays are to relatively small changes in the level of peak operations.

We would prefer, as experts in the field, to have abundant opportunity to explore these technical issues until we are satisfied that we have been given the best available evidence of the potential cumulative impact of all of the demand and system management methods on the problems of airfield capacity and aircraft delays that appear to motivate the proposal to build a third runway. However, our obligation as members of the Panel is to render a decision based upon the evidence that has been presented to us.

We recognize that the decision as to whether to build the third runway is an important, and controversial, public matter that will affect the entire regional community. Our Order should not be read as the final word on the Demand/System Management Issues we have addressed. We encourage the POS, the WSDOT, the FAA, the airlines and the public to continue rigorous examination of the planning assumptions that underlie the proposal to build the runway and to persist in efforts to determine whether adequate solutions to the problems of capacity and delay can be found without building a new runway at Sea-Tac.

We will now turn to the specific methods of demand and system management that have been presented to us.

Feasibility Determinations.

Congestion Pricing. The Panel has determined that "congestion pricing" is not feasible within the meaning of the Resolution. There are three basic reasons for this determination.

First, even if congestion pricing could be introduced at Sea-Tac today, the Panel could not say, based upon the evidence we have seen, that it could reasonably be expected to have such a significant impact on the delays at the airport that it would warrant deferring or eliminating construction of a third runway. The POS claims that it would not, and no party has shown that the POS is wrong.

Second, there are serious legal questions (which the Panel does not presume to have authority to resolve) as to whether the POS could implement congestion pricing before the year 2001 without the approval of a majority-in-interest of the signatory airlines serving the Airport. Although the United States Department of Transportation ("USDOT") has recently said that airport owners may implement "properly structured" congestion pricing methods, this power is constrained by existing agreements with airlines that prescribe how aeronautical rates and charges are to be established at Sea-Tac. (In the future, we encourage the POS and the airlines to fashion agreements that allow for the introduction of properly structured peak hour pricing.) Even though congestion pricing might reduce the total costs of airline operations at Sea-Tac by reducing the costs of delays, the airlines serving Sea-Tac have not yet given the POS approval to implement congestion pricing and it would be unrealistic to expect them to do so during the term of the existing signatory agreements. The Panel therefore cannot confidently say that the POS has the ability to introduce peak hour pricing before the year 2001.

Third, while there are sound economic reasons to expect peak pricing to reduce airport delays, the potential impact of congestion pricing is very sensitive to the particular configuration of operations and delays at an airport. Local conditions will determine whether the introduction of congestion pricing will alter the level or pattern of demand for use of the airfield and, if it does, what impact the change will have on expected levels of delay. The structure of the market and the nature of the delay function can change significantly over time, as the experience of Sea-Tac in recent years demonstrates. We cannot say whether, in the year 2001 or later, congestion pricing is likely to be effective at Sea-Tac, especially if the USDOT maintains its current policy limiting charges for the common use of an airfield to the recovery of historical costs.

While the Panel is confident that congestion pricing is an important tool that could improve the efficiency of the use of scarce airfield resources in Seattle, and therefore deserves careful study by the POS and the airlines, the Panel finds the potential impact of congestion pricing in the future to be too speculative to rely upon as a justification for eliminating or deferring the construction of the third runway.

For all of these reasons, the Panel has concluded that it is not reasonable to expect that congestion pricing will obviate or defer the need to construct the third runway and, therefore, that congestion pricing is not "feasible" within the meaning of the Resolution.

Gate Controls. The Panel has determined that the use of "gate controls" is not feasible within the meaning of the Resolution. In theory, gate controls (in the form of minimum passenger flow-through requirements) could lead to improved airfield efficiency, and hence fewer delays, if they induced airlines to reduce the number of aircraft operations they use to serve a given flow of passengers, either by consolidating flights on larger aircraft or by improving the load factors on smaller aircraft. Such a system of gate controls would, however, raise a series of questions, in practice, that remain unanswered on the record before us: (i) how would such gate controls be structured; (ii) how would the airlines, and their passengers, respond; and (iii) could the POS lawfully implement such a system of gate controls without the agreement of affected airlines? Gate controls may be useful, in the future, as one component of an overall program to encourage greater airfield efficiency at Sea-Tac, but no party has offered any empirical evidence that the implementation of gate controls could reasonably be expected, in the near term, to obviate or defer the need to construct the third runway. As a

result, the Panel must reject gate controls as a feasible alternative to the construction of a third runway. We nevertheless strongly encourage the POS to continue to examine the potential benefits of gate controls as a means of improving the efficiency of use of scarce airport resources.

High-speed Rail. The Panel has determined that a new system of high-speed rail is not "feasible," within the meaning of the Resolution. We reached this conclusion because even under the most optimistic scenarios, the time frame for implementing a newly-constructed, high-speed rail link between Portland, Seattle and Vancouver is exceedingly long and highly uncertain. Because of the inevitably very long period of time required to put true high-speed rail in service, and because of the uncertainties about the economics and financing of high-speed rail, there is no assurance that a system of high-speed rail would offer any basis for deferring or eliminating the construction of the third runway, even though, if a new high-speed rail link were ultimately put in service, we would expect there to be a very substantial diversion of travelers from air to rail transportation in the Portland-Seattle-Vancouver corridor.

The Panel has, however, been unable to determine, based upon the evidence presented to us, whether more readily achievable improvements in existing rail service connections to the principal short-haul markets served by Sea-Tac — Portland and Vancouver — are "feasible."

The following facts and circumstances suggest that improved rail service along the Portland-Seattle-Vancouver corridor using existing railroad rights-of-way could have a significant impact on the level and pattern of aircraft operations at Sea-Tac and might allow the POS to defer construction of the third runway without suffering unacceptable amounts of delay at the Airport:

- Sea-Tac is not currently a highly congested airport. According to the most recent ASQP data available from the USDOT (for May 1995), Sea-Tac ranks #1 in on-time departures (90.0%) and #6 in on-time arrivals (84.6%). In recent years, the total annual hours of delay (as defined in the 1995 FAA Capacity Enhancement Update) have dropped from 48,000 (in 1988) to only 26,000. Reported delays as compiled in the FAA's ATOMS data series show a similar decline, from 30 delays per thousand operations in 1990 to six delays per thousand operations in 1994.

- The problems of airfield capacity and operational delays that appear to motivate the decision to build the new runway occur when poor visibility coincides with peak demand.

- A small reduction in the total level of aircraft operations occurring during peak periods can have a significant impact upon the delays that would occur during conditions of poor visibility at the Airport.

- The structure of air demand at Sea-Tac includes a large number of flights to and from Portland and Vancouver, especially during peak periods. These high-frequency flights add significantly to airport congestion (particularly in poor-visibility conditions, when capacity is restricted).

- Currently, the airlines have low load factors on many of their flights serving the Portland-Seattle-Vancouver markets.

- More than half of the passengers carried on flights serving Portland and Vancouver are O&D passengers, who are more likely than connecting passengers to opt for improved rail service.

If improved rail service along the Portland-Seattle-Vancouver corridor induced even a relatively small number of airline passengers to switch to rail, and if the resulting reduction in aircraft load factors caused the airlines to eliminate some of their peak period operations, it is likely that there would be a significant reduction in the levels of delay experienced at Sea-Tac, which could defer the need for the new runway.

Unfortunately, despite the Panel's repeated requests for detailed input on these questions, no party has submitted satisfactory evidence on the likely rate of diversion of passengers from air to rail travel, on the impact such a diversion of passengers would have on airline operations at Sea-Tac or on the resulting delay profile at the Airport that could reasonably be expected.

The WSDOT has attempted, in good faith, to meet its burden, as the "lead agency" under the MOU, to show that the high-speed rail option is not feasible within the meaning of the Resolution. The Panel has concluded, however, that the WSDOT (together with the POS and FAA) has not met this burden. (For example, the evidence offered on the diversion of passengers on the Talgo route is not persuasive. Upon review of the underlying survey, it appears to the Panel that there is no support for the claim that all of the new rail passengers have been diverted from automobile travel. In fact, there appears to be a 20 to 1 preference for rail over air travel reflected in the survey results.) We cannot, therefore, find that improvements in rail service are *not* a "feasible" method of system management. At the same time, however, the Panel is reluctant to find that rail improvements *are* feasible, within the meaning of the Resolution, without more persuasive evidence on the issues of passenger diversion and its likely impact on airline operations and airport delay. As a result, after much deliberation, we have concluded that we should continue to examine the rail option during Phase II of our consideration of Demand/System Management Issues.

We will seek, in Phase II, additional evidence from the WSDOT, the POS, the FAA, the airlines and the public, focused on the following issues:

- What improvements in rail service on the Portland-Seattle-Vancouver rail corridor are now underway under the auspices of the WSDOT?

- What improvements in rail service on the Portland-Seattle-Vancouver rail corridor, and along the entire West Coast, are or will be incorporated in WSDOT's Statewide Transportation Plan or other long-range transportation plans?

- How have the elapsed travel times and convenience of scheduling been altered and what further improvements are anticipated?

- What has been the impact on ridership during 1995?

- What are the best estimates of expected air-rail diversion of O&D passengers on the Portland and Vancouver routes served by Sea-Tac?

- What impact would such air-rail diversion be reasonably expected to have on aircraft operations, and resulting delays, at Sea-Tac?

We intend to resolve the question of whether the rail option is "feasible," and if it is, whether it has been "pursued and achieved" as required by the Resolution, before April 1, 1996. In due course, the Panel will issue Information Requests and a Notice of Hearing with respect to these matters.

LDA. Although the MOU and the Implementation Steps do not contemplate the Panel's consideration of methods of demand or system management that have not been offered for consideration by the Coordinating Committee, we have reviewed the Bogan Report (submitted after the close of the hearings by the RCAA) which suggests that the use of LDA might be a technological improvement in system management that could obviate the need to construct the third runway. The Bogan Report is a provocative document that deserves scrutiny by, and a response from, both the POS and the FAA. The Panel has determined, however, that we will not consider LDA as a method of system management to be assessed under the Resolution for a variety reasons.

First, the RCAA submission was not timely. Under our Preliminary Order, comments from all members of the Coordinating Committee and from the public on the Demand/System Management Issues were to be submitted by April 14, 1995. We established this requirement to ensure that all participants in this process would have a reasonable opportunity to review the comments before the hearings began on May 3, 1995. The RCAA failed to meet this deadline by ten weeks.

Second, we could not fairly consider the Bogan Report without providing an opportunity to the POS and the FAA to offer their comments on it. To do so would require us to reopen the record and defer the completion of our Phase I deliberations for far longer than was ever contemplated when the Resolution was enacted and the April 1996 decision point was established.

Third, the Panel itself has many questions about the Bogan Report. We are concerned that it may not have taken full account of the complex, dynamic interaction between effective airfield capacity, operational activity and airport delays.

Accordingly, the Panel has concluded that it will not consider LDA. We emphasize, however, that nothing in this Order should be interpreted as expressing any opinion about the potential impact of LDA on the problems of congestion and delay that have been offered as justifications for the construction of the third runway. Indeed, the potential impacts of rapidly improving air traffic control technology should continue to be a focus of attention for both the POS and the FAA in their assessments of the need for the new runway.

Closing Comments.

We have now completed our Phase I consideration of Demand/System Management Issues. Under the terms of the PSRC's Resolution, our inquiry was narrow in scope. We have determined that, within the meaning of the PSRC's Resolution as we interpret it, congestion pricing, gate controls and high-speed rail are not "feasible" methods of demand or system management. We have, however, left open the question of whether more readily achievable improvements in existing rail service may be "feasible." This is the only method of system management we will consider in Phase II.

We have not been appointed, and we are unable, to comment upon the entire DEIS or to attempt to resolve two critical questions that remain open for public discourse: (i) whether the need for the third runway has been established, and (ii) whether a combination of improvements in air traffic control, in airport and airline management and in regional transportation infrastructure could defer or obviate the need to build the proposed third runway at Sea-Tac.

Scott P. Lewis, Chair

William Bowlby

Martha J. Langelan

SEATTLE - TACOMA INTERNATIONAL AIRPORT

DATA PACKAGE NO. 11

AIRPORT CAPACITY ENHANCEMENT PLAN UPDATE

April 1995

Prepared by
Federal Aviation Administration
Technical Center
Atlantic City, New Jersey

214

Seattle-Tacoma International Airport

Data Package No. 11

Airport Capacity Enhancement Plan Update

Prepared by

Federal Aviation Administration
Technical Center
Atlantic City, New Jersey

April 1995

214

TABLE OF CONTENTS

214

LIST OF EXHIBITS

1. Airport Layout and Potential Improvements

A list of potential improvements to Seattle-Tacoma International Airport (SEA) was developed for the following groups:

- Airfield Improvements.
- Facility and Equipment Improvements.
- Operational Improvements.
- User Improvements.

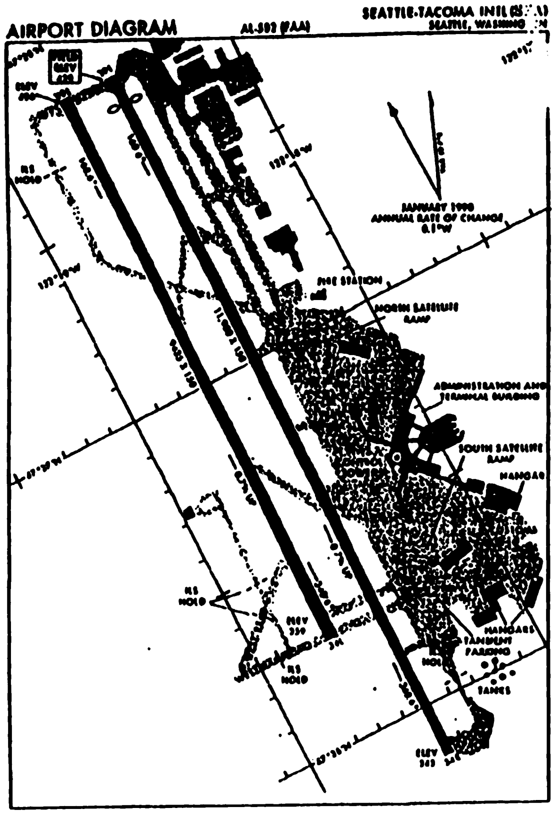
Exhibit 1, the current SEA airport layout, depicts the runways, the runway exits, taxiways, and gate areas at the airport.

Exhibit 2 presents a preliminary list of potential improvements for SEA.

214

EXHIBIT 1

SEATTLE-TACOMA AIRPORT LAYOUT



214

EXHIBIT 2

POTENTIAL IMPROVEMENTS[1]

Airfield Improvements

1. Basecase.
   - High speed exits on Runway 16R/34L
   - South Aviation Support Area
   - Expanded Concourse A
   - MLS
   - 34L as primary arrival runway in north flow
   - 16R/34L shortened by 325' off the north end
   - 16L/34R shifted 300' to the south
2. Class 3 & 4 Runway (16/34X) 1500' from 16L/34R
3. Class 3 & 4 Runway (16/34X) 2500' from 16L/34R
4. Full use Runway (16/34X) 2500' from 16L/34R with arrivals on 16L & 16X or 34R & 34X.
5. Full use Runway (16/34X) 2500' from 16L/34R with arrivals on 16R & 16X or 34L & 34X.
6. Full use Runway (16/34X) 3300' from 16L/34R with Precision Runway Monitor. 16R departures cross Runway 16L at threshold.
7. Full use Runway (16/34X) 3300' from 16L/34R with arrivals on 16R & 16X or 34L & 34X (no PRM).
8. Modified Full Use Runway (16/34X) ~~3300'~~ 2500' from 16L/34R, except NO heavy aircraft on 16X/34X.

Facility & Equipment Improvements

~~9. Offset Procedures.~~
10. Wake Vortex Detection and Avoidance System.
~~11. CAT I Approaches with 3 RVRs.~~
12. CAT II Approaches.
13. CAT III Approaches.
~~14. Staggered Runways for Reduced Wake Vortex Thresholds Separations.~~
~~15. Converging Runway Display Aid (CRDA) for Simultaneous Converging Instrument Approaches between SEA 16L/X and Boeing Field 13R.~~

Operational Improvements

~~16. Reduce In-trail Separations in IFR to 3.0 nm.~~
17. Reduce In-trail Separations in IFR to 2.5 nm.
18. FMS and GPS Approaches.

User Improvements

~~19. All Commercial Flights Capable of Operating at 300' RVR.~~
20. Demand Management Strategies.
21. Uniform Schedule within each hour.

[1] Improvements will be modeled with and without interaction with Boeing Field as appropriate.

II. Model Inputs

The FAA Technical Center conducted a data collection at Seattle-Tacoma International Airport (SEA) during the weeks of October 25 and November 1. The SEA Airport Traffic Control Tower (ATCT) and the Port of Seattle provided the FAA Technical Center with information regarding operations at SEA. This data, along with the data from the data collection, are presented in detail in this section of the report. This information will be used to prepare inputs to the SIMMOD simulation model to evaluate the proposed capacity enhance options.

Exhibit 3 defines the aircraft weight classes to be used in this study

Exhibit 4 lists the aircraft types observed during the data collection. Aircraft types are grouped by class as defined in Exhibit 3.

Exhibits 5 through 8 show the runway exit usage and the arrival runway occupancy times by class observed during data collection. It provides exit utilization data for each aircraft class and exit; the proportion of time the exit was used, the arrival runway occupancy time, and the number of occurrences.

In a previous meeting, a comparison of the separations input from report FAA-78-8A and field data collection showed general agreement between the two tables (see Data Package #2). Therefore it was agreed at the January 1994 meeting to use separations from report FAA-78-8A. The 78-8A separations and separations computed from data collection presented previously were computed using the same aircraft approach speeds. This assured that the comparison of the time between operations was consistent. However, the approach speeds used in both computations were different from those agreed to for this study (see Exhibit 13 of this Data Package). Exhibit 9 shows the 78-8A VFR separations and the separations from field data collection recompute to reflect the approach speeds agreed to for this study. A recomparison of the 78-8A VFR separations and separations computed from data collection recompute with the agreed to speeds will yield the same relative agreement between the two tables. Three days of IFR data was supplied by the Port of Seattle for examination of the arrival/arrival separations observed at SEA-TAC. This "field data collection" yielded results that did not warrant a change from the basic premise of report 78-8A. This report recommends using the ATC rule plus a buffer of 1.65 standard deviations of the interarrival time (judged to be 18sec). It is recommended that the IFR separations in Exhibit 10, recompute using this technique, be used for all scenarios where IFR separations are applied, i.e. VFR2, IFR1, IFR2, IFR3, IFR4.

Exhibit 11 describes the SEA weather definitions.

Exhibits 12 and 13 show the length of common approach paths and arrival aircraft approach speeds.

Exhibits 14 and 15 lists the aircraft gate service times and the arrival lateness distribution.

For each arrival, the lateness distribution is sampled and the resulting time is added to the scheduled arrival time. This input varies the arrival time of an aircraft each time the model is run. If this arrival is scheduled as a subsequent departure, its departure time is the later of its scheduled departure time or its arrival time plus gate service time.

Exhibit 16 shows demands characteristics for the SEA-TAC Baseline, Future 1, and Future 2 schedules. Exhibit 17 shows demand applied to Boeing Field (BFI) for experiments where it is agreed to model the interaction between SEA and BFI.

Exhibits 18 through 23 summarize the estimates of direct operating costs used to translate delays from hours to dollars. Airline financial data was derived from FAA Form 41, Schedule P-5.2 (item # 70989, *Total Aircraft Operating Expenses*). Ramp-to-ramp blocks hours were derived from FAA Traffic Form 41, Schedule T-2 (Item # Z630, *Revenue Aircraft Hours, Ramp-To-Ramp*). The dollar per hours costs are calculated as the ration of these two figures. The numbers in Exhibits 18 through 23 are for the quarter ending September 1994.

214

EXHIBIT 3
AIRCRAFT CLASSIFICATION

Class	Types of Aircraft[a]
A (4)	Single-engine and small twin-engine prop aircraft weighing 12,500 lb.[b] or less (e.g. PA31, BE20, BE90)
B (3)	Twin-engine aircraft weighing 12,500 lb.[b] or more (e.g., DH8, BA31, SHD6)
C (2)	All non-heavy jet aircraft (e.g. B757, B737, FK28, LR35)
D (1)	Heavy aircraft[c] (e.g., L1011, DC8, DC10, B747, B767, MD11)

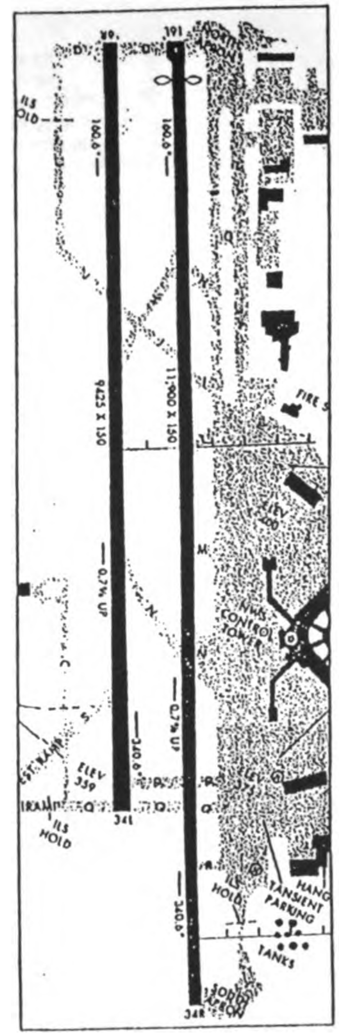
Notes:
[a] For aircraft type designator, see FAA Handbook 7340.1B with changes.
[b] Weights refer to maximum certificated takeoff weights.
[c] Heavy aircraft are those capable of takeoff weights of 300,000 lb. or more whether or not they are operating at this weight during a particular phase of flight (reference FAA Handbook 7110.65 with changes).

These definitions have been used to generate all the data presented in this report by aircraft class. The Design Team must decide to accept these values, or agree on any modifications to them. The critical factor in determining the aircraft class should be their approach speeds and how arrivals are separated at the point of closest approach (at threshold, except for a small following a heavy). For example, in previous studies the approach speed of a small jet (eg. Lear) better approximated that of a large aircraft, and therefore was considered a class 2 (large).

Agreed to by Design Team on 1 December 1993.

214

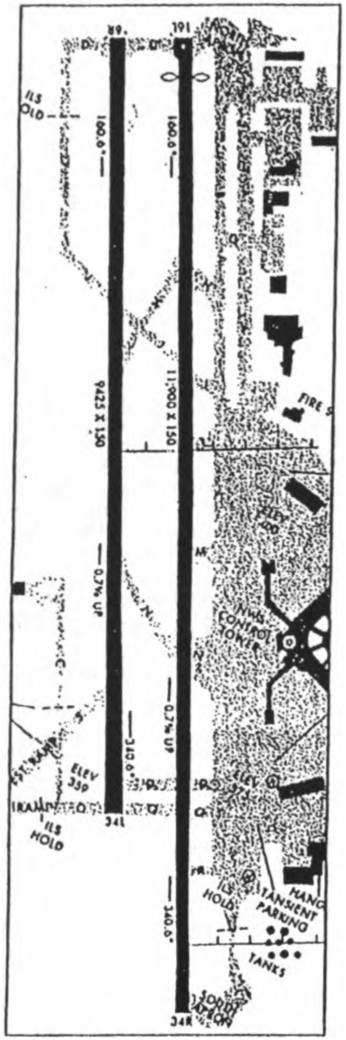
EXHIBIT 6
RUNWAY 16R EXIT UTILIZATION[*]



16R	J	K	M	S	Q
	3200'	4000'	6450'	7850'	9425'
Class 1			.72/47/18		.28/79/ 7
Class 2			.95/47/270		.05/73/13
Class 3	.06/35/10	.06/39/11	.88/52/154	.00/65/ 1	
Class 4	.32/40/11	.09/41/ 3	.56/57/19	.03/67/ 1	

[*] Proportion of observations / runway occupancy time(sec)/no. of observations

EXHIBIT 7
RUNWAY 34L EXIT UTILIZATION*



34L	N	H	J
	3000'	5450'	6250'
Class 1			
Class 2	.05/44/ 2	.92/44/34	.03/56/ 1
Class 3	.66/37/29	.34/53/15	
Class 4	.61/36/ 8	.39/54/ 5	

* Proportion of observations / runway occupancy time(sec)/no. of observations

EXHIBIT 4
AIRCRAFT TYPES OBSERVED AT FIELD DATA COLLECTION

Class 1 - Heavy Jets

B747	Boeing 747	DC10	McDonnell-Douglas DC10
B767	Boeing 767	MD11	McDonnell-Douglas MD-11
L101	Lockheed L1011	DC8	Mcdonnell-Douglas DC-8

Class 2 - Non-Heavy Jets

A320	Airbus 320	DC9	McDonnell-Douglas DC-9
B727	Boeing 727	MD80	McDonnell-Douglas MD-80
B737	Boeing 737	FA28	Fokker Fellowship
B757	Boeing 757	G2	Gulfstream/Amer. Gulfstream II
HS25	Hawker-Siddeley HS/DH/BH125	LR35	Gates Learjet 35
WW24	Westwind 1124	DA50	Dassault Falcon
N265	Rockwell Int'l Sabreliner (265)	C650	Cessna III

Class 3 - Large Twin-engine Propeller Aircraft

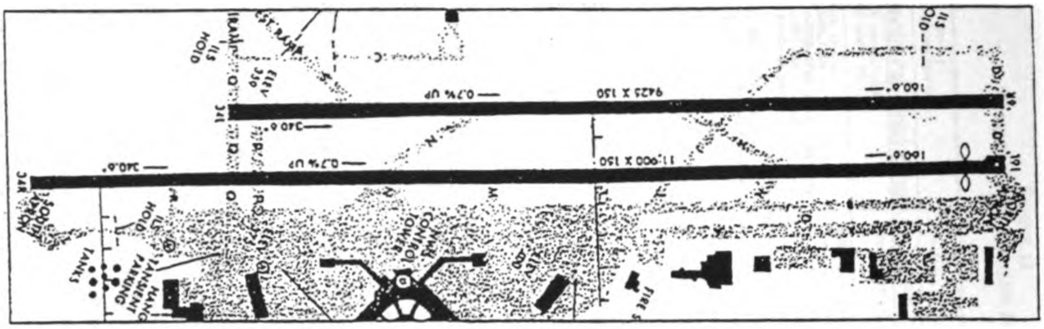
DH80	DeHavilland DASH-8	BA31	British Aerospace Jetstream 31
BE30	Beech Super King Air 300		
CV64	General Dynamics Convair 640	CV60	General Dynamics Convair 600
CV69	General Dynamics Convair	SHD6	Short 360
SW4	Swearingen Merlin (TV/Metro III)	BE20	Beech Super King Air 200

Class 4 - Single-engine and Small Twin-engine Propeller Aircraft

DC30	McDonnell-Douglass DC-3	AC68	Rockwell Int'l Super Commander
BE90	Beech King 90	PA31	Piper Navajo
C172	Cessna Skyhawk 172	C210	Cessna 210
C208	Cessna Caravan I	C310	Cessna 310
C340	Cessna 340	C402	Cessna 402
C404	Cessna Titan		

214

EXHIBIT 5
RUNWAY 16L EXIT UTILIZATION*



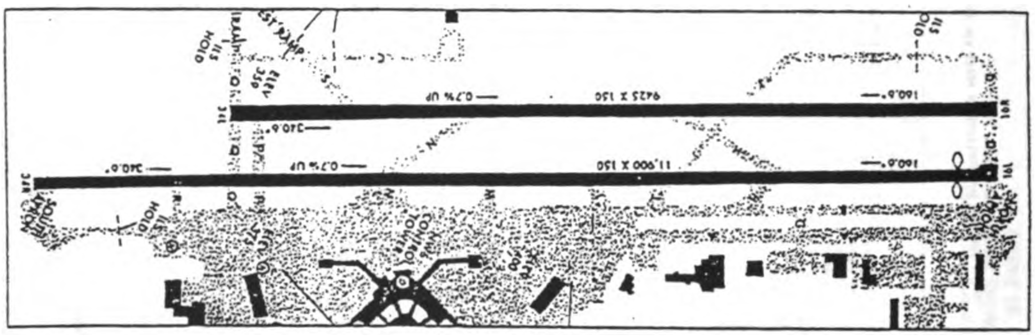
16L	H	J	L	M	N	P
	3100'	4200'	5000'	6500'	7350'	9050'
Class 1				.29/62/ 2	.57/63/ 4	.14/69/ 1
Class 2		.01/35/ 1	.03/44/ 2	.32/59/43	.56/59/43	.08/60/ 6
Class 3		.18/38/ 9	.14/45/ 7	.41/60/20	.27/62/13	
Class 4	.38/30/ 5	.31/44/ 4	.08/53/ 1	.21/55/ 3		

* Proportion of observations / runway occupancy time(sec)/no. of observations

1483

214

EXHIBIT 8
RUNWAY 34R EXIT UTILIZATION*



34R	P	N	M	L	J
	2850'	4550'	5400'	6900'	7700'
Class 1			.09/50/ 2	.77/62/17	.14/65/ 3
Class 2		.21/43/30	.41/50/59	.37/58/53	.02/58/ 3
Class 3	.02/30/ 2	.79/46/72	.12/50/11	.07/66/ 6	
Class 4	.20/34/ 1	.60/56/ 1	.20/56/ 1		

* Proportion of observations / runway occupancy time(sec)/no. of observations

Exhibit 9
VFR Separations

Report FAA-EM-78-8A[1]
At Point of Closest Approach (with missed approach buffer)

A/A (NM)		TRAIL A/C 1 (D)	2 (C)	3 (B)	4 (A)
LEAD A/C	1 (D)	4.27	5.04	4.67	5.49
	2 (C)	3.38	3.21	2.97	3.69
	3 (B)	3.38	3.21	2.97	3.69
	4 (A)	3.38	3.21	2.97	2.89

D/D(MIN)		TRAIL A/C 1 (D)	2 (C)	3 (B)	4 (A)
LEAD A/C	1 (D)	1.50	2.00	2.00	2.00
	2 (C)	1.00	1.00	1.00	0.83
	3 (B)	1.00	1.00	1.00	0.83
	4 (A)	0.85	0.75	0.58	0.58

D/A (NM)		TRAIL A/C 1 (D)	2 (C)	3 (B)	4 (A)
LEAD A/C	1 (D)	1.87	1.64	1.52	1.09
	2 (C)	1.86	1.64	1.52	1.09
	3 (B)	1.86	1.64	1.52	1.09
	4 (A)	1.63	1.42	1.32	0.95

A/D (MIN)		TRAIL A/C 1 (D)	2 (C)	3 (B)	4 (A)
LEAD A/C	1 (D)	BASED ON ROT FROM SEA FIELD DATA MAY 1992			
	2 (C)				
	3 (B)				
	4 (A)				

DATA COLLECTION
Observed Spacings at Threshold
20th percentile of spa[illegible]ngs ≤ 3 minutes)

A/A (NM)		TRA[illegible]L A/C 1 (D)	[illegible] ([illegible])	3 (B)	4 (A)
LEAD A/C	1 (D)	--	3.[illegible] ([illegible])	--	--
	2 (C)	3.44 (25)	[illegible].9 ([illegible].07)	3.16 (118)	2.11 (21)
	3 (B)	3.70 (20)	[illegible].92 (113)	2.76 (75)	--
	4 (A)	--	--	--	--

D/D (MIN)		TRAIL A/C 1 (D)	2 (C)	3 (B)	4 (A
LEAD A/C	1 (D)	--	1.55 (23)	--	--
	2 (C)	--	0.98 (194)	0.82 (158)	--
	3 (B)	0.62 (22)	1.03 (107)	0.88 (68)	--
	4 (A)	--	--	--	--

D/A (NM)		TRAIL A/C 1 (D)	2 (C)	3 (B)	4 (A)
LEAD A/C	1 (D)	--	--	--	--
	2 (C)	--	2.64 (43)	2.35 (26)	
	3 (B)	--	1.96 (35)	1.91 (38)	--
	4 (A)	--	--	--	--

AVG ARR RWY OCCUPANCY TIMES OF LEAD A/C	1 (D)	2 (C)	3 (B)	4 (A)
(MIN)	1.13	0.86	0.81	0.90

[1] As modified to reflect SEA class definitions and approach speeds.

Exhibit 10
IFR Separations

Report FAA-EM-78-8A[1]
At Point of Closest Approach

A/A (NM)		TRAIL A/C 1 (D)	2 (C)	3 (B)	4 (A)
LEAD A/C	1 (D)	5.28	6.16	6.07	6.99
	2 (C)	4.28	4.16	4.07	4.99
	3 (B)	4.28	4.16	4.07	4.99
	4 (A)	4.28	4.16	4.07	3.99

D/D(MIN)		TRAIL A/C 1 (D)	2 (C)	3 (B)	4 (A)
LEAD A/C	1 (D)	1.50	2.00	2.00	2.00
	2 (C)	1.00	1.00	1.00	1.00
	3 (B)	1.00	1.00	1.00	1.00
	4 (A)	1.00	1.00	1.00	1.00

D/A (NM)		TRAIL A/C 1 (D)	2 (C)	3 (B)	4 (A)
LEAD A/C	1 (D)	2.00	2.00	2.00	2.00
	2 (C)	2.00	2.00	2.00	2.00
	3 (B)	2.00	2.00	2.00	2.00
	4 (A)	2.00	2.00	2.00	2.00

A/D (MIN)		TRAIL A/C. 1 (D)	2 (C)	3 (B)	4 (A)
LEAD A/C	1 (D)	BASED ON ROT FROM SEA FIELD DATA MAY 1992			
	2 (C)				
	3 (B)				
	4 (A)				

[1] As modified to reflect SEA class definitions and approach speeds.

Exhibit 11
Weather Definitions and Minima

Wx	Runway Operating Configuration	Ceiling	Visibility	South	North	Total
VFR1	Ind. arr & dep with dual approach streams	> 5000'	> 5 sm			56.1
VFR2	Single Arrival stream with Additional A/C under ceiling	(2500'-4999')	> 3 sm			19.7
IFR1	Single approach stream	(800'-2499')	> 2 sm			17.0
IFR2	One appr. stream-protect glideslope area	N/A	(1800'- 2 sm)			5.4
IFR3	Same as IFR2 - NO arr to the north	N/A	(600'-1799')			1.5
IFR4	Low visibility plan-One runway	N/A	< 600'			0.3
TOTALS						100.0

Source: P & D Aviation - National Weather Service data from SEA-TAC Airport weather station from 1 Jan 82 through 31 Mar 92

Exhibit 12
Length of Common Approach (NM)

VFR	6 nm for classes 1, 2 and 3
	3 nm for class 4
IFR	6 nm for all classes

Agreed to by Design Team on 27 January 1994. Same numbers as used in 1989 Study.

Exhibit 13
Approach Speeds (Knots)

Speed	Class 1	Class 2	Class 3	Class 4
(Knots)	155	140	130	120

Agreed to by Design Team on 27 January 1994.

Exhibit 14
Aircraft Gate Service Times
(Minimum Turn-Around Times)

Class 1 (D)		Class 2 (C)		Class 3 (B)		Class 4 (A)	
Minutes	Cum. Prob.	Minutes	Cum. Prob.	Minutes	Cum. Prob.	Minutes	Cum. Prob.
45	0.12	25	0.25	20	0.25	10	0.40
50	0.31	35	0.59	25	0.59	15	0.80
60	0.43	45	0.80	30	0.80	20	0.90
65	0.55	55	0.89	40	0.89	25	1.00
85	1.00	60	1.00	45	1.00		

Agreed to by Design Team on 27 January 1994. Same numbers as used in 1989 Study.

Exhibit 15
Arrival Aircraft Lateness Distribution

To simulate more realistic conditions, a lateness distribution (arrival variability distribution) is added to the OAG scheduled arrival time. This accounts for any lateness NOT attributable to SEA.

Amount by which actual arrival time at threshold would exceed scheduled arrival time (minutes)	Distribution of aircraft lateness (cumulative %)
-15	4.7%
-2	31.5%
0	52.6%
5	70.3%
10	83.6%
15	94.3%
30	95.9%
45	98.4%
60	100.0%

Agreed to by Design Team on 27 January 1994. Same numbers as used in 1989 Study.

EXHIBIT 16
DEMAND CHARACTERISTICS SEA-TAC

Annual & Daily Demand

Year	Annual Operations	Daily Operations	Equivalent Days
Baseline	345,000	1040	332
Future 1	425,000	1280	332
Future 2	525,000	1581	332

NOTE: (Annual Operations) / (Daily Operations) = Equivalent Days
The 1989-91 SEA Capacity Design Team Study used 331 equivalent days.
Source: Baseline schedule based on 30 August 1993. Agreed to on 27 January 1994.

Fleet Mix

	Class 1	Class 2	Class 3	Class 4
Baseline	8.6%	54.2%	31.3%	5.9%
Future 1	8.6%	54.2%	31.3%	5.9%
Future 2	8.6%	54.2%	31.3%	5.9%

Source: Schedule Supplied by Port of Seattle.
Agreed to on 23 March 1994.

EXHIBIT 16 (con't)
DEMAND CHARACTERISTICS SEA-TAC

	Arrivals(1)	Departures(2)	Totals
00:00 - 00:59	6	6	12
01:00 - 01:59	1	2	3
02:00 - 02:59	0	0	0
03:00 - 03:59	4	0	4
04:00 - 04:59	1	0	1
05:00 - 05:59	8	4	12
06:00 - 06:59	13	24	37
07:00 - 07:59	21	43	64
08:00 - 08:59	20	42	62
09:00 - 09:59	33	21	54
10:00 - 10:59	40	31	71
11:00 - 11:59	38	30	68
12:00 - 12:59	29	38	67
13:00 - 13:59	32	39	71
14:00 - 14:59	26	32	58
15:00 - 15:59	33	26	59
16:00 - 16:59	20	30	50
17:00 - 17:59	32	23	55
18:00 - 18:59	42	34	76
19:00 - 19:59	35	30	65
20:00 - 20:59	33	24	57
21:00 - 21:59	23	16	39
22:00 - 22:59	22	10	32
23:00 - 23:59	8	15	23
TOTALS	520	520	1040

(1) Arrival time is time at 30 nm for SEA-TAC
(2) Departure time is time at push-back from gate

Source: Port of Seattle
Note: The same hourly profile will we maintained in Future1 and Future 2 schedules

214

EXHIBIT 17
DEMAND CHARACTERISTICS BOEING FIELD - IFR

	Baseline			Future 1			Future 2		
	Arr	Dep	Tot	Arr	Dep	Tot	Arr	Dep	Tot
00:00 - 00:59	0	0	0	0	0	0	0	0	0
01:00 - 01:59	0	0	0	0	0	0	0	0	0
02:00 - 02:59	0	0	0	0	0	0	0	0	0
03:00 - 03:59	0	0	0	0	0	0	0	0	0
04:00 - 04:59	0	0	0	0	0	0	0	0	0
05:00 - 05:59	8	6	14	10	7	17	12	9	21
06:00 - 06:59	9	5	14	11	6	17	14	8	22
07:00 - 07:59	8	15	23	10	18	28	12	21	33
08:00 - 08:59	3	7	10	4	9	13	5	11	16
09:00 - 09:59	2	8	10	2	10	12	3	12	15
10:00 - 10:59	2	9	11	2	11	13	3	13	16
11:00 - 11:59	7	5	12	9	6	15	11	8	19
12:00 - 12:59	4	2	6	5	2	7	6	3	9
13:00 - 13:59	4	3	7	5	4	9	6	5	11
14:00 - 14:59	4	2	6	5	2	7	6	3	9
15:00 - 15:59	4	3	7	5	4	9	6	5	11
16:00 - 16:59	9	8	17	11	10	21	13	11	24
17:00 - 17:59	6	4	10	7	5	12	9	6	15
18:00 - 18:59	8	0	8	10	0	10	12	0	12
19:00 - 19:59	1	5	6	1	6	7	2	8	10
20:00 - 20:59	6	3	9	7	4	11	9	5	14
21:00 - 21:59	4	3	7	5	4	9	6	5	11
22:00 - 22:59	0	1	1	0	1	1	0	2	2
23:00 - 23:59	0	0	0	0	0	0	0	0	0
TOTALS	89	89	178	109	109	218	135	135	270

Source: ?

214

EXHIBIT 18
CLASS 1 OPERATING COSTS

Airline	A/C	#	Class	Cost/Hr	Tot Cost	
Airborne Express	DC8	1	1	$ 4,108	$ 4,108	Industry Average
American	B767	4	1	$ 2,672	$ 10,688	
American	DC10	3	1	$ 3,961	$ 11,883	
American	MD11	2	1	$ 3,563	$ 7,126	
British Airways	B767	2	1	$ 2,949	$ 5,898	Industry Average
China Eastern	MD11	2	1	$ 4,491	$ 8,982	AA,DL
Continental	EA30	9	1	$ 2,686	$ 24,174	
Delta	B767	8	1	$ 2,748	$ 21,984	
Delta	L101	5	1	$ 3,531	$ 17,653	
Emory	DC8S	1	1	$ 3,954	$ 3,954	DHL
Federal Express	DC10	3	1	$ 6,946	$ 20,837	
Hawaiian	L101	1	1	$ 3,495	$ 3,495	Industry Average
Martinair	DC10	1	1	$ 4,339	$ 4,339	Industry Average
Northwest	B747	9	1	$ 5,575	$ 50,171	
Northwest	DC10	9	1	$ 3,914	$ 35,222	
Scandinavian	B767	2	1	$ 2,949	$ 5,898	Industry Average
TWA	L101	4	1	$ 3,424	$ 13,696	
U.S. Air Transit	DC8S	2	1	$ 4,108	$ 8,216	Industry Average
United	B767	2	1	$ 2,892	$ 5,783	
United	DC10	19	1	$ 5,142	$ 97,689	
		89			$ 361,772	Wt. Avg = $ 4,064.85

214

Exhibit 19
Class 2 Operating Costs

Airline	A/C	#	Class	Cost/Hr	Tot Cost	
Airborne Express	DC9	1	2	$ 1,682	$ 1,682	Industry Average
Alaska Airlines	B727	30	2	$ 1,996	$ 59,880	
Alaska Airlines	B734	39	2	$ 1,948	$ 75,972	
Alaska Airlines	MD80	99	2	$ 1,701	$ 168,399	
America West	B73S	6	2	$ 1,513	$ 9,078	
America West	EA32	10	2	$ 1,924	$ 19,240	
American	B727	4	2	$ 2,021	$ 8,084	
American	B73S	1	2	$ 1,704	$ 1,704	Industry Average
American	B757	6	2	$ 2,105	$ 12,630	
American	MD80	16	2	$ 1,778	$ 28,448	
Continental	B73S	2	2	$ 1,541	$ 3,081	
Continental	MD80	16	2	$ 1,757	$ 28,112	
Delta	B727	17	2	$ 2,121	$ 36,057	
Delta	B757	22	2	$ 2,275	$ 50,050	
Great American	DC9	1	2	$ 1,682	$ 1,682	Industry Average
Horizon	FK28	33	2	$ 1,523	$ 50,259	
Markair	B73F	26	2	$ 1,589	$ 41,314	
Morris	B73S	35	2	$ 1,704	$ 59,640	Industry Average
Northwest	B727	4	2	$ 2,179	$ 8,716	
Northwest	B757	19	2	$ 1,777	$ 33,763	
Northwest	EA32	6	2	$ 1,742	$ 10,452	
Reno	MD82	19	2	$ 1,796	$ 34,124	Industry Average
Ryan Int'l	B727	1	2	$ 2,217	$ 2,217	Industry Average
Sun Country	B727	2	2	$ 2,217	$ 4,434	Industry Average
TWA	MD80	12	2	$ 1,733	$ 20,796	
United	B727	26	2	$ 2,767	$ 71,942	
United	B737	70	2	$ 1,765	$ 123,550	
United	B757	22	2	$ 2,535	$ 55,770	
USAir	B73S	13	2	$ 2,073	$ 26,949	
USAir	B757	4	2	$ 2,424	$ 9,696	
Viscount Air	B737	2	2	$ 1,924	$ 3,848	Industry Average
		564			$1,061,569	Wt. Avg = $1,882.21

214

Exhibit 20
Class 3 Operating Costs

Airline	A/C	#	Class	Cost/Hr	Tot Cost	
Air BC	DH8	11	3	$ 812	$ 8,932	Horizon
Alaska Airlines	DH8	13	3	$ 812	$ 10,556	Horizon
Horizon	DH8	145	3	$ 812	$ 117,740	
Horizon	SW3	59	3	$ 490	$ 28,910	
United	J31	2	3	$ 476	$ 952	Trans State Air
West Air/United Ex.	BA31	86	3	$ 476	$ 40,936	Trans State Air
		316			$ 208,026	Wt. Avg = $ 658.31

Exhibit 21
Class 4 Operating Costs

Airline	A/C	#	Class	Cost/Hr	Tot Cost	
Atlantic Aero	C208	1	4	$ 571	$ 571	Fed Ex
Empire Air	C208	5	4	$ 571	$ 2,855	Fed Ex
Airpac	PA31	1	4	$ 666	$ 666	HNTB - 7/15/93 data (airline)
Awood Air	PA31	4	4	$ 463	$ 1,850	HNTB - 7/15/93 BE1 data (airline)
Harbor	PA31	37	4	$ 463	$ 17,116	HNTB - 7/15/93 BE1 data (airline)
		48			$ 23,059	Wt. Avg = $ 480.39

EXHIBIT 22

SUMMARY OF AIRCRAFT IN SCHEDULE WITHOUT FORM 41 OPERATING COSTS

Airline	A/C	#	Class
Awood Air	SW4	1	3
Horizon	SW4	2	3
Time Air	SDH6	6	3
Viking Int'l	CV64	1	3
Airpac	C404	2	4
Alaska Airlines	BE90	1	4
Atlantic Aero	C172	1	4
Horizon	BE90	1	4
Sal Air	DC3	4	4
Time Air	C402	1	4
Western	C172	3	4

EXHIBIT 23

SUMMARY OF AIRCRAFT OPERATING COSTS

	%	Wt Cost/Class	
Class 1	8.6	$4,064.65	$ 350
Class 2	54.2	$1,882.21	$ 1,020
Class 3	31.3	$ 658.31	$ 206
Class 4	5.9	$ 480.39	$ 28
Weighted Cost per Aircraft / Hr			$ 1,604

III. Summary of SIMMOD Results

Exhibits 24 through 35 provide summaries of the average arrival and departure delays; travel time offsets; and total savings (in hours per year) for Basecase 2000 and each improvement. Exhibits 36 through 47 provide additional information summarizing the delays in each weather condition. Exhibit 48 summarizes the savings in hours per year and dollars per year for each improvement.

It should be noted that results for Experiment #8 (Modified Full Use Runway) do not reflect all of the implications of restricting runway 16X to non-heavy jets. There are considerable complications in controlling traffic to a limited use runway that can not be fully modeled. It is felt that these simulation results underestimate the delays associated with this type of runway.

214

Alternative: Basecase - #1

Demand : Baseline - 1040 ops/day - 345,000 ops/yr

Configuration	Exp. #	% of Ops Arr	% of Ops Dep	Travel Time Arr	Travel Time Dep
South VFR1	0SV100	28.0%	27.2%	17.4	14.5
South VFR2	0SV200	15.1%	15.4%	17.6	14.6
South IFR1	0SI100	12.9%	13.8%	17.6	14.6
South IFR2	0SI200	3.3%	3.5%	17.6	14.6
South IFR3	0SI200	0.7%	0.8%	17.6	14.6
South IFR4	0SI400	0.1%	0.1%	17.6	15.0
North VFR1	0SV100	30.1%	29.0%	17.4	14.5
North VFR2	0SV200	4.2%	4.3%	17.6	14.6
North IFR1	0SI100	2.6%	2.8%	17.6	14.6
North IFR2	0SI200	2.0%	2.1%	17.6	14.6
North IFR3	0SI200	0.8%	0.9%	17.6	14.6
North IFR4	0SI400	0.1%	0.1%	17.6	15.0

	Arr	Dep	Tot
Delay	7.67	1.32	4.50
Trav. Time	17.47	14.54	16.01

Total Delay (Hours per Year)
25,867

Travel Time Offset
0

Demand: Future 1 - 1280 ops/day - 425,000 ops/yr

Configuration	Exp. #	% of Ops Arr	% of Ops Dep	Travel Time Arr	Travel Time Dep
South VFR1	1SV100	29.5%	27.8%	17.4	14.4
South VFR2	1SV200	14.4%	15.1%	17.6	14.5
South IFR1	1SI100	12.3%	13.5%	17.6	14.5
South IFR2	1SI200	3.1%	3.4%	17.6	14.5
South IFR3	1SI200	0.7%	0.8%	17.6	14.5
South IFR4	1SI400	0.1%	0.1%	17.6	14.9
North VFR1	1SV100	30.8%	29.4%	17.4	14.4
North VFR2	1SV200	4.0%	4.2%	17.6	14.5
North IFR1	1SI100	2.4%	2.7%	17.6	14.5
North IFR2	1SI200	1.9%	2.1%	17.6	14.5
North IFR3	1SI200	0.7%	0.9%	17.6	14.5
North IFR4	1SI400	0.1%	0.1%	17.6	14.9

	Arr	Dep	Tot
Delay	28.59	2.61	15.60
Trav. Time	17.49	14.46	15.99

Total Delay (Hours per Year)
110,490

Travel Time Offset
0

Demand: Future 2 - 1581 ops/day - 525,000 ops/yr

Configuration	Exp. #	% of Ops Arr	% of Ops Dep	Travel Time Arr	Travel Time Dep
South VFR1	2SV100	31.8%	30.1%	17.5	14.4
South VFR2	2SV200	3.6%	4.1%	17.6	14.5
South IFR1	2SI100	2.3%	2.6%	17.7	14.5
South IFR2	2SI200	1.8%	2.0%	17.7	14.5
South IFR3	2SI200	0.7%	0.8%	17.7	14.5
South IFR4	2SI400	0.1%	0.1%	17.8	14.9
North VFR1	2SV100	31.3%	28.1%	17.5	14.4
North VFR2	2SV200	13.0%	14.8%	17.6	14.5
North IFR1	2SI100	11.8%	13.4%	17.7	14.5
North IFR2	2SI200	2.9%	3.2%	17.7	14.5
North IFR3	2SI200	0.7%	0.8%	17.7	14.5
North IFR4	2SI400	0.1%	0.1%	17.8	14.9

	Arr	Dep	Tot
Delay	70.05	11.79	40.92
Trav. Time	17.53	14.45	15.99

Total Delay (Hours per Year)
357,976

Travel Time Offset
0

214

EXHIBIT 25

Average Delay per Operation Computation

Basecase - #1

Weather		Baseline Exp.	%	Del.	Prop.	Future 1 Exp.	%	Del.	Prop.	Future 2 Exp.	%	Del.	Prop.
South	VFR1	0SV100	27.6%	1.26	0.34	1SV100	28.7%	2.21	0.63	2SV100	31.0%	9.11	2.82
	VFR2	0SV200	15.3%	6.33	0.97	1SV200	14.8%	33.10	4.89	2SV200	3.9%	98.42	3.72
	IFR1	0SI100	13.4%	11.36	1.52	1SI100	12.9%	61.26	8.01	2SI100	2.4%	111.12	2.70
	IFR2	0SI200	3.4%	11.94	0.40	1SI200	3.2%	52.66	1.69	2SI200	1.8%	118.13	2.14
	IFR3	0SI200	0.9%	11.94	0.09	1SI200	0.8%	52.55	0.39	2SI200	0.8%	118.13	0.88
	IFR4	0SI400	0.1%	252.85	0.24	1SI400	0.1%	379.94	0.33	2SI400	0.1%	711.89	0.61
North	VFR1	0SV100	29.6%	1.26	0.37	1SV100	30.1%	2.21	0.67	2SV100	28.7%	9.11	2.71
	VFR2	0SV200	4.3%	6.33	0.27	1SV200	4.1%	33.10	1.36	2SV200	13.9%	98.42	13.42
	IFR1	0SI100	2.7%	11.38	0.31	1SI100	2.5%	61.26	1.30	2SI100	12.6%	111.12	13.99
	IFR2	0SI200	2.1%	11.94	0.24	1SI200	2.0%	52.66	1.03	2SI200	3.0%	118.13	3.51
	IFR3	0SI200	0.8%	11.94	0.10	1SI200	0.8%	52.55	0.42	2SI200	0.7%	115.13	0.81
	IFR4	0SI400	0.1%	252.65	0.25	1SI400	0.1%	379.94	0.34	2SI400	0.1%	711.89	0.58
Weighted Avg Delay (Min per Operation)					5.11				19.66				47.89
Computed Avg Delay (Min per Operation)*					4.60				15.60				40.92
IFR Factor					0.88				0.78				0.84

* Based on 10 year weather history

214

Alternative: Class 3&4 Runway 1500' from 16L/34R - #2

Demand : Baseline - 1040 ops/day - 345,000 ops/yr

Configuration	Exp. #	% of Ops Arr	% of Ops Dep	Travel Time Arr	Travel Time Dep
South VFR1	0SV100	27.7%	27.1%	17.4	14.5
South VFR2	0SV202	15.7%	15.5%	17.6	14.5
South IFR1	0SI100	12.8%	13.8%	17.6	14.6
South IFR2	0SI200	3.2%	3.5%	17.6	14.6
South IFR3	0SI200	0.7%	0.8%	17.6	14.6
South IFR4	0SI400	0.1%	0.1%	17.6	15.0
North VFR1	0SV100	29.9%	29.0%	17.4	14.5
North VFR2	0SV202	4.4%	4.3%	17.6	14.5
North IFR1	0SI100	2.6%	2.8%	17.6	14.6
North IFR2	0SI200	2.0%	2.1%	17.6	14.6
North IFR3	0SI200	0.8%	0.9%	17.6	14.6
North IFR4	0SI400	0.1%	0.1%	17.6	15.0

	Arr	Dep	Tot
Delay	5.61	[illegible]28	3.55
Trav. Time	17.47	[illegible].52	16.00

Total Delay (Hours per Year)
20,400

Travel Time Offset (Hours per Year)
-64

Total Savings (Hours per Year)
5,531

Demand: Future 1 - 1280 ops/day - 425,000 ops/yr

Configuration	Exp. #	% of Ops Arr	% of Ops Dep	Travel Time Arr	Travel Time Dep
South VFR1	1SV100	28.5%	28.7%	17.4	14.4
South VFR2	1SV202	15.9%	12.0%	17.9	14.4
South IFR1	1SI100	11.9%	14.0%	17.6	14.5
South IFR2	1SI200	3.0%	3.5%	17.6	14.5
South IFR3	1SI200	0.7%	0.8%	17.6	14.5
South IFR4	1SI400	0.1%	0.1%	17.6	14.9
North VFR1	1SV100	30.4%	30.5%	17.4	14.4
North VFR2	1SV202	4.5%	4.5%	17.9	14.4
North IFR1	1SI100	2.3%	2.8%	17.6	14.5
North IFR2	1SI200	1.8%	2.1%	17.6	14.5
North IFR3	1SI200	0.7%	0.9%	17.6	14.5
North IFR4	1SI400	0.1%	0.1%	17.6	14.9

	Arr	Dep	Tot
Delay	19.35	2.54	10.95
Trav. Time	17.57	14.46	16.01

Total Delay (Hours per Year)
77,520

Travel Time Offset (Hours per Year)
194

Total Savings (Hours per Year)
32,775

Demand: Future 2 - 1581 ops/day - 525,000 ops/yr

Configuration	Exp. #	% of Ops Arr	% of Ops Dep	Travel Time Arr	Travel Time Dep
South VFR1	2SV102	30.0%	28.2%	17.7	14.4
South VFR2	2SV202	15.4%	15.5%	17.4	14.8
South IFR1	2SI100	11.0%	12.9%	17.7	14.5
South IFR2	2SI200	2.8%	3.1%	17.7	14.5
South IFR3	2SI200	0.6%	0.7%	17.7	14.5
South IFR4	2SI400	0.1%	0.1%	17.6	14.9
North VFR1	2SV102	31.2%	29.8%	17.7	14.4
North VFR2	2SV202	4.3%	4.3%	17.4	14.8
North IFR1	2SI100	2.1%	2.5%	17.7	14.5
North IFR2	2SI200	1.7%	1.9%	17.7	14.5
North IFR3	2SI200	0.7%	0.8%	17.7	14.5
North IFR4	2SI400	0.1%	0.1%	17.6	14.9

	Arr	Dep	Tot
Delay	45.30	4.93	25.12
Trav. Time	17.61	14.51	16.06

Total Delay (Hours per Year)
219,711

Travel Time Offset
636

Total Savings (Hours per Year)
137,629

214

EXHIBIT 27

Average Delay per Operation Computation

Class 3&4 Runway 1500' from 16L/34R - #2

		Baseline				Future 1				Future 2			
Weather		Exp.	%	Del.	Prop.	Exp.	%	Del.	Prop.	Exp.	%	Del.	Prop.
South	VFR1	0SV100	27.4%	1.25	0.34	1SV100	28.6%	2.21	0.63	2SV102	29.1%	3.24	0.95
	VFR2	0SV202	18.8%	1.67	0.28	1SV202	13.9%	4.41	0.61	2SV202	15.4%	21.68	3.34
	IFR1	0SI100	13.3%	11.38	1.51	1SI100	12.9%	51.28	6.63	2SI100	12.0%	111.12	13.30
	IFR2	0SI200	3.4%	11.94	0.40	1SI200	3.3%	52.55	1.71	2SI200	2.9%	115.13	3.39
	IFR3	0SI200	0.8%	11.94	0.09	1SI200	0.8%	52.55	0.40	2SI200	0.7%	116.13	0.78
	IFR4	0SI400	0.1%	252.95	0.24	1SI400	0.1%	379.94	0.34	2SI400	0.1%	711.89	0.57
North	VFR1	0SV100	29.5%	1.25	0.37	1SV100	30.8%	2.21	0.67	2SV102	30.5%	3.24	0.99
	VFR2	0SV202	4.3%	1.67	0.07	1SV202	4.6%	4.41	0.20	2SV202	4.3%	21.66	0.93
	IFR1	0SI100	2.7%	11.38	0.31	1SI100	2.6%	51.28	1.31	2SI100	2.3%	111.12	2.60
	IFR2	0SI200	2.0%	11.94	0.24	1SI200	2.0%	52.55	1.04	2SI200	1.8%	115.13	2.07
	IFR3	0SI200	0.8%	11.94	0.10	1SI200	0.8%	52.55	0.43	2SI200	0.7%	115.13	0.85
	IFR4	0SI400	0.1%	252.85	0.25	1SI400	0.1%	379.94	0.34	2SI400	0.1%	711.89	0.59
Weighted Avg Delay (Min per Operation)					4.19				14.32				30.37
Computed Avg Delay (Min per Operation)*					3.55				10.95				25.12
IFR Factor					0.82				0.74				0.82

* Based on 10 year weather history

214

Alternative: Class 3&4 Runway 2500' from 16L/34R - #3

Demand : Baseline - 1040 ops/day - 345,000 ops/yr

Configuration	Exp. #	% of Ops Arr	% of Ops Dep	Travel Time Arr	Travel Time Dep
South VFR1	0SV100	27.4%	27.0%	17.4	14.5
South VFR2	0SV203	15.3%	15.4%	17.7	14.5
South IFR1	0SI103	13.5%	14.0%	17.4	14.9
South IFR2	0SI200	3.2%	3.5%	17.6	14.6
South IFR3	0SI200	0.7%	0.8%	17.6	14.6
South IFR4	0SI400	0.1%	0.1%	17.6	15.0
North VFR1	0SV100	29.8%	28.9%	17.4	14.5
North VFR2	0SV203B	4.3%	4.3%	17.7	14.5
North IFR1	0SI103B	2.8%	2.8%	17.4	14.9
North IFR2	0SI200	1.9%	2.1%	17.6	14.6
North IFR3	0SI200	0.8%	0.9%	17.6	14.6
North IFR4	0SI400	0.1%	0.1%	17.6	15.0

	Arr	Dep	Tot
Delay	3.32	1.32	2.32
Trav. Time	17.47	14.66	16.03

Total Delay (Hours per Year)
13,351

Travel Time Offset (Hours per Year)
[illegible]

Total Savings (Hours per Year)
12,416

Demand: Future 1 - 1280 ops/day - 425,000 ops/yr

Configuration	Exp. #	% of Ops Arr	% of Ops Dep	Travel Time Arr	Travel Time Dep
South VFR1	1SV100	27.8%	27.2%	17.4	14.4
South VFR2	1SV203	15.3%	15.5%	18.1	14.4
South IFR1	1SI103	13.5%	14.0%	17.4	14.9
South IFR2	1SI200	2.9%	3.3%	17.6	14.5
South IFR3	1SI200	0.7%	0.8%	17.6	14.5
South IFR4	1SI400	0.1%	0.1%	17.6	14.9
North VFR1	1SV100	30.1%	29.1%	17.4	14.4
North VFR2	1SV203B	4.3%	4.3%	18.1	14.4
North IFR1	1SI103B	2.8%	2.8%	17.4	14.9
North IFR2	1SI200	1.8%	2.0%	17.6	14.5
North IFR3	1SI200	0.7%	0.9%	17.6	14.5
North IFR4	1SI400	0.1%	0.1%	17.6	14.9

	Arr	Dep	Tot
Delay	9.21	2.84	5.93
Trav. Time	17.56	14.52	16.04

Total Delay (Hours per Year)
41,965

Travel Time Offset (Hours per Year)
379

Total Savings (Hours per Year)
68,145

Demand: Future 2 - 1581 ops/day - 525,000 ops/yr

Configuration	Exp. #	% of Ops Arr	% of Ops Dep	Travel Time Arr	Travel Time Dep
South VFR1	2SV103	28.9%	27.7%	17.8	14.4
South VFR2	2SV203	14.7%	15.8%	17.9	14.5
South IFR1	2SI103	13.2%	13.5%	17.9	14.5
South IFR2	2SI200	2.6%	3.1%	17.7	14.5
South IFR3	2SI200	0.6%	0.7%	17.7	14.5
South IFR4	2SI400	0.1%	0.1%	17.6	14.9
North VFR1	2SV103B	30.7%	29.5%	17.8	14.4
North VFR2	2SV203B	4.2%	4.3%	17.9	14.5
North IFR1	2SI103B	2.7%	2.7%	17.9	14.5
North IFR2	2SI200	1.6%	1.9%	17.7	14.5
North IFR3	2SI200	0.7%	0.8%	17.7	14.5
North IFR4	2SI400	0.1%	0.1%	17.6	14.9

	Arr	Dep	Tot
Delay	24.57	5.67	15.12
Trav. Time	17.80	14.45	16.13

Total Delay (Hours per Year)
132,273

Travel Time Offset
1,215

Total Savings (Hours per Year)
224,488

214

EXHIBIT 29

Average Delay per Operation Computation

Class 3&4 Runway 2500' from 16L/34R - #3

		Baseline				Future 1				Future 2			
Weather		Exp.	%	Del.	Prop.	Exp.	%	Del.	Prop.	Exp.	%	Del.	Prop.
South	VFR1	0SV100	27.2%	1.25	0.34	1SV100	27.5%	2.21	0.61	2SV103	28.3%	3.20	0.91
	VFR2	0SV203	15.4%	1.60	0.25	1SV203	15.4%	4.53	0.70	2SV203	15.2%	21.17	3.21
	IFR1	0SI103	13.7%	1.68	0.23	1SI103	13.7%	4.79	0.66	2SI103	13.4%	24.24	3.24
	IFR2	0SI200	3.3%	11.94	0.40	1SI200	3.1%	52.55	1.63	2SI200	2.8%	116.13	3.27
	IFR3	0SI200	0.8%	11.94	0.09	1SI200	0.7%	52.55	0.39	2SI200	0.7%	116.13	0.78
	IFR4	0SI400	0.1%	252.85	0.24	1SI400	0.1%	379.84	0.33	2SI400	0.1%	711.89	0.58
North	VFR1	0SV100	29.4%	1.25	0.37	1SV100	29.6%	2.21	0.65	2SV103B	30.1%	3.15	0.96
	VFR2	0SV203B	4.3%	1.52	0.07	1SV203B	4.3%	4.34	0.19	2SV203B	4.2%	20.85	0.89
	IFR1	0SI103B	2.8%	1.54	0.04	1SI103B	2.8%	4.55	0.13	2SI103B	2.7%	24.50	0.66
	IFR2	0SI200	2.0%	11.94	0.24	1SI200	1.9%	52.55	1.00	2SI200	1.7%	116.13	2.00
	IFR3	0SI200	0.8%	11.39	0.09	1SI200	0.8%	52.55	0.42	2SI200	0.7%	116.13	0.84
	IFR4	0SI400	0.1%	252.85	0.25	1SI400	0.1%	379.84	0.33	2SI400	0.1%	711.89	0.57
Weighted Avg Delay (Min per Operation)					2.60				7.02				17.68
Computed Avg Delay (Min per Operation)*					2.32				5.93				15.12
IFR Factor					0.89				0.81				0.83

* Based on 10 year weather history

214

Alternative: Full Use Runway 2500' from 16L/34R VFR Arrivals on 16R - #5

Demand : Baseline - 1040 ops/day - 345,000 ops/yr

Configuration	Exp. #	% of Ops Arr	% of Ops Dep	Travel Time Arr	Travel Time Dep
South VFR1	0SV100	27.3%	27.0%	17.4	14.5
South VFR2	0SV205	15.3%	15.4%	17.6	14.9
South IFR1	0SI105	13.4%	14.1%	17.6	14.9
South IFR2	0SI205	3.2%	3.3%	18.4	14.8
South IFR3	0SI205	0.8%	0.8%	18.4	14.8
South IFR4	0SI405	0.1%	0.2%	18.7	14.5
North VFR1	0SV100	29.8%	28.9%	17.4	14.5
North VFR2	0SV205B	4.3%	4.3%	17.6	14.9
North IFR1	0SI105B	2.7%	2.8%	17.6	14.9
North IFR2	0NI205B	2.1%	2.2%	17.6	14.9
North IFR3	0SI205	0.8%	0.8%	18.4	14.8
North IFR4	0SI405	0.1%	0.2%	18.7	14.5

	Arr	Dep	Tot
Delay	1.95	1.82	1.79
Trav. Time	17.54	14.69	16.11

Total Delay (Hours [illegible] Year)
10,272.08

Travel Time Offset (Hours per Year)
606.[illegible]

Total Savings (Hours per Year)
14,968.35

Demand: Future 1 - 1280 ops/day - 425,000 ops/yr

Configuration	Exp. #	% of Ops Arr	% of Ops Dep	Travel Time Arr	Travel Time Dep
South VFR1	1SV100	27.4%	27.0%	17.4	14.4
South VFR2	1SV205	15.4%	15.5%	17.7	14.9
South IFR1	1SI105	13.6%	14.1%	17.7	14.9
South IFR2	1SI205	2.9%	3.2%	19.3	14.7
South IFR3	1SI205	0.7%	0.8%	19.3	14.7
South IFR4	1SI405	0.1%	0.2%	18.7	14.4
North VFR1	1SV100	29.8%	28.9%	17.4	14.4
North VFR2	1SV205B	4.3%	4.3%	17.7	14.9
North IFR1	1SI105B	2.8%	2.9%	17.7	14.9
North IFR2	1NI205B	2.2%	2.2%	17.7	14.9
North IFR3	1SI205	0.7%	0.8%	19.3	14.7
North IFR4	1SI405	0.1%	0.2%	18.7	14.4

	Arr	Dep	Tot
Delay	4.73	2.91	3.82
Trav. Time	17.61	14.63	16.12

Total Delay (Hours per Year)
27,055.79

Travel Time Offset (Hours per Year)
954.95

Total Savings (Hours per Year)
82,478.86

Demand: Future 2 - 1581 ops/day - 525,000 ops/yr

Configuration	Exp. #	% of Ops Arr	% of Ops Dep	Travel Time Arr	Travel Time Dep
South VFR1	2SV105	27.9%	27.4%	18.1	14.4
South VFR2	2SV205	15.4%	15.5%	17.8	14.8
South IFR1	2SI105	13.6%	13.8%	17.8	14.9
South IFR2	2SI405	2.3%	3.1%	18.8	14.4
South IFR3	2SI405	0.5%	0.7%	18.8	14.4
South IFR4	2SI405	0.1%	0.1%	18.8	14.4
North VFR1	2SV105B	30.1%	29.2%	18.1	14.4
North VFR2	2SV205B	4.4%	4.4%	17.8	14.7
North IFR1	2SI105B	2.8%	2.8%	17.8	14.9
North IFR2	2NI205B	2.1%	2.0%	17.8	14.8
North IFR3	2SI405	0.6%	0.8%	18.8	14.4
North IFR4	2SI405	0.1%	0.1%	18.8	14.4

	Arr	Dep	Tot
Delay	13.31	3.24	8.28
Trav. Time	18.00	14.56	16.28

Total Delay (Hours per Year)
72,391.36

Travel Time Offset
2,505.18

Total Savings (Hours per Year)
283,079.81

214

EXHIBIT 31

Average Delay per Operation Computation

Full Use Runway 2500' from 16L/34R - #5

Weather		Baseline Exp.	Baseline %	Baseline Del.	Baseline Prop.	Future 1 Exp.	Future 1 %	Future 1 Del.	Future 1 Prop.	Future 2 Exp.	Future 2 %	Future 2 Del.	Future 2 Prop.
South	VFR1	0SV100	27.1%	1.26	0.34	1SV100	27.2%	2.21	0.60	2SV105	27.6%	2.84	0.70
	VFR2	0SV205	15.4%	1.42	0.22	1SV205	15.4%	2.33	0.36	2SV205	15.5%	5.31	0.82
	IFR1	0SI105	13.8%	1.11	0.15	1SI105	13.8%	2.61	0.39	2SI105	13.7%	7.68	1.05
	IFR2	0SI205	3.3%	10.08	0.33	1SI205	3.0%	48.53	1.80	2SI405	2.7%	141.70	3.87
	IFR3	0SI205	0.8%	10.08	0.08	1SI205	0.7%	48.53	0.38	2SI405	0.6%	141.70	0.88
	IFR4	0SI405	0.1%	22.84	0.03	1SI405	0.1%	67.88	0.09	2SI405	0.1%	141.70	0.18
North	VFR1	0SV100	29.3%	1.26	0.37	1SV100	29.4%	2.21	0.65	2SV105B	28.7%	2.31	0.68
	VFR2	0SV205B	4.3%	1.31	0.06	1SV205B	4.3%	2.21	0.10	2SV205B	4.4%	3.67	0.16
	IFR1	0SI105B	2.8%	1.39	0.04	1SI105B	2.8%	2.19	0.06	2SI105B	2.8%	5.68	0.16
	IFR2	0NI205B	2.2%	1.72	0.04	1NI205B	2.2%	3.70	0.08	2NI205B	2.0%	23.39	0.47
	IFR3	0SI205	0.8%	10.08	0.06	1SI205	0.6%	48.53	0.37	2SI405	0.7%	141.70	0.99
	IFR4	0SI405	0.2%	22.84	0.03	1SI405	0.1%	67.88	0.10	2SI405	0.1%	141.70	0.18
Weighted Avg Delay (Min per Operation)					1.76				4.63				10.17
Computed Avg Delay (Min per Operation)*					1.79				3.82				8.28
IFR Factor					1.02				0.76				0.78

* Based on 10 year weather history

214

Alternative: - #5 (North Flow Preferred in VFR1 and VFR2)

Demand : Baseline - 1040 ops/day - 345,000 ops/yr

Configuration	Exp. #	% of Ops Arr	% of Ops Dep	Travel Time Arr	Travel Time Dep
South VFR1	0SV100	21.4%	21.3%	17.4	14.5
South VFR2	0SV205	8.9%	9.1%	17.6	14.9
South IFR1	0SI105	13.4%	14.1%	17.6	14.9
South IFR2	0SI205	3.2%	3.3%	18.4	14.8
South IFR3	0SI205	0.8%	0.8%	18.4	14.8
South IFR4	0SI405	0.1%	0.2%	18.7	14.5
North VFR1	0SV100	35.6%	34.6%	17.4	14.5
North VFR2	0SV205B	10.7%	10.6%	17.6	14.9
North IFR1	0SI105B	2.7%	2.8%	17.6	14.9
North IFR2	0NI205B	2.1%	2.2%	17.6	14.9
North IFR3	0SI205	0.8%	0.8%	18.4	14.8
North IFR4	0SI405	0.1%	0.2%	18.7	14.5

	Arr	Dep	Tot
Delay	1.95	1.62	1.79
Trav. Time	17.54	14.89	16.11

Total Delay (Hours per Year)
10,272

Travel Time Offset (Hours per Year)
606

Total Savings (Hours per Year)
14,990

Demand: Future 1 - 1280 ops/day - 425,000 ops/yr

Configuration	Exp. #	% of Ops Arr	% of Ops Dep	Travel Time Arr	Travel Time Dep
South VFR1	1SV100	21.5%	21.3%	17.4	14.4
South VFR2	1SV205	8.9%	9.2%	17.7	14.9
South IFR1	1SI105	13.6%	14.1%	17.7	14.9
South IFR2	1SI205	2.9%	3.2%	19.3	14.7
South IFR3	1SI205	0.7%	0.8%	19.3	14.7
South IFR4	1SI405	0.1%	0.2%	18.7	14.4
North VFR1	1SV100	35.8%	34.7%	17.4	14.4
North VFR2	1SV205B	10.9%	10.6%	17.7	14.9
North IFR1	1SI105B	2.8%	2.9%	17.7	14.9
North IFR2	1NI205B	2.1%	2.2%	17.7	14.9
North IFR3	1SI205	0.7%	0.8%	19.3	14.7
North IFR4	1SI405	0.1%	0.2%	18.7	14.4

	Arr	Dep	Tot
Delay	4.69	2.91	3.60
Trav. Time	17.61	14.83	16.12

Total Delay (Hours per Year)
26,914

Travel Time Offset (Hours per Year)
955

Total Savings (Hours per Year)
82,620

Demand: Future 2 - 1581 ops/day - 525,000 ops/yr

Configuration	Exp. #	% of Ops Arr	% of Ops Dep	Travel Time Arr	Travel Time Dep
South VFR1	2SV105	21.7%	21.5%	18.1	14.4
South VFR2	2SV205	8.8%	9.2%	17.8	14.8
South IFR1	2SI105	13.5%	13.8%	17.8	14.9
South IFR2	2SI405	2.3%	3.1%	18.8	14.4
South IFR3	2SI405	0.5%	0.7%	18.8	14.4
South IFR4	2SI405	0.1%	0.1%	18.8	14.4
North VFR1	2SV105B	36.3%	35.0%	18.1	14.4
North VFR2	2SV205B	11.1%	10.8%	17.8	14.7
North IFR1	2SI105B	2.8%	2.8%	17.8	14.9
North IFR2	2NI205B	2.1%	2.0%	17.8	14.8
North IFR3	2SI405	0.6%	0.8%	18.8	14.4
North IFR4	2SI405	0.1%	0.1%	18.8	14.4

	Arr	Dep	Tot
Delay	12.91	3.24	8.08
Trav. Time	18.00	14.56	16.26

Total Delay (Hours per Year)
70,642

Travel Time Offset
2,520

Total Savings (Hours per Year)
284,815

214

EXHIBIT 33

Average Delay per Operation Computation

- #5 (North Flow Preferred)

		Baseline				Future 1				Future 2			
Weather		Exp.	%	Del.	Prop.	Exp.	%	Del.	Prop.	Exp.	%	Del.	Prop.
South	VFR1	0SV100	21.4%	1.25	0.27	1SV100	21.4%	2.21	0.47	2SV105	21.6%	2.54	0.56
	VFR2	0SV205	9.0%	1.42	0.13	1SV205	8.0%	2.33	0.21	2SV205	8.0%	5.31	0.48
	IFR1	0SI105	13.8%	1.11	0.15	1SI105	13.5%	2.01	0.38	2SI105	13.7%	7.88	1.06
	IFR2	0SI205	3.3%	10.08	0.33	1SI205	3.0%	48.53	1.60	2SI405	2.7%	141.70	3.87
	IFR3	0SI205	0.8%	10.08	0.08	1SI205	0.7%	48.83	0.35	2SI405	0.8%	141.70	0.99
	IFR4	0SI405	0.1%	22.84	0.03	1SI405	0.1%	67.98	0.09	2SI405	0.1%	141.70	0.18
North	VFR1	0SV100	35.1%	1.25	0.44	1SV100	35.2%	2.21	0.78	2SV105B	35.7%	2.31	0.83
	VFR2	0SV205B	10.7%	1.31	0.14	1SV205B	10.7%	2.21	0.24	2SV205B	10.9%	3.67	0.40
	IFR1	0SI105B	2.8%	1.39	0.04	1SI105B	2.8%	2.19	0.06	2SI105B	2.8%	5.69	0.16
	IFR2	0NI205B	2.2%	1.72	0.04	1NI205B	2.2%	3.70	0.08	2NI205B	2.0%	23.39	0.47
	IFR3	0SI205	0.8%	10.08	0.08	1SI205	0.8%	48.53	0.37	2SI405	0.7%	141.70	0.99
	IFR4	0SI405	0.2%	22.84	0.03	1SI405	0.1%	67.98	0.10	2SI405	0.1%	141.70	0.16
Weighted Avg Delay (Min per Operation)					1.76				4.62				10.49
Computed Avg Delay (Min per Operation)*					1.79				3.60				8.08
IFR Factor					1.02				0.78				0.77

* Based on 10 year weather history

214

Alternative: Full Use Runway 3300' from 16L/43R with PRM - #6

Demand : Baseline - 1040 ops/day - 345,000 ops/yr

Configuration	Exp. #	% of Ops Arr	% of Ops Dep	Travel Time Arr	Travel Time Dep
South VFR1	0SV100	27.3%	27.0%	17.4	14.5
South VFR2	0SV206	15.3%	15.4%	17.8	14.5
South IFR1	0SI106	13.5%	14.0%	17.8	14.9
South IFR2	0SI206	3.3%	3.5%	18.7	14.8
South IFR3	0SI206	0.8%	0.8%	18.7	14.8
South IFR4	0SI406	0.1%	0.1%	19.1	14.5
North VFR1	0SV100	29.8%	28.9%	17.4	14.5
North VFR2	0SV206B	4.3%	4.3%	18.0	14.5
North IFR1	0SI106B	2.7%	2.8%	17.8	14.9
North IFR2	0NI206B	2.1%	2.2%	17.8	14.9
North IFR3	0SI206	0.8%	0.9%	18.7	14.8
North IFR4	0SI406	0.1%	0.2%	19.1	14.5

	Arr	Dep	Tot
Delay	1.90	1.21	1.56
Trav. Time	17.62	[illegible].61	16.11

Total Delay (Hours [illegible]r Y[illegible]r)
6,946.51

Travel Time Offset ([illegible]urs per Year)
596.[illegible]

Total Savings (Hours per Year)
16,322.01

Demand: Future 1 - 1280 ops/day - 425,000 ops/yr

Configuration	Exp. #	% of Ops Arr	% of Ops Dep	Travel Time Arr	Travel Time Dep
South VFR1	1SV100	28.5%	27.0%	17.4	14.4
South VFR2	1SV206	16.0%	15.5%	18.1	14.4
South IFR1	1SI106	14.1%	14.0%	17.9	14.9
South IFR2	1SI206	3.1%	3.3%	19.6	14.7
South IFR3	1SI206	0.7%	0.8%	19.6	14.7
South IFR4	1SI406	0.1%	0.1%	19.1	14.4
North VFR1	1SV100	31.0%	28.9%	17.4	14.4
North VFR2	1SV206B	0.4%	4.3%	18.1	14.4
North IFR1	1SI106B	2.9%	2.8%	17.8	14.9
North IFR2	1NI206B	2.2%	2.2%	17.9	14.9
North IFR3	1SI206	0.8%	0.8%	19.6	14.7
North IFR4	1SI406	0.1%	0.2%	19.1	14.4

	Arr	Dep	Tot
Delay	4.21	2.37	3.29
Trav. Time	17.72	14.53	16.13

Total Delay (Hours per Year)
23,301.97

Travel Time Offset (Hours per Year)
988.16

Total Savings (Hours per Year)
86,199.46

Demand: Future 2 - 1581 ops/day - 525,000 ops/yr

Configuration	Exp. #	% of Ops Arr	% of Ops Dep	Travel Time Arr	Travel Time Dep
South VFR1	2SV106	27.8%	27.4%	18.3	14.4
South VFR2	2SV206	15.4%	15.6%	18.2	14.4
South IFR1	2SI106	13.7%	13.8%	18.0	14.8
South IFR2	2SI406	2.3%	3.1%	19.2	14.4
South IFR3	2SI406	0.5%	0.7%	19.2	14.4
South IFR4	2SI406	0.1%	0.1%	19.2	14.4
North VFR1	2SV106B	30.1%	29.1%	18.3	14.4
North VFR2	2SV206B	4.4%	4.4%	18.2	14.4
North IFR1	2SI106B	2.8%	2.8%	18.0	14.8
North IFR2	2NI206B	2.2%	2.0%	18.0	14.7
North IFR3	2SI406	0.6%	0.8%	19.2	14.4
North IFR4	2SI406	0.1%	0.1%	19.2	14.4

	Arr	Dep	Tot
Delay	12.29	3.09	7.69
Trav. Time	18.27	14.47	16.37

Total Delay (Hours per Year)
67,273.66

Travel Time Offset
3,303.88

Total Savings (Hours per Year)
287,398.80

214

EXHIBIT 35

Average Delay per Operation Computation

Full Use Runway 3300' from 16L/34R with PRM - #6

Weather		Baseline Exp.	Baseline %	Baseline Del.	Baseline Prop.	Future 1 Exp.	Future 1 %	Future 1 Del.	Future 1 Prop.	Future 2 Exp.	Future 2 %	Future 2 Del.	Future 2 Prop.
South	VFR1	0SV100	27.1%	1.25	0.34	1SV100	27.8%	2.21	0.61	2SV106	27.6%	2.74	0.76
	VFR2	0SV206	15.4%	0.73	0.11	1SV206	15.7%	2.34	0.37	2SV206	15.5%	5.11	0.79
	IFR1	0SI106	13.7%	1.38	0.19	1SI106	14.1%	2.33	0.33	2SI106	13.8%	6.36	0.88
	IFR2	0SI206	3.4%	6.17	0.21	1SI206	3.2%	35.89	1.16	2SI406	2.7%	141.73	3.87
	IFR3	0SI206	0.8%	6.17	0.05	1SI206	0.8%	39.59	0.27	2SI406	0.6%	141.73	0.69
	IFR4	0SI406	0.1%	22.83	0.03	1SI406	0.1%	68.01	0.09	2SI406	0.1%	141.73	0.18
North	VFR1	0SV100	29.3%	1.25	0.37	1SV100	30.0%	2.21	0.66	2SV106B	29.6%	2.26	0.67
	VFR2	0SV206B	4.3%	1.17	0.05	1SV206B	2.4%	2.09	0.05	2SV206B	4.4%	3.57	0.16
	IFR1	0SI106B	2.9%	1.31	0.04	1SI106B	2.9%	2.13	0.06	2SI106B	2.5%	6.00	0.14
	IFR2	0NI206B	2.1%	1.48	0.03	1NI206B	2.2%	2.52	0.06	2NI206B	2.1%	11.89	0.25
	IFR3	0SI206	0.6%	6.17	0.05	1SI206	0.8%	35.69	0.29	2SI406	0.7%	141.73	0.96
	IFR4	0SI406	0.2%	22.83	0.03	1SI406	0.1%	68.01	0.10	2SI406	0.1%	141.73	0.18
Weighted Avg Delay (Min per Operation)					1.50				4.04				9.74
Computed Avg Delay (Min per Operation)*					1.56				3.28				7.69
IFR Factor					1.07				0.73				0.75

* Based on 10 year weather history

Exhibit 36

Alternative: Modified Full Use R/W 2500' from 16L/43R with PRM - No Hvy - #8

(see note below)

Demand : Baseline - 1040 ops/day - 345,000 ops/yr

		% of Ops		Travel Time	
Configuration	Exp. #	Arr	Dep	Arr	Dep
South VFR1	0SV100	27.3%	27.0%	17.4	14.8
South VFR2	0SV208	15.3%	15.5%	17.6	14.9
South IFR1	0SI108	13.4%	14.1%	17.6	14.9
South IFR2	0SI208	3.3%	3.3%	18.3	14.8
South IFR3	0SI208	0.9%	0.9%	18.3	14.8
South IFR4	0SI408	0.1%	0.2%	19.4	14.6
North VFR1	0SV100	29.8%	28.9%	17.4	14.5
North VFR2	0SV208B	4.3%	4.3%	17.6	14.9
North IFR1	0SI108B	2.7%	2.8%	17.6	14.9
North IFR2	0NI208B	2.1%	2.3%	17.6	14.0
North IFR3	0SI208	0.8%	0.6%	18.3	14.8
North IFR4	0SI408	0.1%	0.2%	19.4	14.8

	Arr	Dep	Tot
Delay	1.85	2.01	1.93
Trav. Time	17.53	14.69	16.11

Total Delay (Hours per Year)
11,107

Travel Time Offset (Hours per Year)
575

Total Savings (Hours per Year)
14,186

Demand: Future 1 - 1280 ops/day - 425,000 ops/yr

		% of Ops		Travel Time	
Configuration	Exp. #	Arr	Dep	Arr	Dep
South VFR1	1SV100	27.4%	27.1%	17.4	14.4
South VFR2	1SV208	15.4%	15.6%	17.7	14.9
South IFR1	1SI108	13.5%	14.3%	17.7	14.9
South IFR2	1SI208	3.0%	3.0%	19.2	14.7
South IFR3	1SI208	0.7%	0.7%	19.2	14.7
South IFR4	1SI408	0.1%	0.2%	19.4	14.7
North VFR1	1SV100	29.8%	28.9%	17.4	14.4
North VFR2	1SV208B	4.3%	4.3%	17.7	14.9
North IFR1	1SI108B	2.8%	2.9%	17.7	14.9
North IFR2	1NI208B	2.1%	2.2%	17.7	14.9
North IFR3	1SI208	0.7%	0.8%	19.2	14.7
North IFR4	1SI408	0.1%	0.2%	19.4	14.7

	Arr	Dep	Tot
Delay	4.22	3.69	3.96
Trav. Time	17.60	14.63	16.12

Total Delay (Hours per Year)
28,012

Travel Time Offset (Hours per Year)
935

Total Savings (Hours per Year)
81,542

Demand: Future 2 - 1581 ops/day - 525,000 ops/yr

		% of Ops		Travel Time	
Configuration	Exp. #	Arr	Dep	Arr	Dep
South VFR1	2SV108	27.9%	27.5%	18.1	14.4
South VFR2	2SV208	15.4%	15.6%	17.7	14.8
South IFR1	2SI108	13.5%	14.0%	17.7	14.9
South IFR2	2SI408	2.3%	2.9%	19.4	14.7
South IFR3	2SI408	0.6%	0.7%	19.4	14.7
South IFR4	2SI408	0.1%	0.1%	19.4	14.7
North VFR1	2SV108B	30.2%	29.2%	18.1	14.4
North VFR2	2SV208B	4.4%	4.3%	17.7	14.8
North IFR1	2SI108B	2.8%	2.8%	17.7	14.9
North IFR2	2NI208B	2.1%	2.0%	17.8	14.8
North IFR3	2SI408	0.6%	0.7%	19.4	14.7
North IFR4	2SI408	0.1%	0.1%	19.4	14.7

	Arr	Dep	Tot
Delay	14.03	4.32	9.19
Trav. Time	17.99	14.57	16.28

Total Delay (Hours per Year)
80,265

Travel Time Offset
2,630

Total Savings (Hours per Year)
275,181

Note: Delays and savings for this alternative are not considered reliable

Exhibit 37

Average Delay per Operation Computation

Modified Full Use Runway (No Heavy A/C) 2500' from 16L/34R - #8 (see note below)

		Baseline				Future 1				Future 2			
Weather		Exp.	%	Del.	Prop.	Exp.	%	Del.	Prop.	Exp.	%	Del.	Prop.
South	VFR1	0SV100	27.2%	1.26	0.34	1SV100	27.2%	2.21	0.60	2SV108	27.7%	2.53	0.70
	VFR2	0SV208	15.4%	1.45	0.22	1SV208	15.5%	2.34	0.36	2SV208	15.6%	5.67	0.88
	IFR1	0SI108	13.8%	1.65	0.23	1SI108	13.9%	2.60	0.36	2SI108	13.7%	8.48	1.17
	IFR2	0SI208	3.3%	15.78	0.52	1SI208	3.0%	56.26	1.69	2SI408	2.6%	139.08	3.61
	IFR3	0SI208	0.8%	15.76	0.12	1SI208	0.7%	56.26	0.40	2SI408	0.6%	139.08	0.96
	IFR4	0SI408	0.1%	23.57	0.03	1SI408	0.1%	70.28	0.10	2SI408	0.1%	139.06	0.18
North	VFR1	0SV100	29.3%	1.25	0.37	1SV100	29.4%	2.21	0.65	2SV108B	28.7%	2.40	0.71
	VFR2	0SV208B	4.3%	1.40	0.06	1SV208B	4.3%	2.17	0.09	2SV208B	4.3%	5.00	0.22
	IFR1	0SI108B	2.5%	1.57	0.04	1SI108B	2.9%	2.33	0.07	2SI108B	2.8%	7.50	0.21
	IFR2	0NI208B	2.2%	1.76	0.04	1NI208B	2.2%	3.66	0.08	2NI208B	2.1%	23.06	0.47
	IFR3	0SI208	0.8%	15.76	0.13	1SI208	0.7%	56.26	0.42	2SI408	0.7%	139.08	0.92
	IFR4	0SI408	0.2%	23.57	0.04	1SI408	0.1%	70.28	0.10	2SI408	0.1%	139.08	0.18
Weighted Avg Delay (Min per Operation)					2.13				4.92				10.09
Computed Avg Delay (Min per Operation)*					1.93				3.96				9.16
IFR Factor					0.66				0.74				0.88

* Based on 10 year weather history

Note: Delays and Savings for this alternative are not considered reliable.

214

Alternative: Wake/Vortex Detection System - #10

Demand : Baseline - 1040 ops/day - 345,000 ops/yr

		% of Ops		Travel Time	
Configuration	Exp. #	Arr	Dep	Arr	Dep
South VFR1	0SV110	27.9%	27.1%	17.4	14.5
South VFR2	0SV210	15.2%	15.4%	17.6	14.6
South IFR1	0SI110	13.0%	13.8%	17.6	14.6
South IFR2	0SI210	3.3%	3.5%	17.6	14.6
South IFR3	0SI210	0.7%	0.8%	17.6	14.6
South IFR4	0SI400	0.1%	0.1%	17.6	15.0
North VFR1	0SV110	30.0%	29.0%	17.4	14.5
North VFR2	0SV210	4.3%	4.3%	17.6	14.6
North IFR1	0SI110	2.6%	2.8%	17.6	14.6
North IFR2	0SI210	2.0%	2.1%	17.6	14.6
North IFR3	0SI210	0.8%	0.9%	17.6	14.6
North IFR4	0SI400	0.1%	0.1%	17.6	15.0

	Arr	Dep	Tot
Delay	6.23	1.1:	3.67
Trav. Time	17.48	14.5-	16.01

Total Delay (Hours per ar)
21,119.63

Travel Time Off:ct
22.57

Total Savings (Hours per Year)
4,725.03

Demand: Future 1 - 1280 ops/day - 425,000 ops/yr

		% of Ops		Travel Time	
Configuration	Exp. #	Arr	Dep	Arr	Dep
South VFR1	1SV110	29.3%	27.7%	17.4	14.4
South VFR2	1SV210	14.5%	15.2%	17.6	14.5
South IFR1	1SI110	12.4%	13.6%	17.6	14.5
South IFR2	1SI210	3.1%	3.4%	17.6	14.5
South IFR3	1SI210	0.7%	0.8%	17.6	14.5
South IFR4	1SI400	0.1%	0.1%	17.6	14.9
North VFR1	1SV110	30.7%	29.4%	17.4	14.4
North VFR2	1SV210	4.1%	4.2%	17.6	14.5
North IFR1	1SI110	2.4%	2.7%	17.6	14.5
North IFR2	1SI210	1.9%	2.1%	17.6	14.5
North IFR3	1SI210	0.7%	0.9%	17.6	14.5
North IFR4	1SI400	0.1%	0.1%	17.6	14.9

	Arr	Dep	Tot
Delay	25.01	2.16	13.59
Trav. Time	17.48	14.54	16.01

Total Delay (Hours per Year)
96,218.03

Travel Time Offset
182.34

Total Savings (Hours per Year)
14,089.24

Demand: Future 2 - 1581 ops/day - 525,000 ops/yr

		% of Ops		Travel Time	
Configuration	Exp. #	Arr	Dep	Arr	Dep
South VFR1	2SV110	31.1%	28.2%	17.5	14.4
South VFR2	2SV210	13.1%	14.9%	17.6	14.5
South IFR1	2SI110	11.9%	13.3%	17.6	14.5
South IFR2	2SI210	2.9%	3.2%	17.6	14.5
South IFR3	2SI210	0.7%	0.8%	17.6	14.5
South IFR4	2SI400	0.1%	0.1%	17.8	14.9
North VFR1	2SV110	31.7%	30.0%	17.5	14.4
North VFR2	2SV210	3.6%	4.1%	17.6	14.5
North IFR1	2SI110	2.3%	2.6%	17.6	14.5
North IFR2	2SI210	1.8%	2.0%	17.6	14.5
North IFR3	2SI210	0.7%	0.8%	17.6	14.5
North IFR4	2SI400	0.1%	0.1%	17.6	14.9

	Arr	Dep	Tot
Delay	63.41	7.46	35.44
Trav. Time	17.48	14.54	16.01

Total Delay (Hours per Year)
309,992.47

Travel Time Offset
191.01

Total Savings (Hours per Year)
47,792.67

214

EXHIBIT 39

Average Delay per Operation Computation

Wake/Vortex Detection System - #10

		Baseline				Future 1				Future 2			
Weather		Exp.	%	Del.	Prop.	Exp.	%	Del.	Prop.	Exp.	%	Del.	Prop.
South	VFR1	0SV110	27.5%	1.11	0.31	1SV110	28.6%	1.93	0.55	2SV110	29.8%	6.17	1.83
	VFR2	0SV210	15.3%	4.88	0.72	1SV210	14.8%	28.83	4.27	2SV210	14.0%	88.58	12.42
	IFR1	0SI110	13.4%	8.47	1.14	1SI110	13.0%	44.81	5.77	2SI110	12.6%	100.82	12.71
	IFR2	0SI210	3.4%	8.95	0.30	1SI210	3.2%	45.71	1.46	2SI210	3.1%	104.63	3.20
	IFR3	0SI210	0.8%	8.95	0.07	1SI210	0.8%	45.71	0.35	2SI210	0.7%	104.63	0.78
	IFR4	0SI400	0.1%	252.85	0.23	1SI400	0.1%	378.84	0.33	2SI400	0.1%	711.89	0.58
North	VFR1	0SV110	29.5%	1.11	0.33	1SV110	30.0%	1.93	0.58	2SV110	30.6%	6.17	1.90
	VFR2	0SV210	4.3%	4.88	0.20	1SV210	4.1%	28.83	1.19	2SV210	3.8%	88.56	3.43
	IFR1	0SI110	2.7%	8.47	0.23	1SI110	2.6%	44.81	1.14	2SI110	2.4%	100.82	2.40
	IFR2	0SI210	2.1%	8.95	0.18	1SI210	2.0%	45.71	0.90	2SI210	1.9%	104.63	1.85
	IFR3	0SI210	0.8%	8.95	0.08	1SI210	0.8%	45.71	0.37	2SI210	0.8%	104.63	0.80
	IFR4	0SI400	0.1%	252.85	0.25	1SI400	0.1%	378.84	0.33	2SI400	0.1%	711.89	0.59
Weighted Avg Delay (Min per Operation)					4.04				17.28				42.62
Computed Avg Delay (Min per Operation)*					3.67				13.59				35.44
IFR Factor					0.89				0.77				0.82

* Based on 10 year weather history

214

Alternative: Without 2 CAT III ILS in Alternative #5 - #13

Demand : Baseline - 1040 ops/day - 345,000 ops/yr

Configuration	Exp. #	% of Ops Arr	% of Ops Dep	Travel Time Arr	Travel Time Dep
South VFR1	0SV100	27.4%	27.0%	17.4	14.5
South VFR2	0SV205	15.3%	15.4%	17.6	14.9
South IFR1	0SI105	13.5%	14.0%	17.6	14.9
South IFR2	0SI200	3.2%	3.5%	17.6	14.6
South IFR3	0SI200	0.7%	0.8%	17.6	14.6
South IFR4	0SI400	0.1%	0.1%	17.6	15.0
North VFR1	0SV100	29.8%	28.9%	17.4	14.5
North VFR2	0SV205B	4.3%	4.3%	17.6	14.9
North IFR1	0SI105B	2.8%	2.0%	17.6	14.9
North IFR2	0SI200	1.9%	2.1%	17.6	14.6
North IFR3	0SI200	0.8%	0.9%	17.6	14.6
North IFR4	0SI400	0.1%	0.1%	17.6	15.0

	Arr	Dep	Tot
Delay	3.14	1.37	2.26
Trav. Time	17.50	14.67	16.06

Total Delay (Hours per Year)
12,977

Travel Time Offset (Hours per Year)
436

Total Savings (Hours per Year)
12,462

Demand: Future 1 - 1280 ops/day - 425,000 ops/yr

Configuration	Exp. #	% of Ops Arr	% of Ops Dep	Travel Time Arr	Travel Time Dep
South VFR1	1SV100	27.5%	27.1%	17.4	14.4
South VFR2	1SV205	15.4%	15.5%	17.7	14.9
South IFR1	1SI105	13.6%	14.1%	17.7	14.9
South IFR2	1SI200	2.9%	3.3%	17.6	14.5
South IFR3	1SI200	0.7%	0.8%	17.6	14.5
South IFR4	1SI400	0.1%	0.1%	17.6	14.9
North VFR1	1SV100	30.0%	29.0%	17.4	14.4
North VFR2	1SV205B	4.4%	4.3%	17.7	14.9
North IFR1	1SI105B	2.9%	2.9%	17.7	14.9
North IFR2	1SI200	1.8%	2.0%	17.6	14.5
North IFR3	1SI200	0.7%	0.9%	17.6	14.5
North IFR4	1SI400	0.1%	0.1%	17.6	14.9

	Arr	Dep	Tot
Delay	7.12	2.65	4.89
Trav. Time	17.53	14.62	16.08

Total Delay (Hours per Year)
34,699

Travel Time Offset (Hours per Year)
632

Total Savings (Hours per Year)
75,259

Demand: Future 2 - 1581 ops/day - 525,000 ops/yr

Configuration	Exp. #	% of Ops Arr	% of Ops Dep	Travel Time Arr	Travel Time Dep
South VFR1	2SV105	27.9%	27.5%	18.1	14.4
South VFR2	2SV205	15.4%	15.6%	17.8	14.8
South IFR1	2SI105	13.6%	13.9%	17.6	14.9
South IFR2	2SI200	2.5%	3.0%	17.7	14.5
South IFR3	2SI200	0.6%	0.7%	17.7	14.5
South IFR4	2SI400	0.1%	0.1%	17.6	14.9
North VFR1	2SV105B	30.3%	29.3%	18.1	14.4
North VFR2	2SV205B	4.4%	4.4%	17.8	14.7
North IFR1	2SI105B	2.9%	2.8%	17.6	14.9
North IFR2	2SI200	1.6%	1.9%	17.7	14.5
North IFR3	2SI200	0.7%	0.8%	17.7	14.5
North IFR4	2SI400	0.1%	0.1%	17.8	14.9

	Arr	Dep	Tot
Delay	15.19	4.14	9.87
Trav. Time	17.95	14.56	16.26

Total Delay (Hours per Year)
84,551

Travel Time Offset
2,319

Total Savings (Hours per Year)
271,108

214

EXHIBIT 41

Average Delay per Operation Computation

Without Two CAT II/III ILSs in Experiment #5 - #13

Weather		Baseline Exp.	%	Del.	Prop.	Future 1 Exp.	%	Del.	Prop.	Future 2 Exp.	%	Del.	Prop.
South	VFR1	0SV100	27.2%	1.25	0.34	1SV100	27.3%	2.21	0.60	2SV105	27.7%	2.54	0.70
	VFR2	0SV205	15.4%	1.42	0.22	1SV205	15.5%	2.33	0.36	2SV205	15.5%	5.31	0.82
	IFR1	0SI105	13.8%	1.11	0.15	1SI105	13.9%	2.61	0.36	2SI105	13.7%	7.68	1.06
	IFR2	0SI200	3.3%	11.94	0.40	1SI200	3.1%	52.55	1.63	2SI200	2.8%	116.13	3.20
	IFR3	0SI200	0.8%	11.84	0.09	1SI200	0.7%	52.55	0.38	2SI200	0.7%	116.13	0.77
	IFR4	0SI400	0.1%	252.65	0.24	1SI400	0.1%	379.94	0.33	2SI400	0.1%	711.89	0.68
North	VFR1	0SV100	29.4%	1.25	0.37	1SV100	29.5%	2.21	0.68	2SV105B	28.8%	2.31	0.69
	VFR2	0SV205B	4.3%	1.31	0.06	1SV205B	4.4%	2.21	0.10	2SV205B	4.4%	3.67	0.16
	IFR1	0SI105B	2.8%	1.39	0.04	1SI105B	2.9%	2.19	0.06	2SI105B	2.9%	5.89	0.16
	IFR2	0SI200	2.0%	11.94	0.24	1SI200	1.9%	52.55	0.99	2SI200	1.7%	116.13	1.96
	IFR3	0SI200	0.8%	11.94	0.10	1SI200	0.8%	52.55	0.41	2SI200	0.7%	116.13	0.83
	IFR4	0SI400	0.1%	252.66	0.26	1SI400	0.1%	379.94	0.33	2SI400	0.1%	711.99	0.57
Weighted Avg Delay (Min per Operation)					2.40				6.22				11.49
Computed Avg Delay (Min per Operation)*					2.20				4.89				9.87
IFR Factor					0.87				0.73				0.82

* Based on 10 year weather history

214

Alternative: 2.5 nmi Intrail in IFR - #17

Demand : Baseline - 1040 ops/day - 345,000 ops/yr

Configuration	Exp. #	% of Ops Arr	% of Ops Dep	Travel Time Arr	Travel Time Dep
South VFR1	0SV100	27.8%	27.1%	17.4	14.5
South VFR2	0SV217	15.2%	15.4%	17.6	14.6
South IFR1	0SI117	13.2%	13.9%	17.6	14.6
South IFR2	0SI200	3.2%	3.5%	17.6	14.6
South IFR3	0SI200	0.7%	0.8%	17.6	14.6
South IFR4	0SI400	0.1%	0.1%	17.6	15.0
North VFR1	0SV100	30.0%	29.0%	17.4	14.5
North VFR2	0SV217	4.3%	4.3%	17.6	14.6
North IFR1	0SI117	2.7%	2.8%	17.6	14.6
North IFR2	0SI200	2.0%	2.1%	17.6	14.6
North IFR3	0SI200	0.8%	0.9%	17.6	14.6
North IFR4	0SI400	0.1%	0.1%	17.6	15.0

	Arr	Dep	Tot
Delay	5.76	1.26	3.51
Trav. Time	17.48	14.54	16.01

Total Delay (Hours per Year)
20,199

Travel Time Offset
10

Total Savings (Hours per Year)
5,658

Demand: Future 1 - 1280 ops/day - 425,000 ops/yr

Configuration	Exp. #	% of Ops Arr	% of Ops Dep	Travel Time Arr	Travel Time Dep
South VFR1	1SV100	29.0%	27.6%	17.4	14.4
South VFR2	1SV217	14.7%	15.3%	17.6	14.5
South IFR1	1SI117	12.5%	13.6%	17.6	14.5
South IFR2	1SI200	3.0%	3.3%	17.6	14.5
South IFR3	1SI200	0.7%	0.8%	17.6	14.5
South IFR4	1SI400	0.1%	0.1%	17.6	14.9
North VFR1	1SV100	30.6%	29.3%	17.4	14.4
North VFR2	1SV217	4.1%	4.2%	17.6	14.5
North IFR1	1SI117	2.5%	2.7%	17.6	14.5
North IFR2	1SI200	1.8%	2.0%	17.6	14.5
North IFR3	1SI200	0.7%	0.9%	17.6	14.5
North IFR4	1SI400	0.1%	0.1%	17.6	14.9

	Arr	Dep	Tot
Delay	22.18	2.59	12.39
Trav. Time	17.49	14.48	15.99

Total Delay (Hours per Year)
87,719

Travel Time Offset
12

Total Savings (Hours per Year)
22,759

Demand: Future 2 - 1581 ops/day - 525,000 ops/yr

Configuration	Exp. #	% of Ops Arr	% of Ops Dep	Travel Time Arr	Travel Time Dep
South VFR1	2SV100	30.9%	28.0%	17.5	14.4
South VFR2	2SV217	13.7%	15.1%	17.6	14.5
South IFR1	2SI117	11.6%	13.3%	17.7	14.5
South IFR2	2SI200	2.9%	3.2%	17.7	14.5
South IFR3	2SI200	0.6%	0.8%	17.7	14.5
South IFR4	2SI400	0.1%	0.1%	17.8	14.9
North VFR1	2SV100	31.7%	30.0%	17.5	14.4
North VFR2	2SV217	3.8%	4.2%	17.6	14.5
North IFR1	2SI117	2.2%	2.6%	17.7	14.5
North IFR2	2SI200	1.7%	2.0%	17.7	14.5
North IFR3	2SI200	0.7%	0.8%	17.7	14.5
North IFR4	2SI400	0.1%	0.1%	17.8	14.9

	Arr	Dep	Tot
Delay	63.66	11.63	37.65
Trav. Time	17.53	14.45	15.99

Total Delay (Hours per Year)
329,326

Travel Time Offset
5

Total Savings (Hours per Year)
28,646

214

EXHIBIT 43

Average Delay per Operation Computation

2.5 nmi Intrail in IFR (Including VFR2) - #17

Weather		Baseline Exp.	%	Del.	Prop.	Future 1 Exp.	%	Del.	Prop.	Future 2 Exp.	%	Del.	Prop.
South	VFR1	0SV100	27.4%	1.25	0.34	1SV100	28.3%	2.21	0.63	2SV100	29.5%	9.11	2.68
	VFR2	0SV217	15.3%	3.95	0.60	1SV217	15.0%	22.06	3.31	2SV217	14.4%	83.71	12.04
	IFR1	0SI117	13.5%	6.06	0.82	1SI117	13.1%	38.39	4.76	2SI117	12.4%	82.14	11.46
	IFR2	0SI200	3.4%	11.94	0.40	1SI200	3.2%	52.55	1.67	2SI200	3.0%	115.13	3.47
	IFR3	0SI200	0.8%	11.94	0.09	1SI200	0.7%	52.55	0.39	2SI200	0.7%	115.13	0.81
	IFR4	0SI400	0.1%	252.85	0.24	1SI400	0.1%	379.94	0.33	2SI400	0.1%	711.89	0.58
North	VFR1	0SV100	29.5%	1.25	0.37	1SV100	30.0%	2.21	0.66	2SV100	30.6%	9.11	2.81
	VFR2	0SV217	4.3%	3.95	0.17	1SV217	4.2%	22.06	0.92	2SV217	4.0%	83.71	3.34
	IFR1	0SI117	2.7%	6.08	0.17	1SI117	2.6%	38.39	0.94	2SI117	2.4%	92.14	2.22
	IFR2	0SI200	2.0%	11.84	0.24	1SI200	1.9%	52.55	1.02	2SI200	1.8%	118.13	2.12
	IFR3	0SI200	0.8%	11.94	0.10	1SI200	0.8%	52.55	0.42	2SI200	0.8%	115.13	0.87
	IFR4	0SI400	0.1%	252.85	0.25	1SI400	0.1%	379.94	0.33	2SI400	0.1%	711.89	0.81
Weighted Avg Delay (Min per Operation)					3.60				15.40				43.02
Computed Avg Delay (Min per Operation)*					3.51				12.39				37.65
IFR Factor					0.91				0.79				0.56

* Based on 10 year weather history

Alternative: GPS (w/o BFI Interaction & Glide Slope Interference) - #18

Demand : Baseline - 1040 ops/day - 345,000 ops/yr

Configuration	Exp. #	% of Ops Arr	% of Ops Dep	Travel Time Arr	Travel Time Dep
South VFR1	0SV100	27.3%	27.0%	17.4	14.5
South VFR2	0SV205B	15.3%	15.4%	17.6	14.9
South IFR1	0SI105B	13.4%	13.9%	17.6	14.9
South IFR2	0SI218	3.3%	3.5%	17.6	14.9
South IFR3	0SI218	0.8%	0.8%	17.6	14.9
South IFR4	0SI405B	0.1%	0.1%	18.7	14.5
North VFR1	0SV100	29.8%	28.9%	17.4	14.5
North VFR2	0SV205B	4.3%	4.3%	17.6	14.9
North IFR1	0SI105B	2.7%	2.8%	17.6	14.9
North IFR2	0NI205B	2.1%	2.2%	17.6	14.9
North IFR3	0SI218	0.8%	0.9%	17.6	14.9
North IFR4	0SI405B	0.1%	0.2%	18.7	14.5

	Arr	Dep	Tot
Delay	1.64	.19	1.37
Trav. Time	17.50	1+.69	16.10

Total Delay (Hours [illegible] Year)
7,655.12

Travel Time Offset (Hours per Year)
518.7[illegible]

Total Savings (Hours per Year)
17,493.36

Demand: Future 1 - 1280 ops/day - 425,000 ops/yr

Configuration	Exp. #	% of Ops Arr	% of Ops Dep	Travel Time Arr	Travel Time Dep
South VFR1	1SV100	27.3%	27.0%	17.4	14.4
South VFR2	1SV205B	15.3%	15.5%	17.7	14.9
South IFR1	1SI105B	13.4%	14.1%	17.7	14.9
South IFR2	1SI218	3.4%	3.3%	17.7	14.8
South IFR3	1SI218	0.8%	0.8%	17.7	14.8
South IFR4	1SI405B	0.1%	0.1%	18.7	14.4
North VFR1	1SV100	29.8%	28.9%	17.4	14.4
North VFR2	1SV205B	4.3%	4.3%	17.7	14.9
North IFR1	1SI105B	2.7%	2.8%	17.7	14.9
North IFR2	1NI205B	2.1%	2.2%	17.7	14.9
North IFR3	1SI218	0.8%	0.8%	17.7	14.8
North IFR4	1SI405B	0.1%	0.2%	18.7	14.4

	Arr	Dep	Tot
	2.83	2.85	2.59
Trav. Time	17.64	14.64	16.09

Total Delay (Hours per Year)
18,344.11

Travel Time Offset (Hours per Year)
740.78

Total Savings (Hours per Year)
91,404.72

Demand: Future 2 - 1581 ops/day - 525,000 ops/yr

Configuration	Exp. #	% of Ops Arr	% of Ops Dep	Travel Time Arr	Travel Time Dep
South VFR1	2SV105B	27.1%	27.2%	18.1	14.4
South VFR2	2SV205B	15.2%	15.6%	17.8	14.7
South IFR1	2SI105B	13.3%	13.8%	17.8	14.9
South IFR2	2SI218	3.1%	3.3%	17.9	14.6
South IFR3	2SI218	0.7%	0.8%	17.9	14.6
South IFR4	2SI405B	0.1%	0.1%	18.8	14.3
North VFR1	2SV105B	29.5%	29.0%	18.1	14.4
North VFR2	2SV205B	4.3%	4.3%	17.8	14.7
North IFR1	2SI105B	2.7%	2.8%	17.8	14.9
North IFR2	2NI205B	2.0%	2.0%	17.8	14.8
North IFR3	2SI218	1.9%	0.8%	17.9	14.6
North IFR4	2SI405B	0.1%	0.2%	18.8	14.3

	Arr	Dep	Tot
	4.90	4.20	4.55
Trav. Time	17.98	14.57	16.27

Total Delay (Hours per Year)
39,804.31

Travel Time Offset
2,480.87

Total Savings (Hours per Year)
315,691.16

EXHIBIT 45

Average Delay per Operation Computation

GPS (No BFI Interaction / No Glide Slope Protection Area) - #18

Weather		Baseline Exp.	Baseline %	Baseline Del.	Baseline Prop.	Future 1 Exp.	Future 1 %	Future 1 Del.	Future 1 Prop.	Future 2 Exp.	Future 2 %	Future 2 Del.	Future 2 Prop.
South	VFR1	0SV100	27.1%	1.25	0.34	1SV100	27.1%	2.21	0.60	2SV105B	27.2%	2.31	0.63
	VFR2	0SV205B	15.4%	1.31	0.20	1SV205B	16.4%	2.33	0.36	2SV205B	15.4%	3.67	0.58
	IFR1	0SI105B	13.7%	1.39	0.19	1SI105B	13.7%	2.61	0.36	2SI105B	13.6%	5.69	0.77
	IFR2	0SI218	3.4%	2.24	0.08	1SI218	3.4%	6.76	0.29	2SI218	3.2%	37.17	1.20
	IFR3	0SI218	0.8%	2.24	0.02	1SI218	0.6%	6.76	0.07	2SI218	0.8%	37.17	0.28
	IFR4	0SI405B	0.1%	11.21	0.02	1SI405B	0.1%	67.96	0.06	2SI405B	0.1%	111.46	0.14
North	VFR1	0SV100	28.3%	1.25	0.37	1SV100	29.3%	2.21	0.65	2SV105B	29.3%	2.31	0.68
	VFR2	0SV205B	4.3%	1.31	0.06	1SV205B	4.3%	2.21	0.09	2SV205B	4.3%	3.67	0.16
	IFR1	0SI105B	2.8%	1.39	0.04	1SI105B	2.8%	2.19	0.06	2SI105B	2.8%	5.69	0.16
	IFR2	0NI205B	2.1%	1.72	0.04	1NI205B	2.1%	3.70	0.06	2NI205B	2.0%	37.17	0.74
	IFR3	0SI218	0.9%	2.24	0.02	1SI218	0.6%	6.76	0.07	2SI218	1.4%	37.17	0.50
	IFR4	0SI405B	0.2%	11.21	0.02	1SI405B	0.1%	67.96	0.10	2SI405B	0.1%	111.46	0.15
Weighted Avg Delay (Min per Operation)					1.37				2.81				5.96
Computed Avg Delay (Min per Operation)*					1.37				2.59				4.55
IFR Factor					0.99				0.90				0.70

* Based on 10 year weather history

214

Alternative: Demand Mangement Strategy - #20

Demand : Baseline - 1010 ops/day - 335,048 ops/yr

Configuration	Exp. #	Parametric Capacity Arr	Parametric Capacity Dep	Travel Time Arr	Travel Time Dep
South VFR1	0SV120	40.25	47.37	17.4	14.5
South VFR2	0SV220	32.94	49.62	17.6	14.6
South IFR1	0SI120	31.00	51.50	17.6	14.6
South IFR2	0SI220	31.03	41.94	17.6	14.6
South IFR3	0SI220	31.03	41.94	17.6	14.6
South IFR4	0SI420	17.30	17.30	17.6	15.0
North VFR1	0SV120	40.25	47.37	17.4	14.5
North VFR2	0SV220	32.94	49.62	17.6	14.6
North IFR1	0SI120	31.00	51.50	17.6	14.6
North IFR2	0SI220	31.03	41.94	17.6	14.6
North IFR3	0SI220	31.03	41.94	17.6	14.6
North IFR4	0SI420	17.30	17.30	17.6	15.0

	Arr	Dep	Tot
Delay	5.73	1.17	3.45
Trav. Time	17.47	14.52	16.00

Total Delay (Hours per Year)
19,281

Travel Time Offset

Total Savings (Hours per Year)

Demand: Future 1 - 1244 ops/day - 413,047 ops/yr

Configuration	Exp. #	Parametric Capacity Arr	Parametric Capacity Dep	Travel Time Arr	Travel Time Dep
South VFR1	1SV120	47.80	50.51	17.4	14.4
South VFR2	1SV220	34.58	50.75	17.6	14.5
South IFR1	1SI120	31.53	53.62	17.6	14.5
South IFR2	1SI220	31.55	43.43	17.6	14.5
South IFR3	1SI220	31.55	43.43	17.6	14.5
South IFR4	1SI420	17.30	17.30	17.6	14.9
North VFR1	1SV120	47.60	50.51	17.4	14.4
North VFR2	1SV220	34.58	50.75	17.6	14.5
North IFR1	1SI120	31.53	53.62	17.6	14.5
North IFR2	1SI220	31.55	43.43	17.6	14.5
North IFR3	1SI220	31.55	43.43	17.6	14.5
North IFR4	1SI420	17.30	17.30	17.6	14.9

	Arr	Dep	Tot
Delay	22.40	2.34	12.37
Trav. Time	17.51	14.47	15.99

Total Delay (Hours per Year)
65,148

Travel Time Offset

Total Savings (Hours per Year)

Demand: Future 2 - 1535 ops/day - 507,725 ops/yr

Configuration	Exp. #	Parametric Capacity Arr	Parametric Capacity Dep	Travel Time Arr	Travel Time Dep
South VFR1	2SV120	54.50	52.30	17.5	14.4
South VFR2	2SV220	33.50	54.60	17.6	14.5
South IFR1	2SI120	31.50	56.30	17.7	14.5
South IFR2	2SI220	31.40	42.40	17.7	14.5
South IFR3	2SI220	31.40	42.40	17.7	14.5
South IFR4	2SI420	17.30	17.30	17.6	14.9
North VFR1	2SV120	54.50	52.30	17.5	14.4
North VFR2	2SV220	33.50	54.60	17.6	14.5
North IFR1	2SI120	31.50	56.30	17.7	14.5
North IFR2	2SI220	31.40	42.40	17.7	14.5
North IFR3	2SI220	31.40	42.40	17.7	14.5
North IFR4	2SI420	17.30	17.30	17.6	14.9

	Arr	Dep	Tot
Delay	63.23	6.95	35.09
Trav. Time	17.53	14.45	15.99

Total Delay (Hours per Year)
298,043

Travel Time Offset

Total Savings (Hours per Year)

214

EXHIBIT 47

Average Delay per Operation Computation

Demand Management Strategy - #20

Weather		Baseline Exp.	Baseline %	Baseline Del.	Baseline Prop.	Future 1 Exp.	Future 1 %	Future 1 Del.	Future 1 Prop.	Future 2 Exp.	Future 2 %	Future 2 Del.	Future 2 Prop.
South	VFR1	0SV120	27.6%	1.09	0.30	1SV120	26.4%	1.90	0.54	2SV120	28.6%	5.38	1.56
	VFR2	0SV220	15.3%	4.85	0.70	1SV220	15.0%	23.20	3.47	2SV220	14.1%	85.99	12.11
	IFR1	0SI120	13.5%	7.68	1.03	1SI120	13.0%	41.87	5.45	2SI120	12.7%	98.61	12.51
	IFR2	0SI220	3.4%	8.13	0.29	1SI220	3.3%	43.30	1.41	2SI220	3.1%	105.19	3.23
	IFR3	0SI220	0.8%	8.13	0.06	1SI220	0.8%	43.30	0.33	2SI220	0.7%	106.19	0.78
	IFR4	0SI420	0.1%	241.54	0.23	1SI420	0.1%	389.20	0.33	2SI420	0.1%	482.16	0.41
North	VFR1	0SV120	29.4%	1.09	0.32	1SV120	29.9%	1.90	0.57	2SV120	30.7%	5.38	1.65
	VFR2	0SV220	4.3%	4.85	0.19	1SV220	4.2%	23.20	0.97	2SV220	3.9%	85.99	3.34
	IFR1	0SI120	2.7%	7.65	0.21	1SI120	2.6%	41.87	1.07	2SI120	2.5%	98.61	2.42
	IFR2	0SI220	2.1%	8.13	0.17	1SI220	2.0%	43.30	0.86	2SI220	1.9%	105.19	1.97
	IFR3	0SI220	0.9%	8.13	0.07	1SI220	0.8%	43.30	0.36	2SI220	0.8%	105.19	0.80
	IFR4	0SI420	0.1%	241.54	0.24	1SI420	0.1%	369.20	0.33	2SI420	0.1%	492.19	0.42
Weighted Avg Delay (Min per Operation)					3.80				15.68				41.20
Computed Avg Delay (Min per Operation)*					3.45				12.37				35.09
IFR Factor					0.99				0.77				0.84

* Based on 10 year weather history

Exhibit 48

Summary of Delays and Savings

	Baseline			Future 1			Future 2		
		Savings/Year			Savings/Year			Savings/Year	
	Delays	Hours	$1M	Delays	Hours	$1M	Delays	Hours	$1M
Basecase 2000 - #1	25,867			110,490			357,976		
Class 3&4 Runway 1500' from 16L/34R - #2	20,400	5,531	$8.9	77,520	32,775	$52.6	219,711	137,629	$220.8
Class 3&4 Runway 2500' from 16L/34R - #3	13,351	12,418	$19.9	41,965	68,145	$109.3	132,273	224,488	$360.1
Full Use Runway 2500' from 16L/34R - #5	10,272	14,988	$24.0	27,056	82,479	$132.3	72,391	283,080	$454.1
- #5 (North Flow Preferred)	10,272	14,990	$24.0	26,914	82,620	$132.5	70,642	284,815	$456.8
Full Use Runway 3300' from 16L/34R with PRM - #6	8,949	16,322	$26.2	23,302	86,199	$138.3	67,274	287,399	$461.0
Modified Full Use Runway (No Heavy A/C) 2500' from 16L/34R - #8	11,107	14,186	$22.8	28,012	81,542	$130.8	80,265	275,181	$441.4
Wake/Vortex Detection System - #10	21,120	4,725	$7.6	96,218	14,089	$22.6	309,992	47,793	$76.7
Without Two CAT II/III ILSs in Experiment #5 - #13	12,977	13,059	$20.9	34,599	76,213	$122.2	84,551	273,611	$438.9
2.5 nmi Intrail in IFR (including VFR2) - #17	20,199	5,658	$9.1	87,719	[illegible]	$36.5	329,326	28,646	$45.9
GPS (No BFI Interaction / No Glide Slope Protection Area) - #18	7,855	17,493	$28.1	18,344	91,405	[illegible]	[illegible]	315,891	$506.4
Demand Management Strategy - #20	19,281			85,148			298,043		

1 Hour = 1,604

IV. Experimental Design and Design Team Schedule

Experimental Design

Proposed improvements will be analyzed with the SIMMOD simulation model. The experimental design normally includes simulations for all weather conditions and configurations. The Design Team may decide that some simulations can be eliminated. Combining improvements into logical packages will also help reduce the required experiments to a manageable number.

Each experiment is assigned a number. The numbering scheme used for the SEA-TAC Capacity Design Team Update is :

```
XYZZ
|||└─→ Improvement Package Number - From Experimental Design Exhibit
||
|└── Flow Direction and Weather ──→  SV1 - South Flow VFR1
|                                    SV2 -     "      VFR2
|                                    SI1 -     "      IFR1
|                                    SI2 -     "      IFR2
|                                    SI3 -     "      IFR3
|                                    SI4 -     "      IFR4
|                                    NV1 - North Flow VFR1
|                                    NV2 -     "      VFR2
|                                    NI1 -     "      IFR1
|                                    NI2 -     "      IFR2
|                                    NI3 -     "      IFR3
|                                    NI4 -     "      IFR4
|
└─── Demand Profile ──────────────→  0 - Baseline
                                     1 - Future 1
                                     2 - Future 2
```

Design Team Schedule

Exhibit 49 lists the recommended milestones and meetings concerning the objectives, and target completion dates of the Seattle-Tacoma Design Team Update activities. These milestones and meetings, held at key decision points, will help the Design Team monitor progress of the study. The target dates are based on the list of improvements and the experimental design as presented in this report. The number of meetings and the dates are tentative, and may be adjusted as progress is achieved.

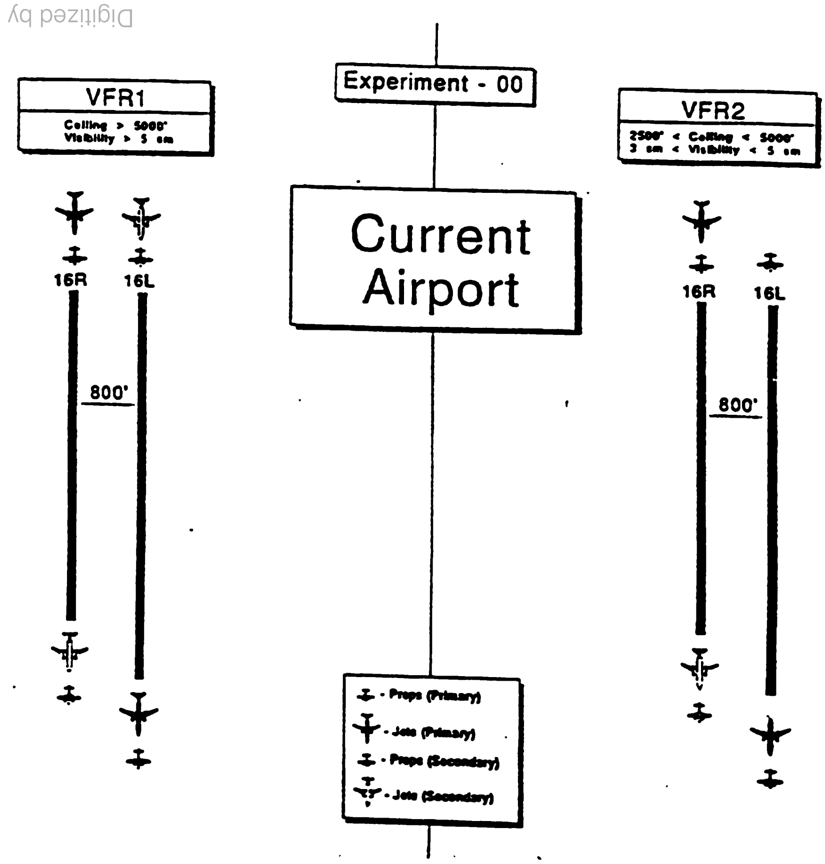
EXHIBIT 49
DESIGN TEAM SCHEDULE

Meeting*	Target Date*	Purpose	Participants/ Responsibility
	10/25/93	On-site data collection. Establish parameters for analytical analysis.	FAAT
1	10/27/93	Kickoff Meeting. Review: Technical Plan, potential improvements, and data requirements.	Entire Design Team
2	12/ 1/93	Discuss: model inputs, assumptions, improvements, forecasts, and initial capacity analysis.	Entire Design Team
3	1/27/94	Agree on model inputs, assumptions, demand forecasts and profiles, and list of improvements	Entire Design Team
4	3/23/94	Review preliminary SIMMOD results, discuss improvements list,	Entire Design Team
5	5/19/94	Review SIMMOD results	Entire Design Team
6	6/23/94	Review SIMMOD results	Entire Design Team
7	8/18/94	Review SIMMOD results	Entire Design Team
8	9/29/94	Review SIMMOD results	Entire Design Team
9	11/17/94	Review SIMMOD results	Entire Design Team
10	1/19/95	Review SIMMOD results	Entire Design Team
11	3/ 2/95	Review SIMMOD results	Entire Design Team
12	4/17/95	Review SIMMOD results	Entire Design Team
	/ /	Publish final report.	FAA HQ

* Number of meetings and target dates are tentative and may be adjusted as progress is achieved.

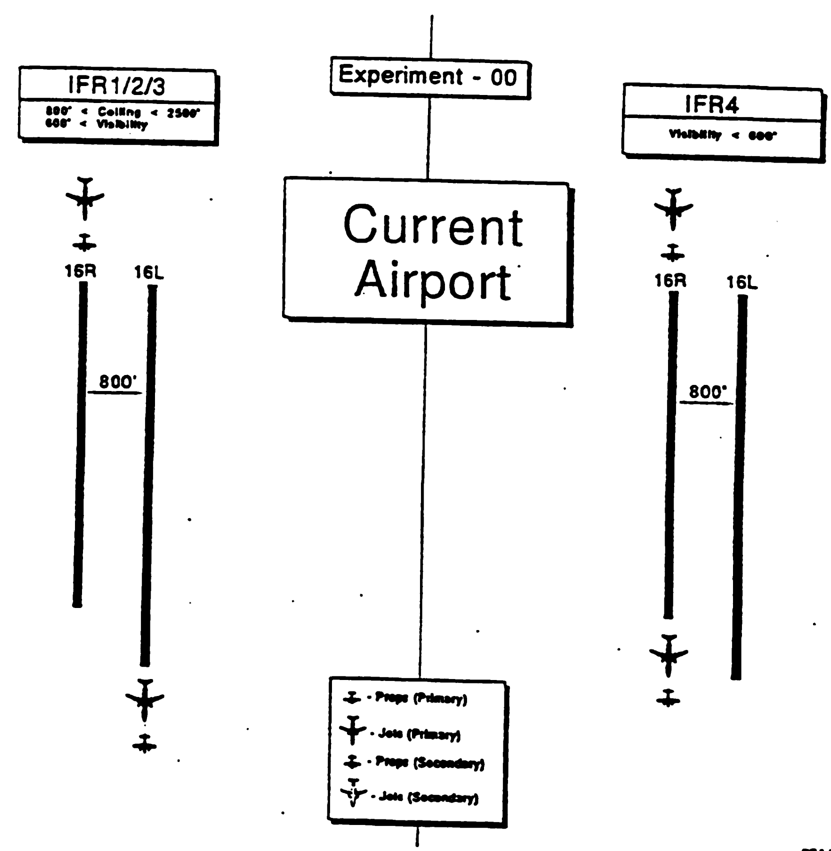
Appendix A

Runway Usage Diagrams

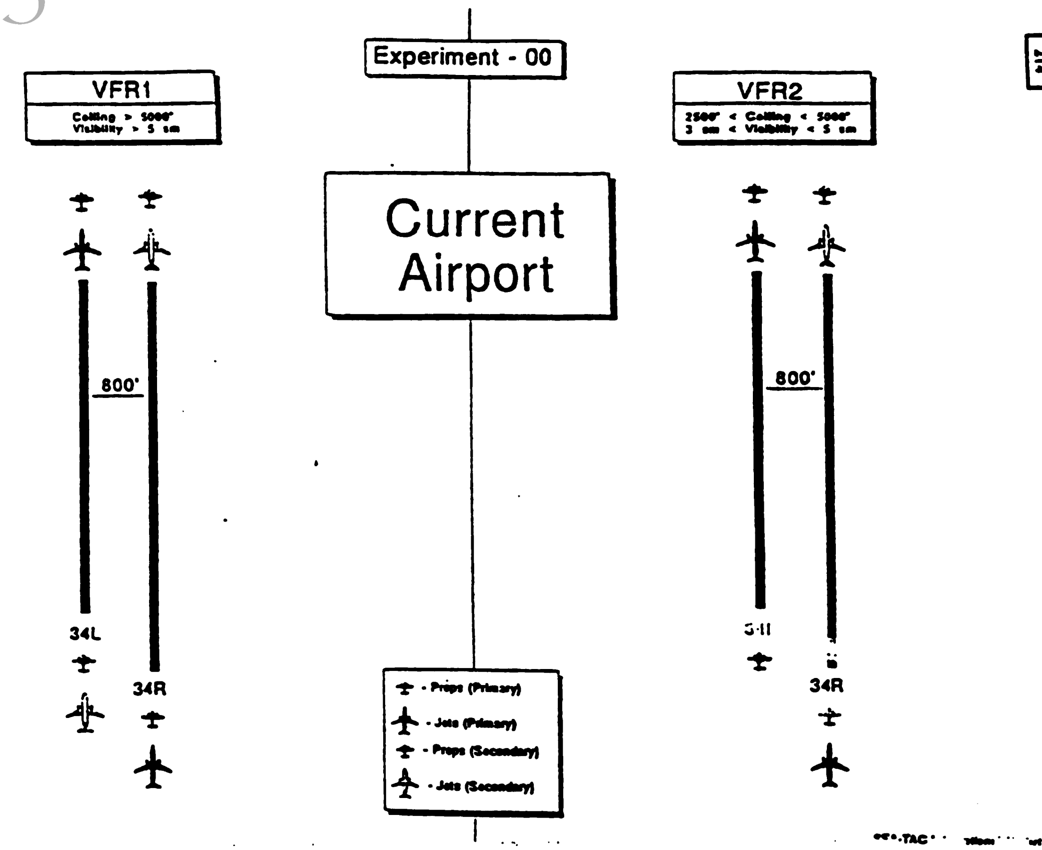

Experiment - 00
VFR1
Ceiling > 5000'
Visibility > 5 sm
VFR2
2500' < Ceiling < 5000'
3 sm < Visibility < 5 sm
Current Airport
16R
16L
800'
- Props (Primary)
- Jets (Primary)
- Props (Secondary)
- Jets (Secondary)

A-2

1504

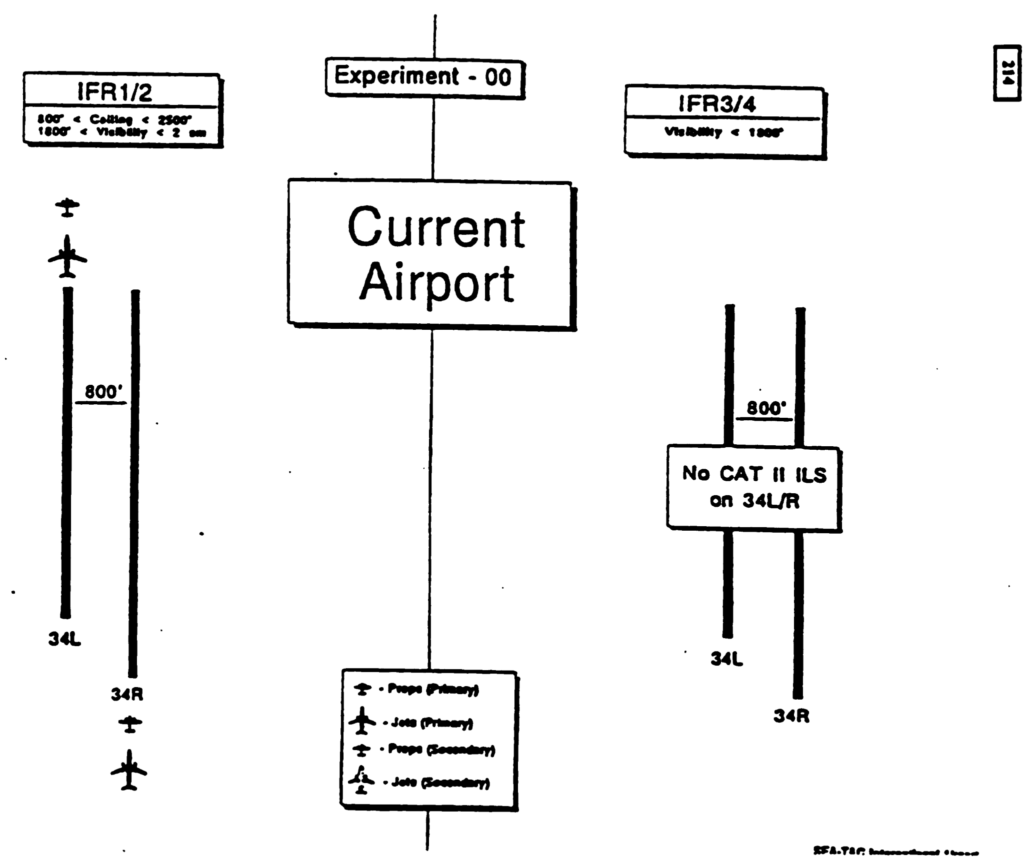

Experiment - 00
IFR1/2/3
IFR4
Current Airport
16R
16L
800'
- Props (Primary)
- Jets (Primary)
- Props (Secondary)
- Jets (Secondary)

A-3

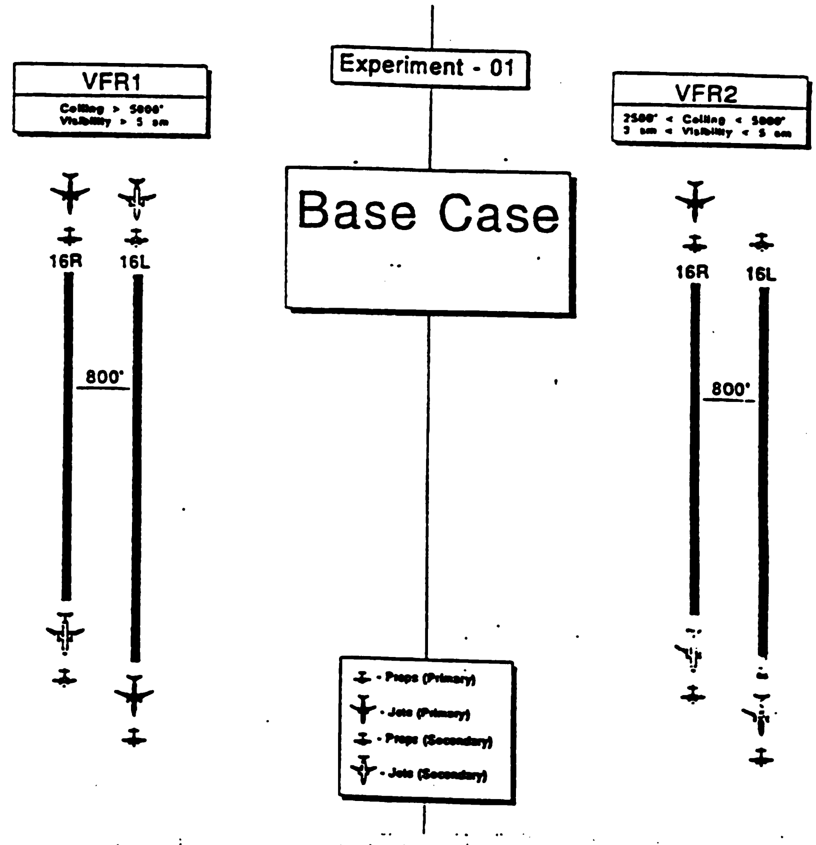

Experiment - 00
VFR1
Ceiling > 5000'
Visibility > 5 sm
VFR2
2500' < Ceiling < 5000'
3 sm < Visibility < 5 sm
Current Airport
800'
800'
34L
34R
34R
- Props (Primary)
- Jets (Primary)
- Props (Secondary)
- Jets (Secondary)

A-4

1505


Experiment - 00
IFR1/2
800' < Ceiling < 2500'
1800' < Visibility < 2 sm
IFR3/4
Visibility < 1800'
Current Airport
800'
800'
No CAT II ILS
on 34L/R
34L
34R
34L
34R
- Props (Primary)
- Jets (Primary)
- Props (Secondary)
- Jets (Secondary)

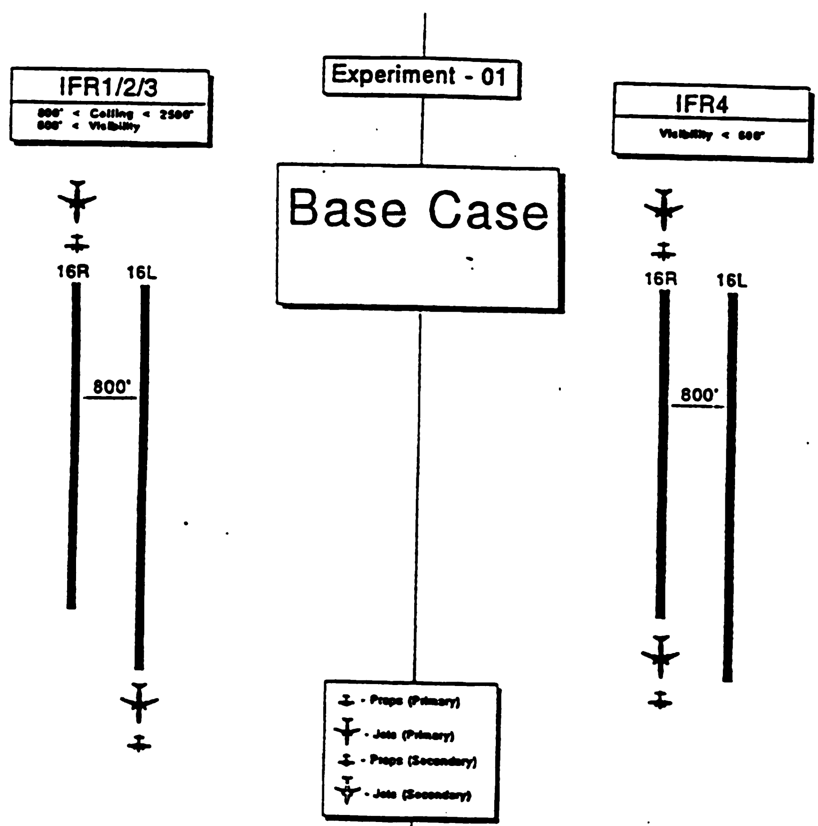
A-5



A-6

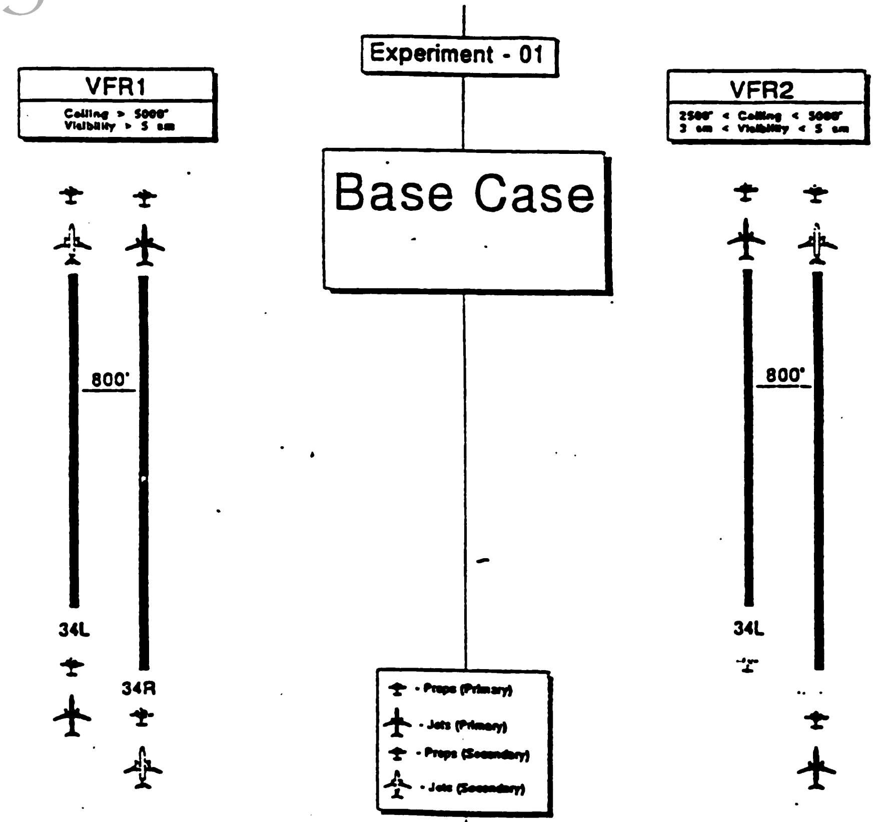
214

1506



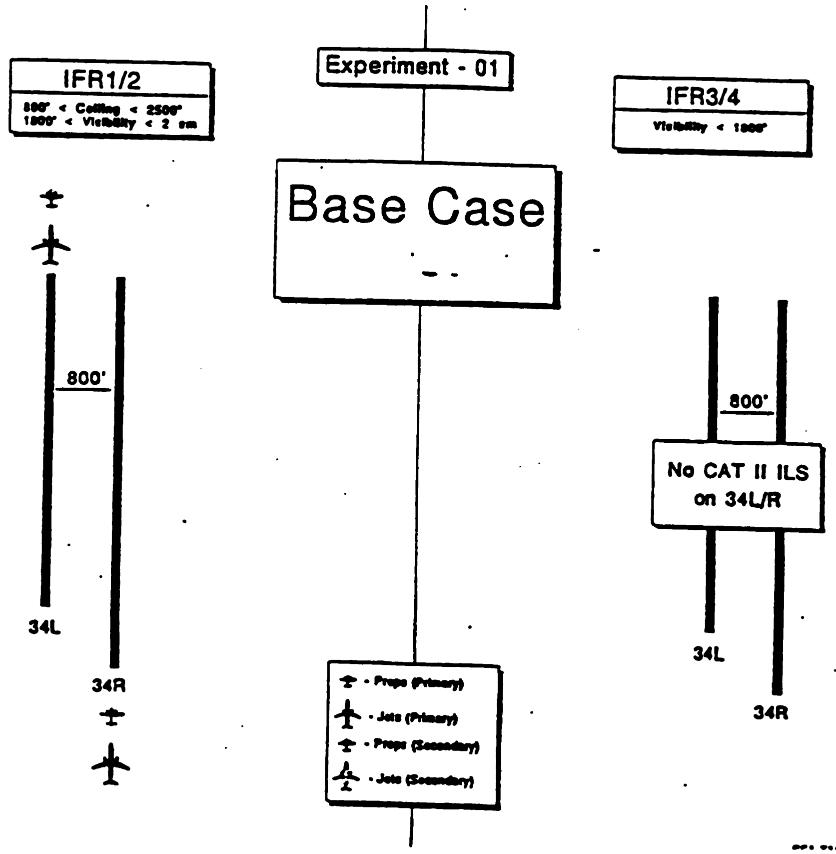
A-7

214

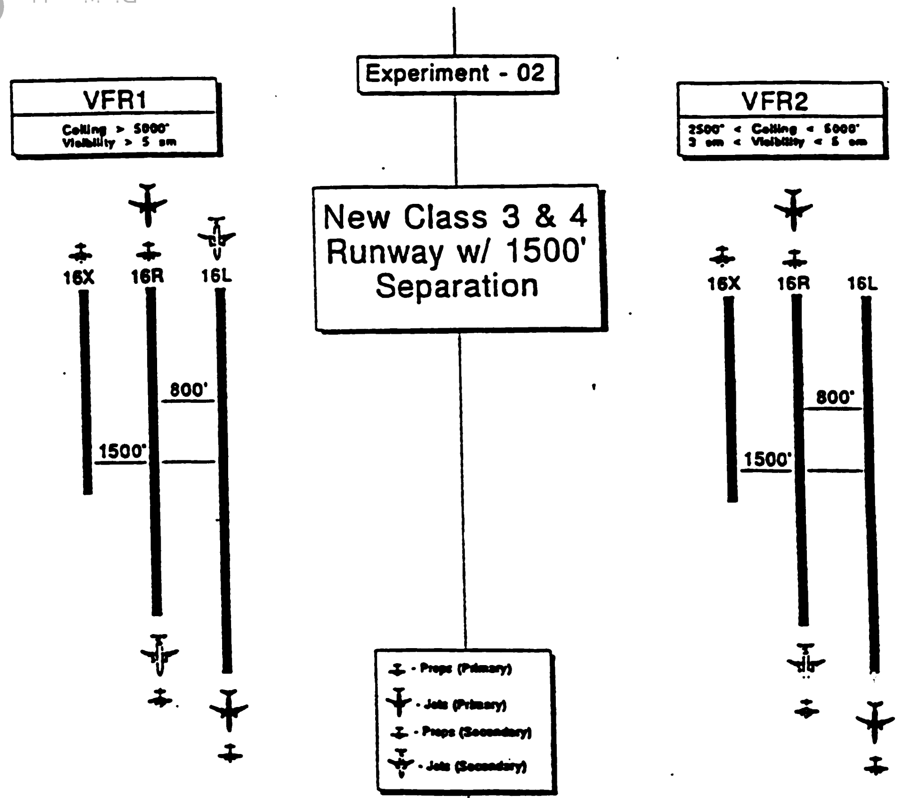

Experiment - 01
VFR1
Ceiling > 5000'
Visibility > 5 sm
Base Case
VFR2
2500' < Ceiling < 5000'
3 sm < Visibility < 5 sm
800'
800'
34L
34R
34L
34R
- Props (Primary)
- Jets (Primary)
- Props (Secondary)
- Jets (Secondary)

A-8

1507


Experiment - 01
IFR1/2
800' < Ceiling < 2500'
1800' < Visibility < 2 sm
Base Case
IFR3/4
Visibility < 1800'
800'
800'
No CAT II ILS
on 34L/R
34L
34R
34L
34R
- Props (Primary)
- Jets (Primary)
- Props (Secondary)
- Jets (Secondary)

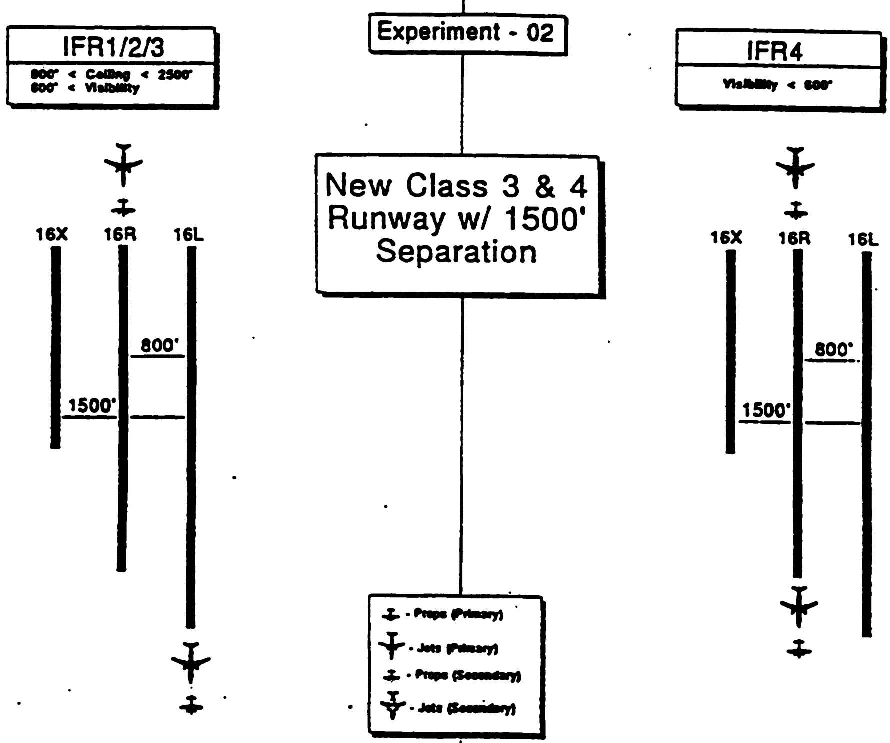
A-9



A-10

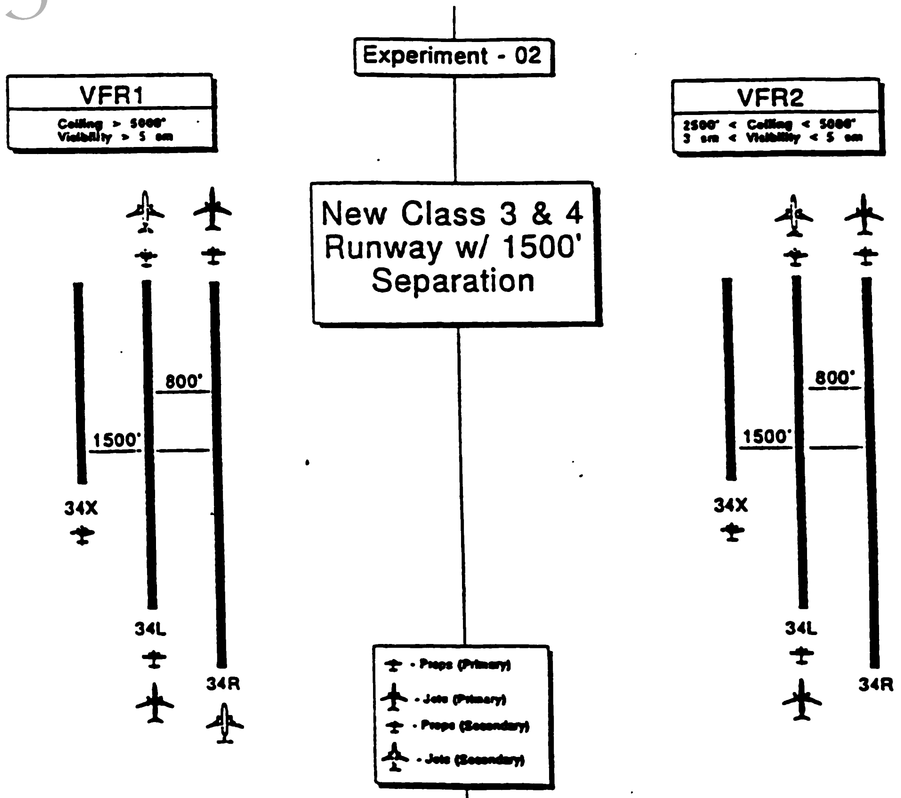
214

1508



A-11

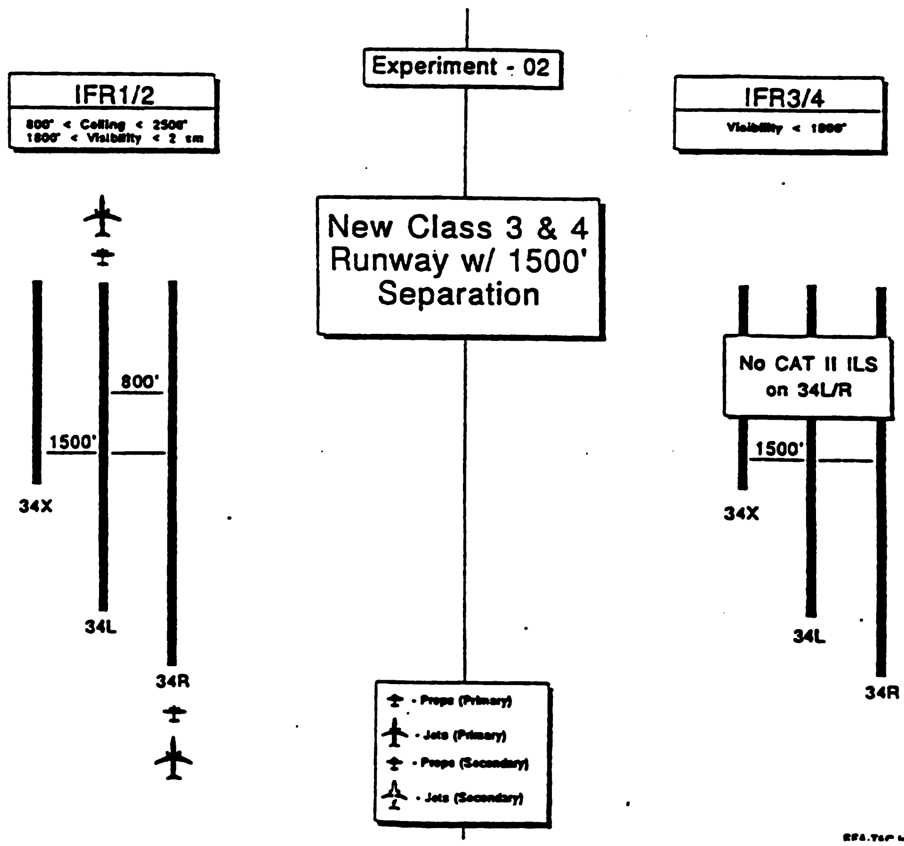
214



214

A-12

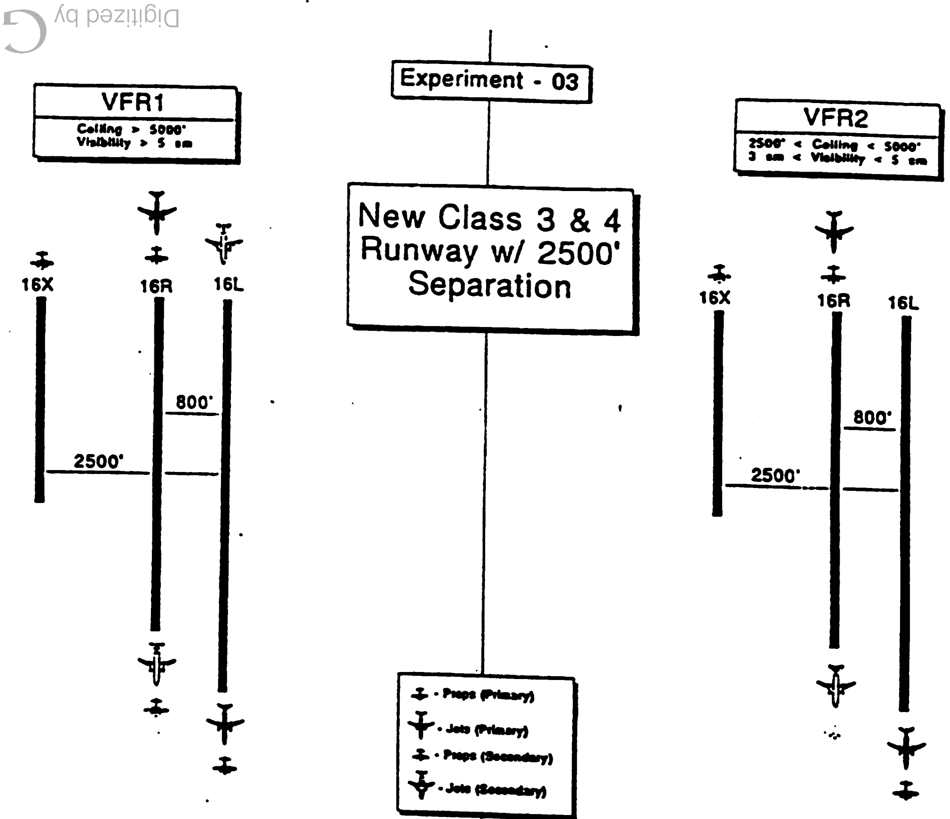
1509



214

A-13

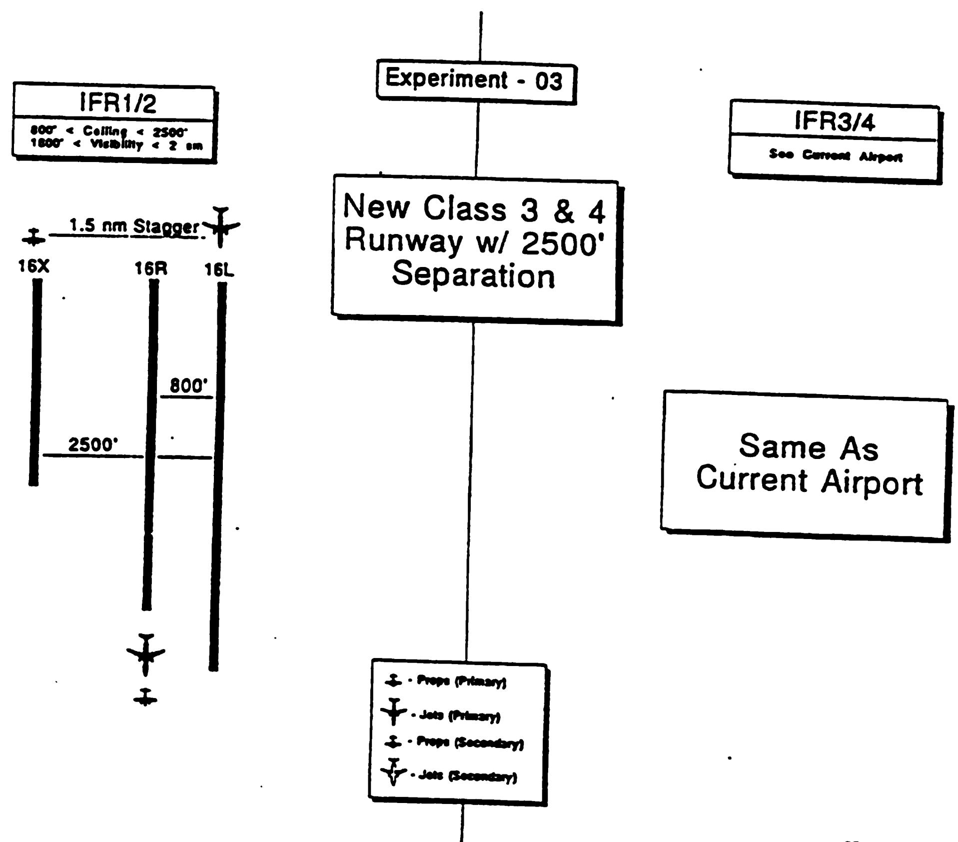
214



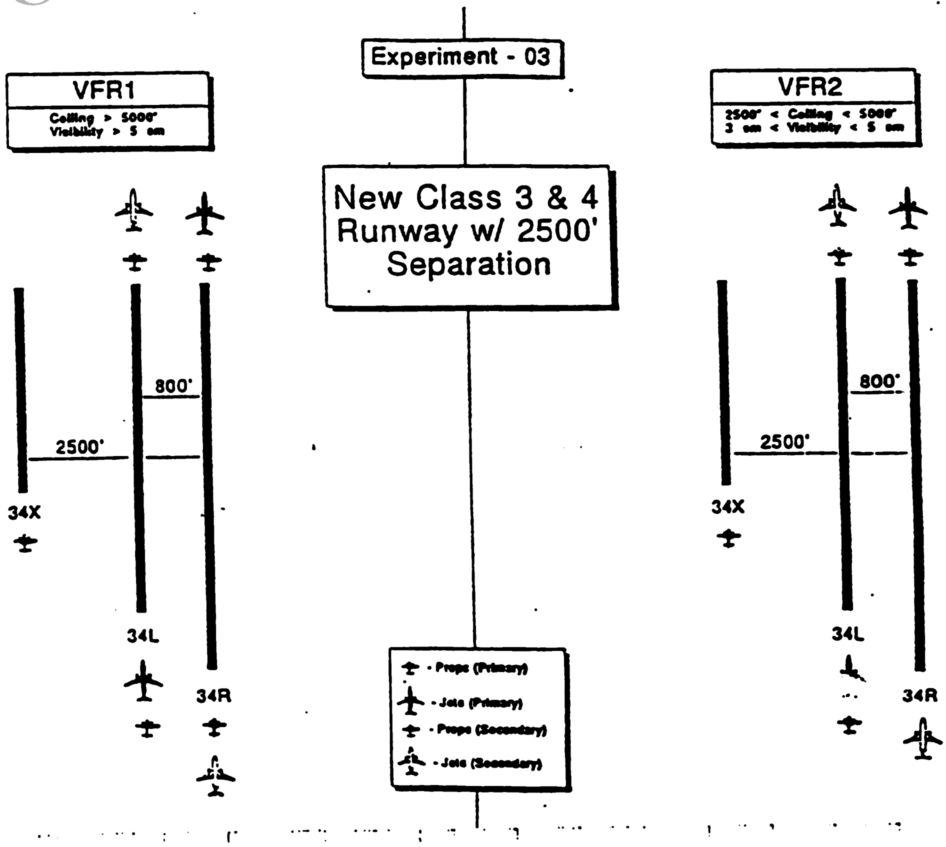
A-14

1510

214



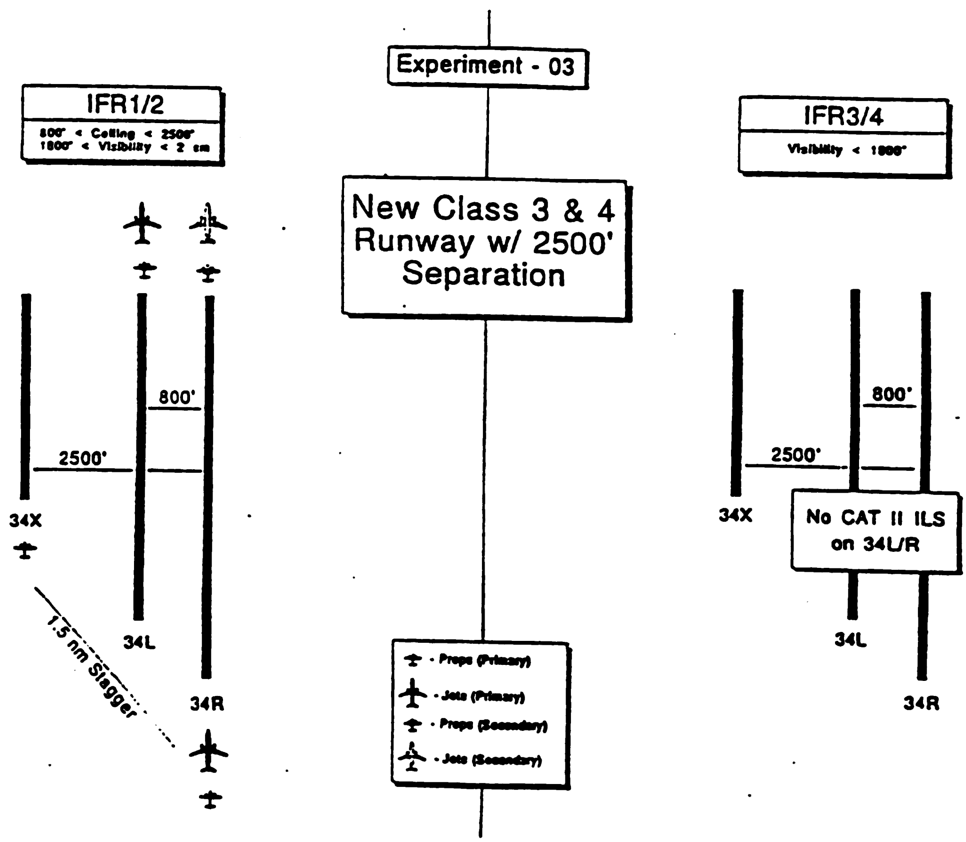
A-15



A-16

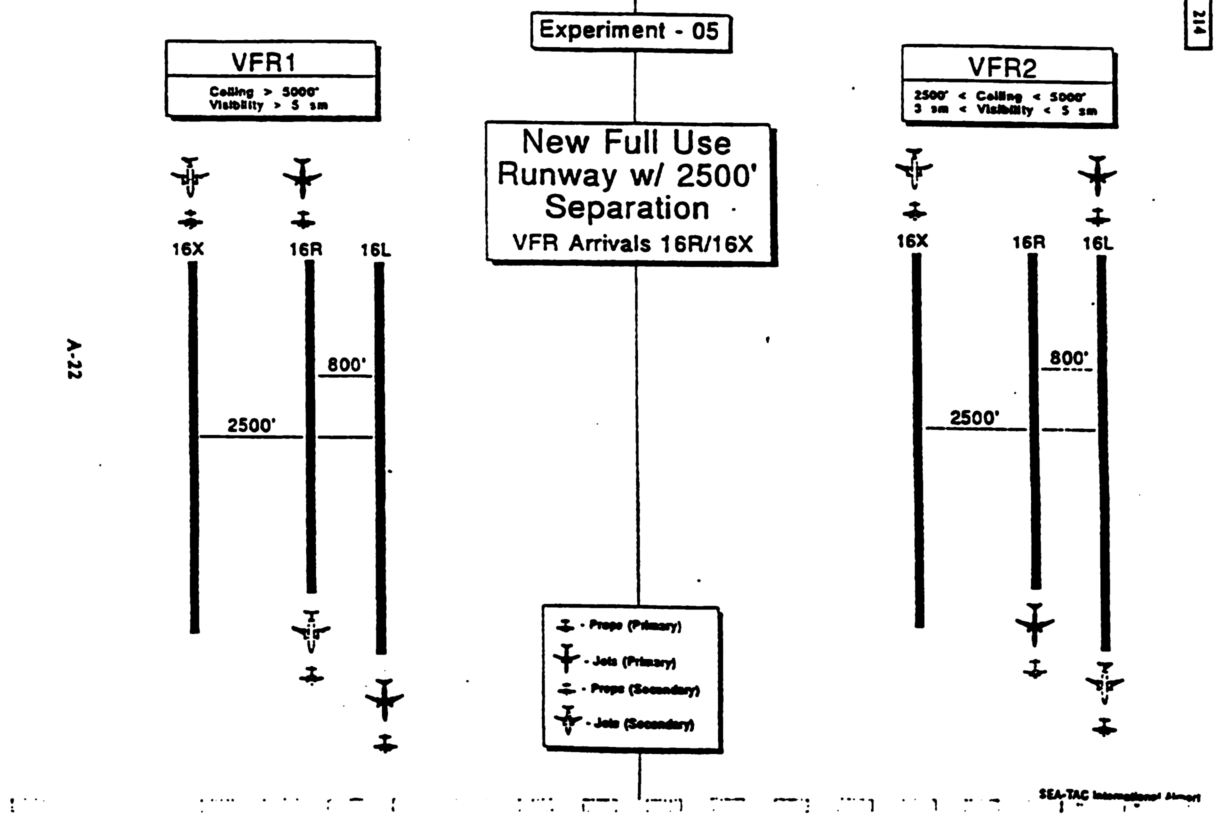
214

1511



A-17

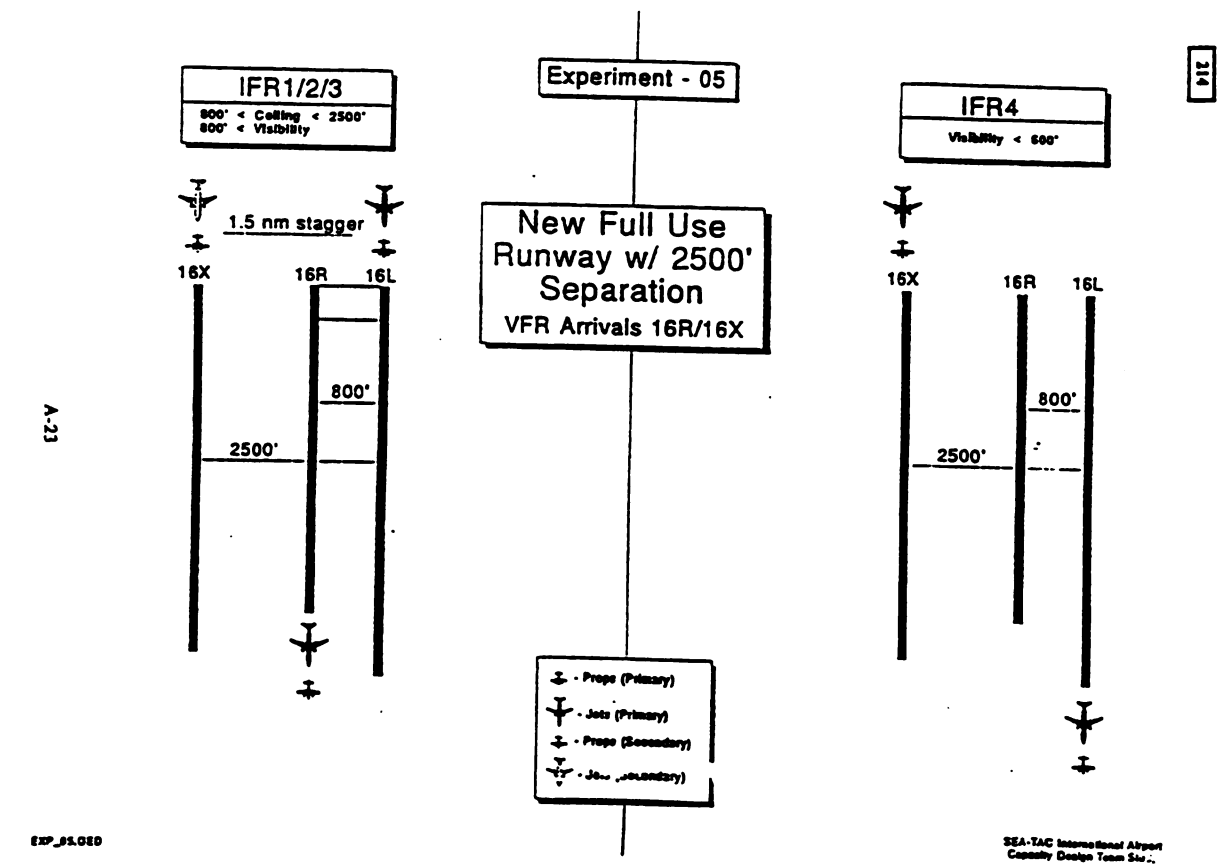
214



A-22

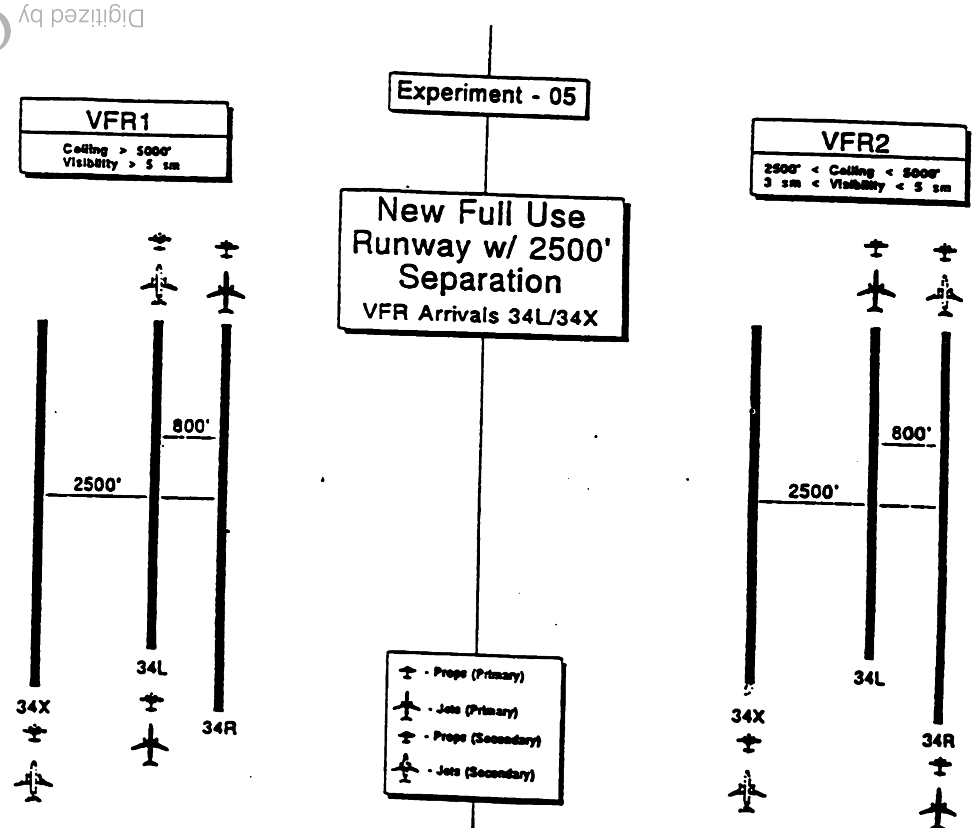
214

1514



A-23

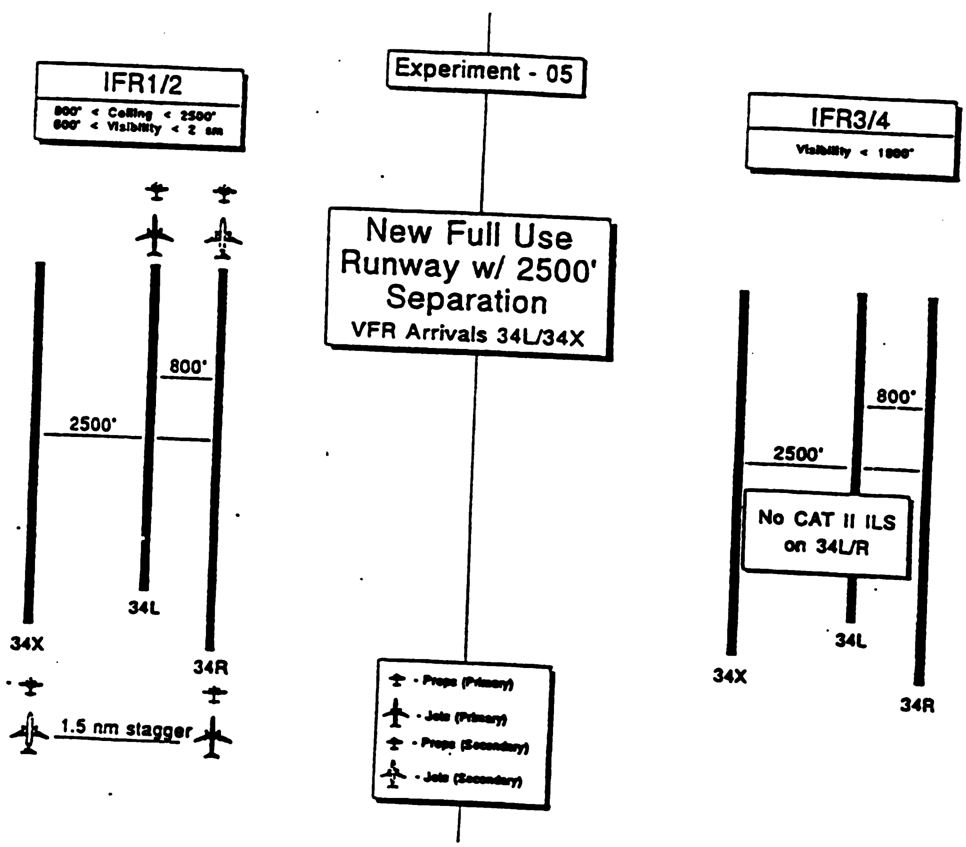
214



214

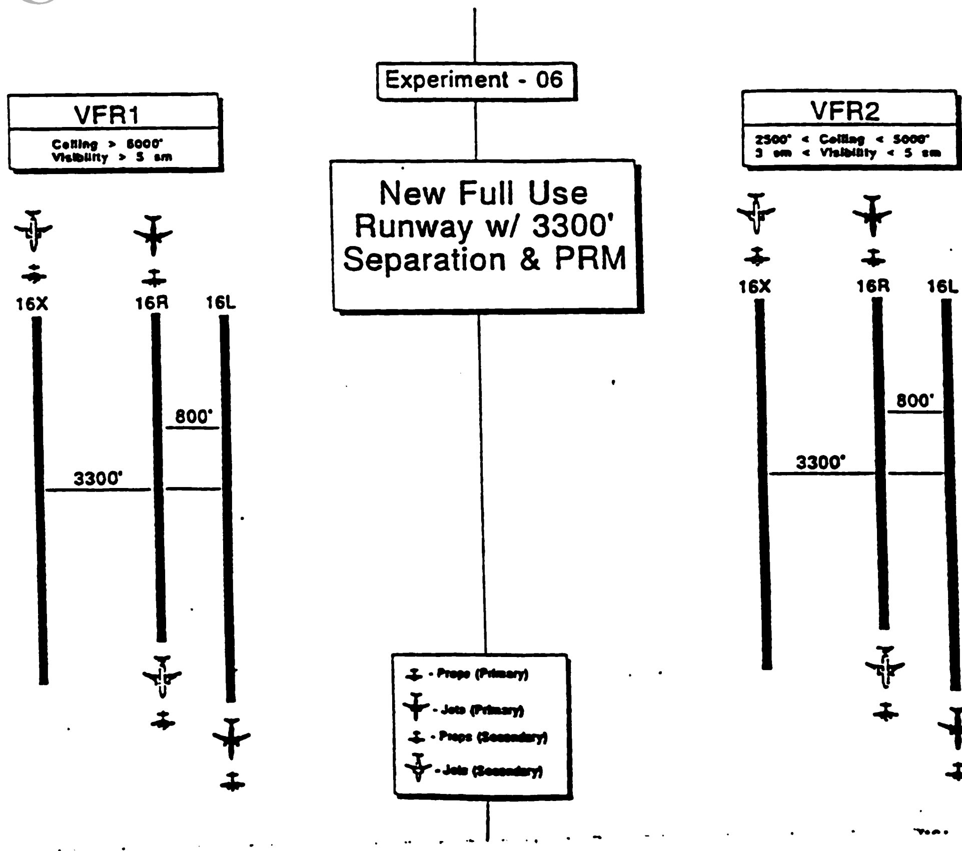
A-24

1515



214

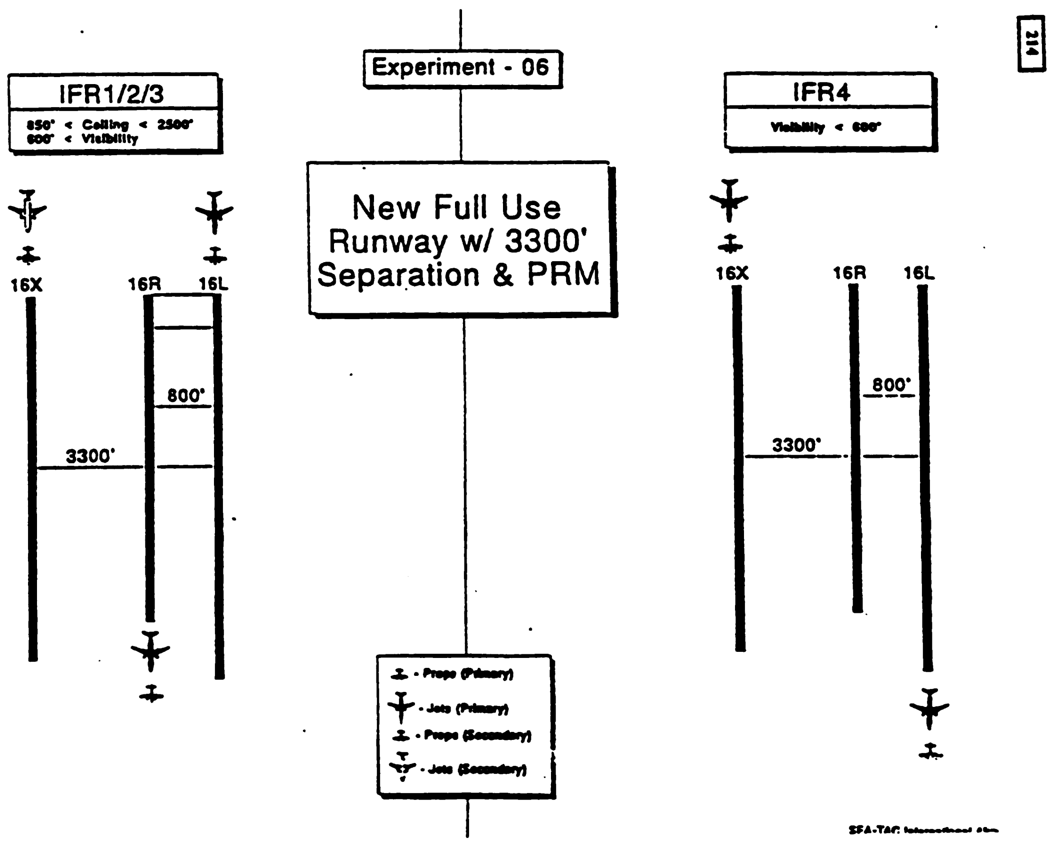
A-25



Experiment - 06
VFR1
Ceiling > 6000'
Visibility > 5 sm
New Full Use
Runway w/ 3300'
Separation & PRM
VFR2
2500' < Ceiling < 5000'
3 sm < Visibility < 5 sm
16X
16R
16L
800'
3300'
- Props (Primary)
- Jets (Primary)
- Props (Secondary)
- Jets (Secondary)
214

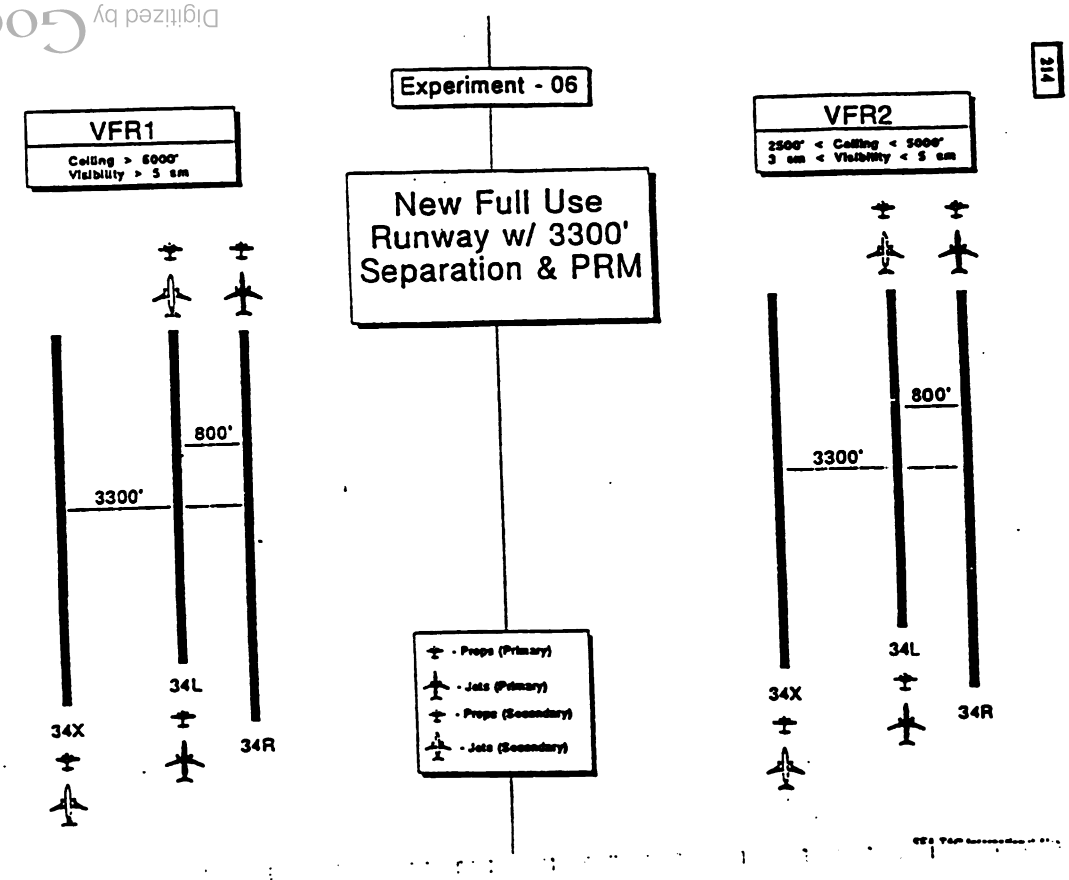
A-26

1516

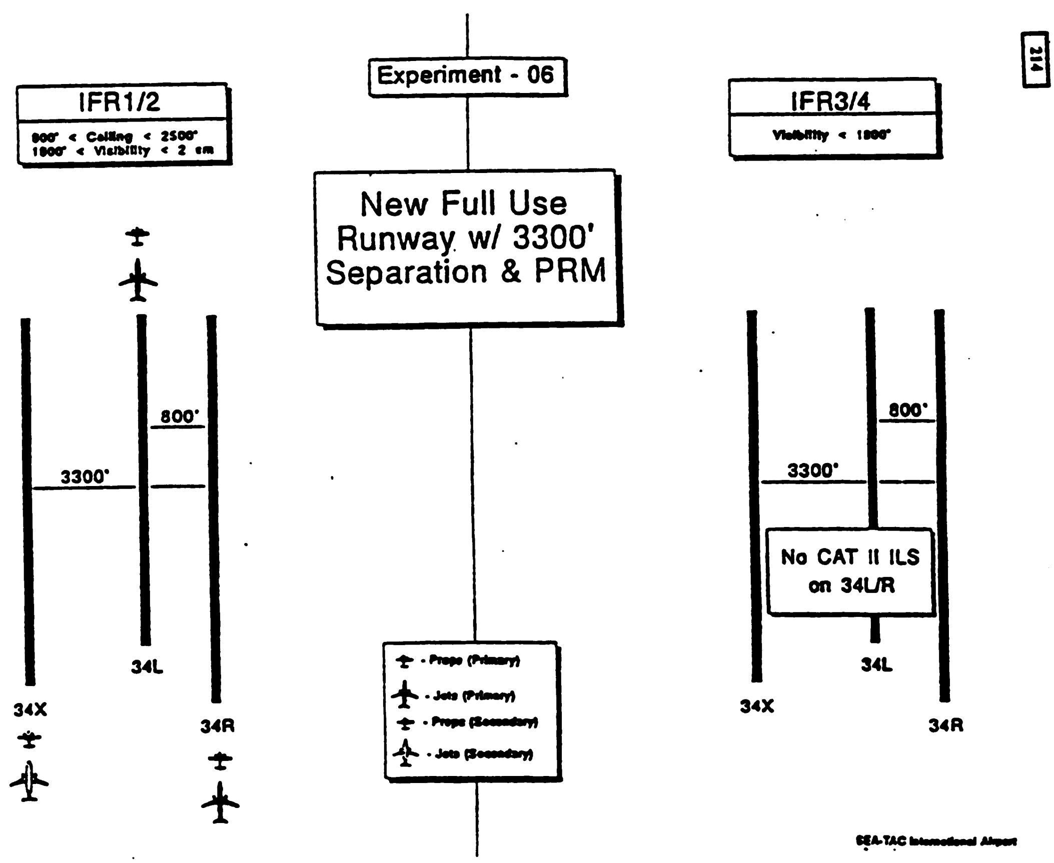


Experiment - 06
IFR1/2/3
850' < Ceiling < 2500'
600' < Visibility
New Full Use
Runway w/ 3300'
Separation & PRM
IFR4
Visibility < 600'
16X
16R
16L
800'
3300'
- Props (Primary)
- Jets (Primary)
- Props (Secondary)
- Jets (Secondary)
214

A-27

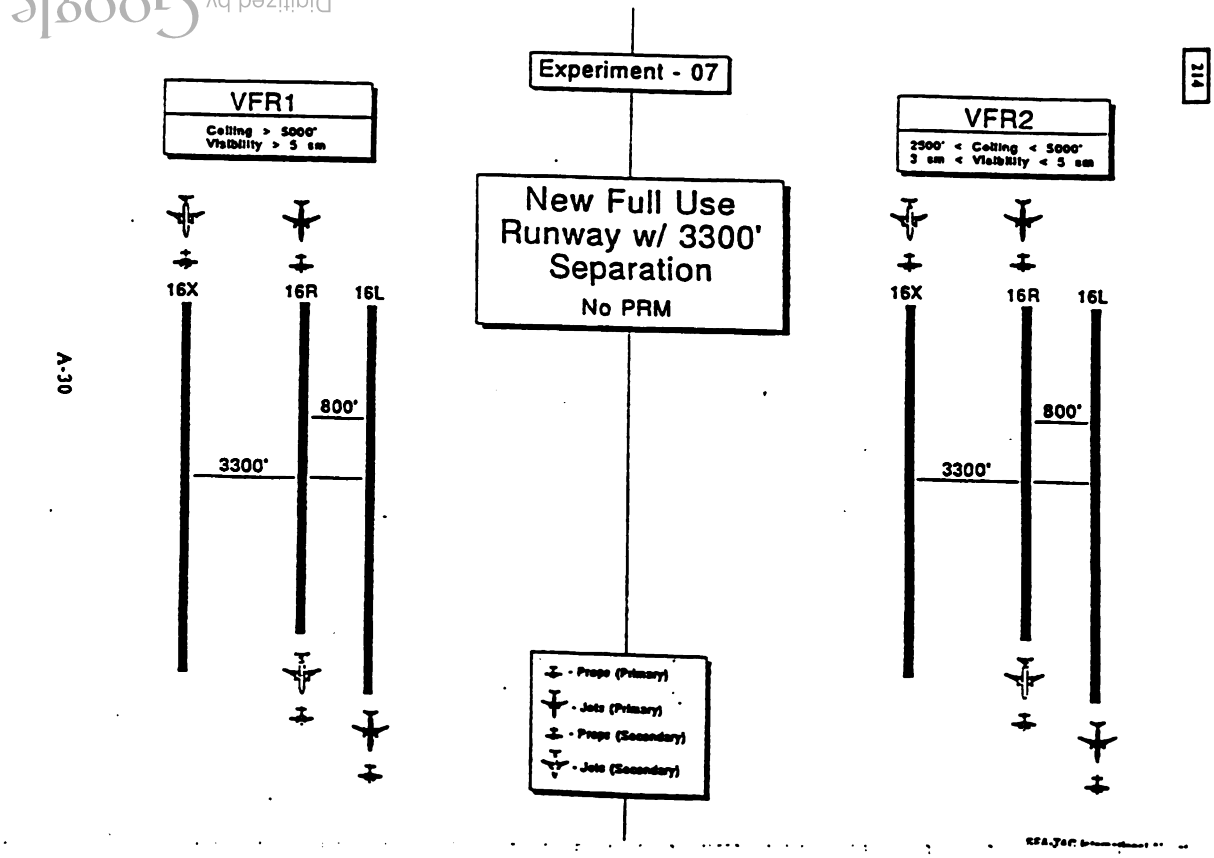

Experiment - 06
VFR1
Ceiling > 6000'
Visibility > 5 sm
New Full Use
Runway w/ 3300'
Separation & PRM
VFR2
2500' < Ceiling < 5000'
3 sm < Visibility < 5 sm
214
800'
3300'
34X
34L
34R
- Props (Primary)
- Jets (Primary)
- Props (Secondary)
- Jets (Secondary)

A-28


Experiment - 06
IFR1/2
800' < Ceiling < 2500'
1800' < Visibility < 2 sm
New Full Use
Runway w/ 3300'
Separation & PRM
IFR3/4
Visibility < 1800'
214
800'
3300'
No CAT II ILS
on 34L/R
34X
34L
34R
- Props (Primary)
- Jets (Primary)
- Props (Secondary)
- Jets (Secondary)
EXP 06 RFD
SEA-TAC International Airport

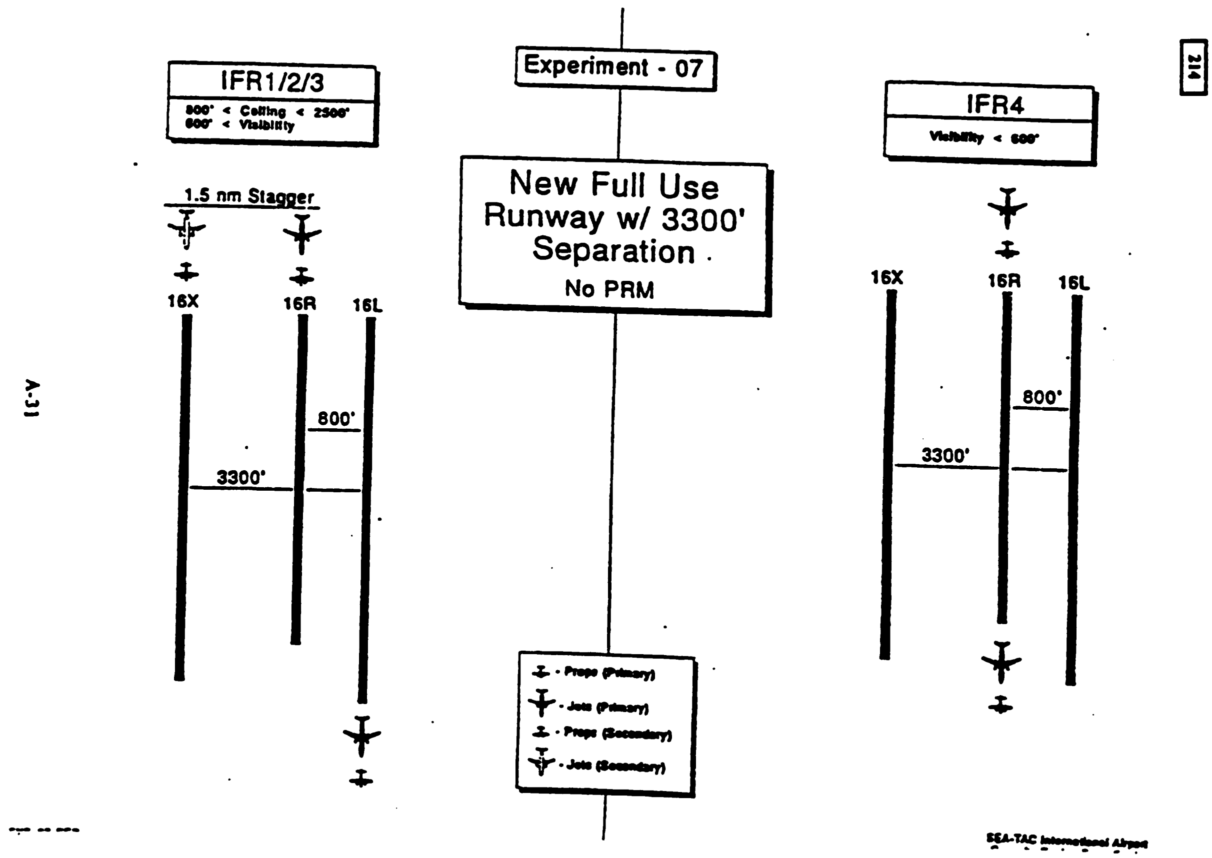
A-29

1518



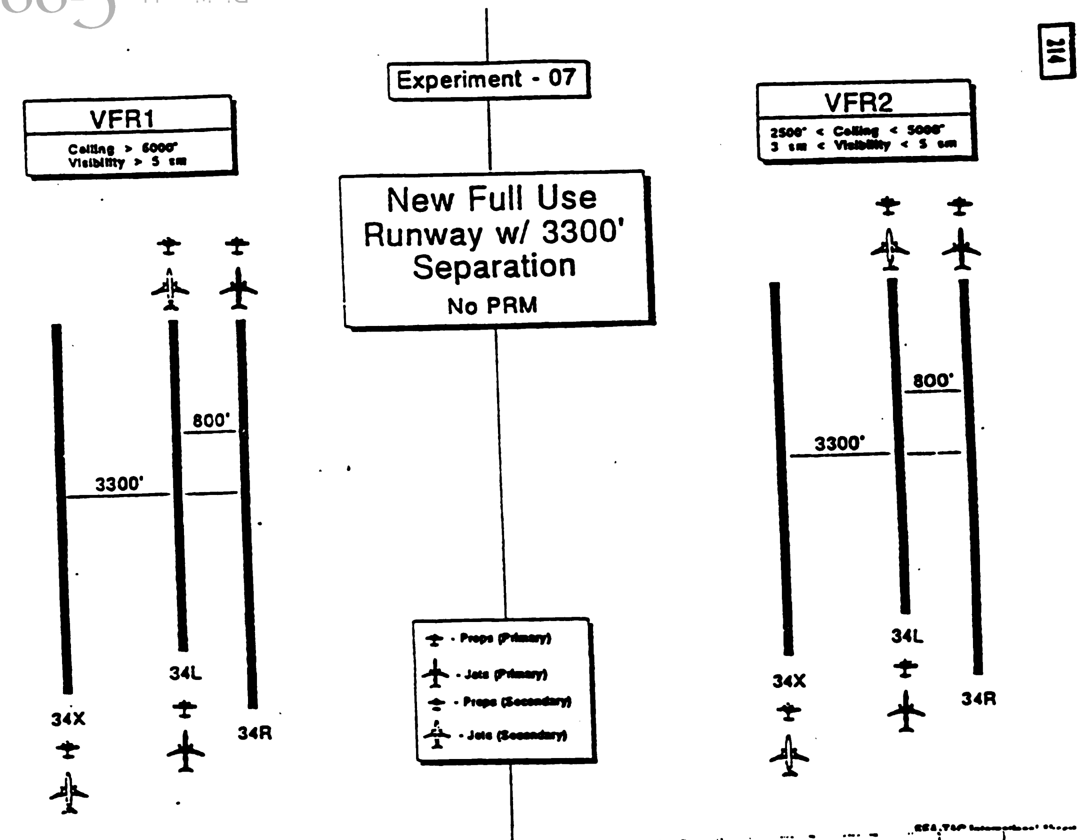
A-30

214



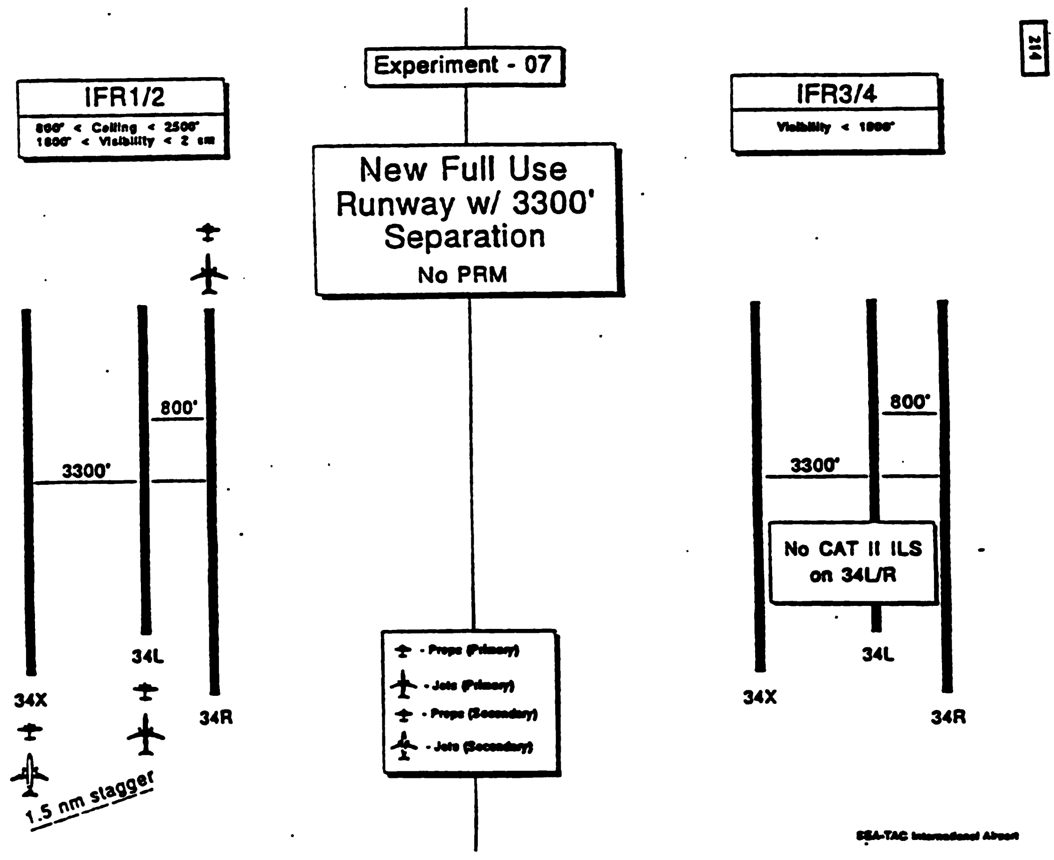
A-31

214

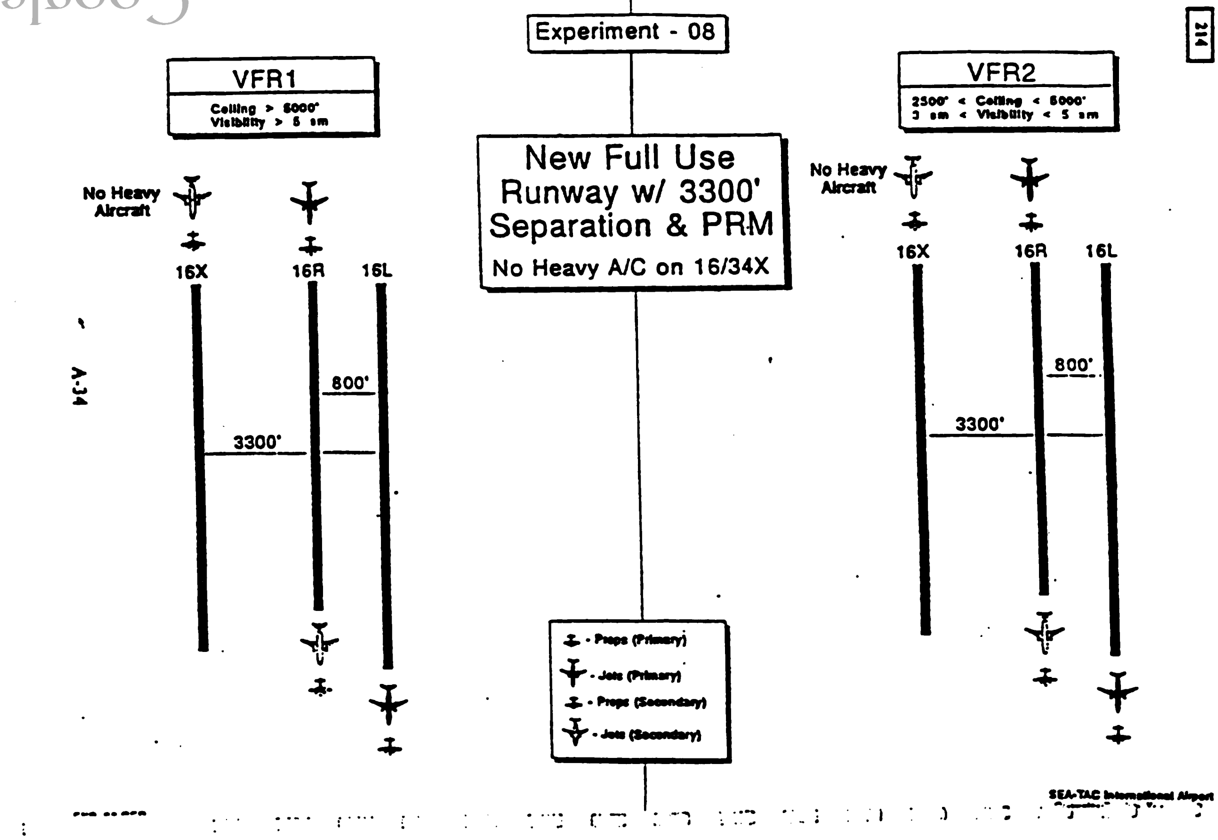

Experiment - 07
VFR1
Ceiling > 6000'
Visibility > 5 sm
New Full Use
Runway w/ 3300'
Separation
No PRM
VFR2
2500' < Ceiling < 5000'
3 sm < Visibility < 5 sm
800'
3300'
34X
34L
34R
- Props (Primary)
- Jets (Primary)
- Props (Secondary)
- Jets (Secondary)
SEA-TAC International Airport
214

A-32

1519

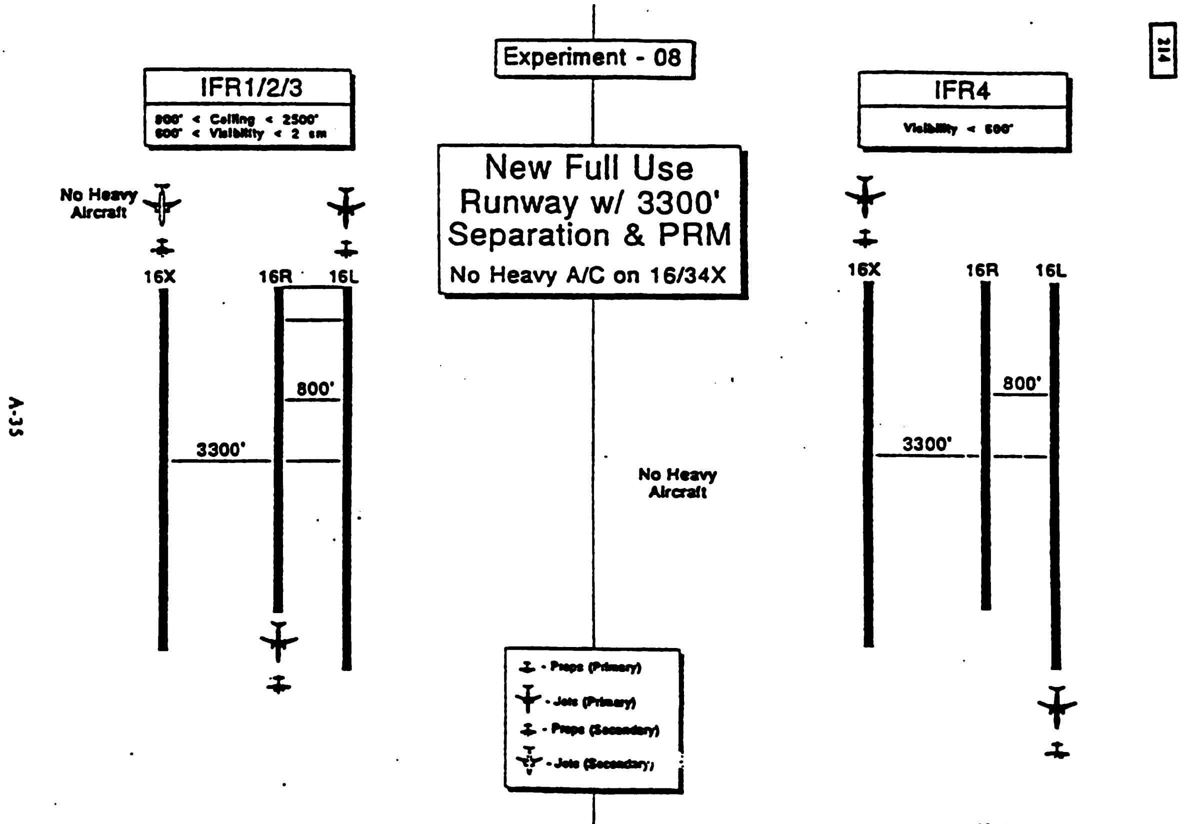

Experiment - 07
IFR1/2
800' < Ceiling < 2500'
1800' < Visibility < 2 sm
New Full Use
Runway w/ 3300'
Separation
No PRM
IFR3/4
Visibility < 1800'
800'
3300'
No CAT II ILS
on 34L/R
34X
34L
34R
1.5 nm stagger
- Props (Primary)
- Jets (Primary)
- Props (Secondary)
- Jets (Secondary)
SEA-TAC International Airport
EXP 07 GFR
214

A-33

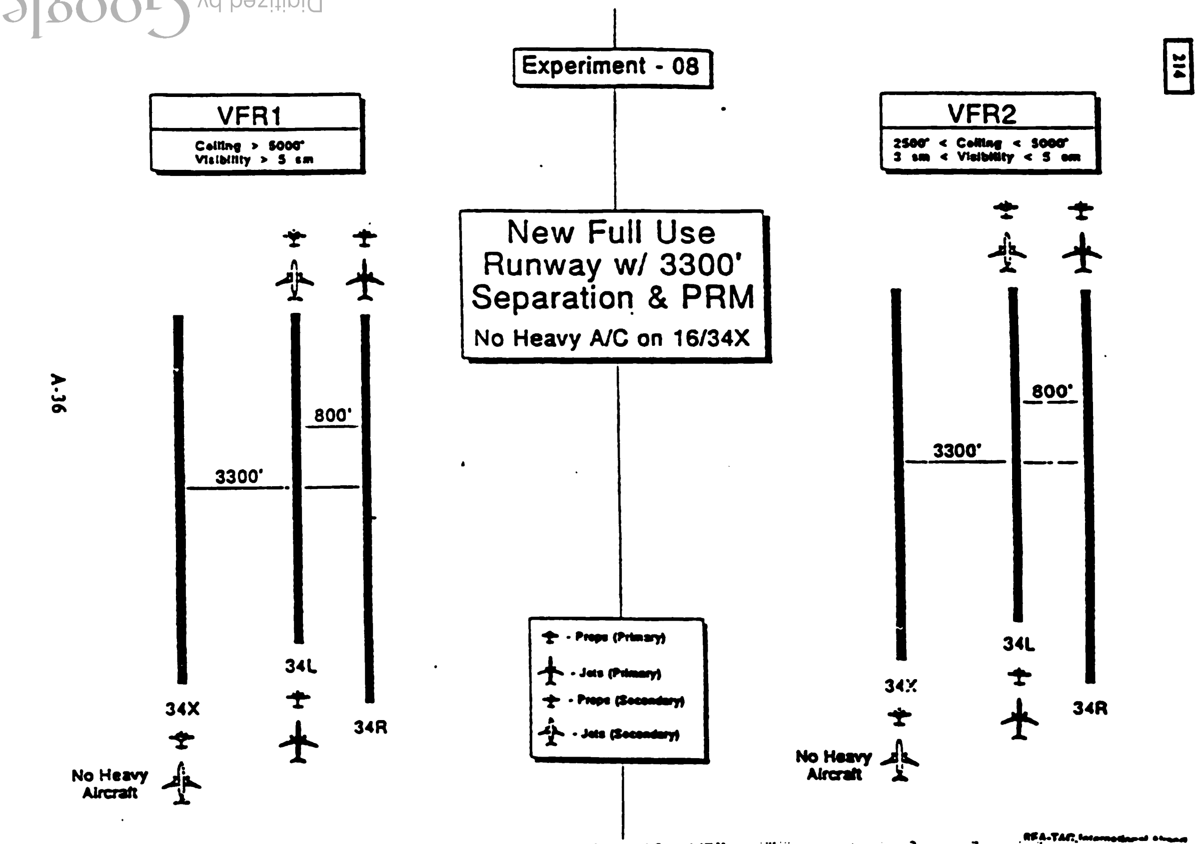

Experiment - 08
VFR1
Ceiling > 5000'
Visibility > 5 sm
VFR2
2500' < Ceiling < 5000'
3 sm < Visibility < 5 sm
New Full Use
Runway w/ 3300'
Separation & PRM
No Heavy A/C on 16/34X
No Heavy Aircraft
16X
16R
16L
800'
3300'
- Props (Primary)
- Jets (Primary)
- Props (Secondary)
- Jets (Secondary)
SEA-TAC International Airport
214

A-34

1520


Experiment - 08
IFR1/2/3
800' < Ceiling < 2500'
600' < Visibility < 2 sm
IFR4
Visibility < 600'
New Full Use
Runway w/ 3300'
Separation & PRM
No Heavy A/C on 16/34X
No Heavy Aircraft
16X
16R
16L
800'
3300'
No Heavy Aircraft
- Props (Primary)
- Jets (Primary)
- Props (Secondary)
- Jets (Secondary)
SEA-TAC International Airport
214

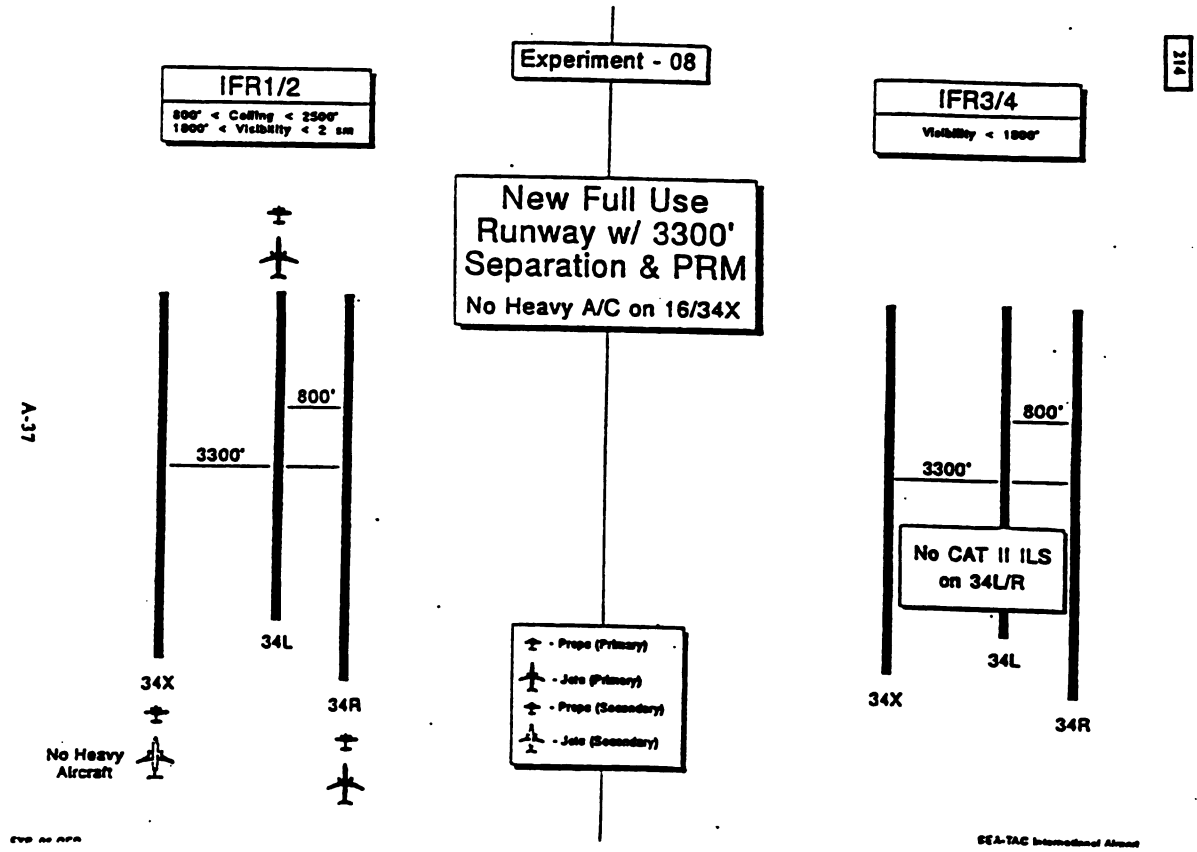
A-35



A-36

214

1521



A-37

214

Puget Sound Regional Council
PSRC

RESOLUTION A-93-03

A RESOLUTION of the General Assembly of the Puget Sound Regional Council Amending the 1988 Interim Regional Airport System Plan (RASP) for Long-Term Commercial Air Transportation Capacity Needs of the Region

WHEREAS, the Puget Sound Regional Council, designated under federal and state laws as the Metropolitan Planning Organization and Regional Transportation Planning Organization for the central Puget Sound region, is responsible for adopting and maintaining regional growth management and transportation strategies for the region; and

WHEREAS, the Regional Council has adopted VISION 2020: Growth and Transportation Strategy for the Central Puget Sound Region, to guide growth management and transportation decisions and actions in King, Kitsap, Pierce and Snohomish counties; and

WHEREAS, VISION 2020 seeks to assure that the people of this region continue to enjoy an outstanding and improving quality of life that includes a vibrant economy, a healthy environment, and livable communities connected by a multimodal, transit-oriented transportation system that emphasizes accessibility and enables the efficient movement of people, goods and freight; and

WHEREAS, with respect to assessments of commercial air transportation needs, the Regional Council acknowledges long term forecasting uncertainties, and the reduction on a day-to-day basis of current airport capacity at Sea-Tac Airport during bad weather conditions; and

WHEREAS, VISION 2020, as the Regional Transportation Plan for the region, includes the 1988 Interim Regional Airport System Plan with language that called upon the region to "proceed expeditiously with the detailed evaluation and selection of a preferred regional air carrier system alternative," and which now needs to be amended to reflect the Regional Council's recent planning and deliberations regarding the long-term commercial air transportation capacity needs of the region; and

WHEREAS, jurisdictions in the region agree to site regional transportation facilities in a manner that reduces adverse societal, environmental and economic impacts; seeks equity and balance in siting and improving the region's transportation system; and addresses regional growth planning objectives; and

WHEREAS, the Regional Council, through the Flight Plan Project, has sought to address policy, environmental, and procedural concerns through a variety of products and processes, including the following:

(a) The Regional Council, acting jointly with the Port of Seattle, completed a non-project Final Environmental Impact Statement evaluating various system alternatives for meeting projected demands and their noise and other environmental impacts, and

(b) The Regional Council conducted a series of workshops, decision meetings, open houses, and a public hearing, to listen to the concerns and suggestions of community groups, individuals and interests that could be affected by a regional commercial air transportation capacity decision; and

WHEREAS, as a part of this effort, the Regional Council finds that commercial air transportation is important to the region's economy, and that additional commercial air transportation capacity needs to be identified and preserved, and implemented when needed at some point in the future; and

WHEREAS, the Regional Council finds that there is no perfect air transportation capacity solution, but that whatever solution is adopted must be part of an integrated transportation system that includes air and marine transportation as well as roadways and rail, that demand management and system management should be utilized to make the most efficient use of the existing system, and that any solution must not result in a decrease in safety and must address noise; and

WHEREAS, the Regional Council further finds that the adopted solution should be flexible, must be consistent with the growth management planning that is occurring in the region, and should be financially feasible; and

WHEREAS, the Regional Council Transportation Policy Board and Executive Board have developed and refined this recommendation to the Regional Council General Assembly; and

WHEREAS, this amendment to the interim Regional Airport System Plan is consistent with the VISION 2020 Final Environmental Impact Statement;

NOW, THEREFORE, BE IT RESOLVED that the Regional Council Executive Board recommends that the General Assembly adopt the following elements of a Regional Airport System Plan amendment:

That the region should pursue vigorously, as the preferred alternative, a major supplemental airport and a third runway at Sea-Tac.

1. The major supplemental airport should be located in the four-county area within a reasonable travel time from significant markets in the region.
2. The third runway shall be authorized by April 1, 1996:
   a. Unless shown through an environmental assessment, which will include financial and market feasibility studies, that a supplemental site is feasible and can eliminate the need for the third runway; and

   b. After demand management and system management programs are pursued and achieved, or determined to be infeasible, based on independent evaluation; and
   c. When noise reduction performance objectives are scheduled, pursued and achieved based on independent evaluation, and based on measurement of real noise impacts.
3. The Regional Council requests consideration by the Federal Aviation Administration of modifying the Four-Post Plan to reduce noise impacts, and the related impacts on regional military air traffic.
4. Evaluation of the major supplemental airport shall be accomplished in cooperation with the state of Washington.
5. Proceed immediately to conduct site-specific studies, including an environmental impact statement, on a Sea-Tac third runway;
6. Eliminate small supplemental airports, including Paine Field, as a preferred alternative.

BE IT FURTHER RESOLVED that the Board is directed to:

1. Take all necessary steps to assure efficient, effective and economical implementation of this resolution.
2. Negotiate with the Port of Seattle, the Washington State Department of Transportation and other responsible agencies, as necessary, to assure the implementation of this resolution.
3. Assure that implementation of this resolution is at all times in compliance with the requirements of all applicable federal, state and local laws and regulations.
4. Report to the General Assembly on the results of its actions at the next regularly scheduled Assembly meeting or at such special meeting of the Assembly as the Board may call.

ADOPTED by the General Assembly this 29th day of April, 1993.

Bill Brubaker
Bill Brubaker, Councilmember
Snohomish County
President, Puget Sound Regional Council

Attest: Mary McCumber
Mary McCumber, Executive Director

STATE OF WASHINGTON
PUGET SOUND REGIONAL COUNCIL

In the Matter of:

Expert Arbitration Panel's Review of Noise and Demand/System Management Issues at Sea-Tac International Airport

PROCEDURAL ORDER

The Expert Arbitration Panel on Noise and Demand/System Management Issues (the "Panel") convened for the first time on August 11, 1994 and held hearings on August 11 and 12, 1994. The focus of these initial hearings was upon the Noise Issues presented to the Panel. The Panel heard a presentation by Mestre Greve Associates, consultant to the Port of Seattle ("POS"), concerning the method the POS proposes to use to validate whether its noise reduction performance objectives are being achieved based on measurements of real noise impacts. The Panel also received oral and written comments from various interested members of the public on the Noise Issues. Turning its attention to the Demand/System Management Issues, the Panel heard preliminary presentations by Claire Barrett & Associates, consultant to the POS on Demand Management, and from Brian Ziegler, speaking for the Washington State Department of Transportation ("WSDOT"), on the System Management option of "high speed rail." A few comments from the public, both oral and written, were also received on these issues.

At the close of the hearings, the Panel announced that it would defer its decision on the question of whether the noise validation method proposed by the POS is satisfactory, that the Panel would hold additional hearings on both Noise and Demand/System Management Issues later this year, and that it would issue a Procedural Order laying out its next steps and its expectations for various participants in the hearing process. This is the Panel's Procedural Order.

Background.

The Panel was appointed in June 1994 by the Secretary of the WSDOT. The appointment of the Panel followed the adoption of Resolution A-93-03 by the Puget Sound Regional Council (the "PSRC"), the PSRC's promulgation of "Implementation Steps" for the Panel, and the execution of a Memorandum of Understanding ("MOU") among the PSRC, the Federal Aviation Administration (the "FAA"), the POS and the WSDOT. It may be useful for the Panel to lay out the provisions of the Resolution, the Implementation Steps and the MOU pertaining to its consideration of Noise Issues.

Resolution A-93-03. The Resolution provides that "the region should pursue vigorously ... a third runway at Sea-Tac" and that the third runway "shall be authorized by April 1, 1996

... [w]hen noise reduction performance objectives are scheduled, pursued and achieved based on independent evaluation, and based on measurement of real noise impacts."

PSRC's "Implementation Steps." As adopted on August 26 and revised on September 23, 1993, the Implementation Steps for the Panel's work on the Noise Issues provide that the Sea-Tac Noise Budget and Nighttime Limitations Program (established as "Mediated Noise Abatement Actions" for the Airport), the restrictions on aircraft power back operations and engine run-ups (established in the Airport's Schedule of Rules and Regulations) and the Acoustical Insulation Program (set forth in Port of Seattle Resolution 31.25) are "responsive" to the Resolution. The Implementation Steps continue, by providing that a "method of independent validation needs to be developed that the Noise Budget and Nighttime Limitations Program noise reduction objectives are sufficient to cause a reduction in measurable real ('on-the-ground') noise by 1996." The Implementation Steps specify that this "validation method shall utilize the measurement of on-the-ground noise by the existing airport noise monitoring system at Sea-Tac Airport." The Implementation Steps direct the Port of Seattle to lead the development of the validation method and to collect and present the required noise data, and provide that in early 1996 the Panel "will determine whether the noise reduction objectives are being pursued and achieved and resulting in a reduction in measurable on-the-ground noise."

Appendix A to the Implementation Steps, in its final form, provides in ¶ 5.1 (dealing with the Noise Issues) that the Panel is to "convene in 1994 to validate the methodology to determine whether the Noise Budget and Nighttime Limitations programs are sufficient to cause a reduction in on-the-ground noise by 1996." It continues, "[t]he Panel will reconvene in late 1995 to early 1996 to determine whether the noise reduction performance objectives are being pursued, and achieved as scheduled (including a reduction in on-the-ground noise)[1] based upon its independent evaluation of information generated through measurement of on-the-ground noise by the noise monitoring system around Sea-Tac International Airport."

Appendix B to the implementation steps provides a general description of existing noise programs. With respect to the Noise Budget, Appendix B provides: "The purpose is to achieve an annual reduction in noise energy produced by aircraft operations. The Budget includes annual maximum noise energy for each year between 1991 and 2001." With respect to the Nighttime Limitations Program, Appendix B provides: "The purpose is to phase out [Stage] 2 aircraft during nighttime hours."

MOU. The MOU, executed in March 1994, states that its purpose is "to formalize the implementation process" and "to set out the rules and responsibilities of the Coordinating Committee ... as well as the rules and responsibilities of individual Committee member agencies." In Part II.D the MOU provides that the Coordinating Committee is to "[e]nsure the use of the noise reduction validation methodology set forth in Appendix B [to the MOU]," and in Part II.B that the "noise reduction programs to be implemented include the ground source programs identified in Implementation Steps, Section III.A.2." The MOU provides in Part IV.D that the POS is to "[u]ndertake the noise reduction validation in consultation with the other

[1] The Panel learned midway through the course of its initial hearings that the words "reasonable, meaningful" had been deleted from the PSRC's original description of the reduction in on-the-ground noise to be validated.

members of the Coordinating Committee and in conformance with Appendix B [to the MOU].[6] Appendix B to the MOU is reproduced, in its entirety, in the margin.[7]

APPENDIX B

The method to validate that the Noise Budget and Nighttime Limitations Program noise reduction objectives result in a reduction in on-the-ground noise by 1996 will at a minimum address the following issues:

1. Forecast the expected relationship of the reduction in the value of the noise metric used in the noise budget and the measured aircraft DNL noise levels appropriate to each of the monitoring sites.

2. The number and location of the existing noise monitoring sites that will be used in the program will be specified. Provisions for removal of data from any failed site must be allowed for.

3. The reference base year noise level will be the aircraft DNL annual average noise level as measured by the Port's permanent noise monitoring system during the 1989-90 time period.

4. The reduction of the average annual on-the-ground noise level will be determined from the average energy reduction in measured aircraft DNL from all of the sites used in the program relative to the base year measured DNL noise levels. The average annual noise reduction for calendar years 1994 and 1995 will be used in monitoring the noise reduction trends.

5. Present a comparison (using available data) in corresponding years of the measured noise reduction per paragraph 4 with the reduction in airport noise exposure level calculated in accordance with Appendix A of the Mediated Agreement.

6. Calibration of the Permanent Noise Monitoring System will be completed using an agreed upon program that is consistent with calibration procedures for airport permanent noise monitoring systems. The measured aircraft DNL noise levels will be considered acceptable if the system has been calibrated in accordance to these procedures.

Data to measure on-the-ground noise reduction shall be determined by using the measured aircraft DNL noise data from the Port's Permanent Noise Monitoring System at Sea-Tac Airport.

I. SCOPE OF PANEL'S INQUIRY ON NOISE ISSUES.

The Panel recognizes that questions have been raised about the scope of its inquiry on Noise Issues. The Panel intends to proceed in two phases. In Phase I, the Panel will address three distinct questions:

1. Has the Panel been asked to determine whether the goals of the Noise Budget and the Nighttime Limitations Program, if achieved, would produce a significant reduction in real noise impacts on-the-ground?

2. If so, would achievement of the noise reduction performance objectives of the Noise Budget and Nighttime Limitations Program produce a significant reduction in real noise impacts on-the-ground?

3. Is the Noise Validation Methodology proposed by the POS a reliable method for determining, on the basis of measurements of actual on-the-ground noise using the existing noise monitoring system at Sea-Tac, whether the noise reduction performance objectives of the Noise Budget and Nighttime Limitations Program have been achieved?

The Panel is of the view that under the Resolution, the Implementation Steps and the MOU the POS has the burden of showing the Panel that it has satisfied the noise reduction performance objectives imposed by the Resolution.

The Panel acknowledges receipt of the August 19, 1994 letter from the Coordinating Committee (which includes the POS) addressing the first question. The Panel will assume, absent an independent submission by the POS, that the Coordinating Committee's August 19 letter, coupled with the points raised by the Port during the hearings in August, contains the entire argument of the POS on this question. The Panel invites responses from the public to the Coordinating Committee's August 19 letter, and invites the POS further to express its views on the second and third questions we have posed in Phase I of our consideration of the Noise Issues. The Panel also invites comments from the PSRC, the WSDOT, the FAA and the public on these questions.

If the Panel determines, in its Phase I decision, that the Noise Validation Methodology proposed by the POS is a reliable method for determining whether appropriate noise reduction performance objectives have been met, the Panel will turn in Phase II of its deliberations, scheduled to take place in late 1995, to the question of whether the POS has demonstrated that it has achieved such goals for noise reduction by 1996.

II. INFORMATION REQUESTS.

At the hearings on August 11 and 12, 1994, the Panel requested a variety of additional information from the POS, its consultants, the FAA, the PSRC, the WSDOT and the public. Some portions of that information — for example, the transcript of the hearings, WSDOT's report on the passenger surveys regarding high-speed rail, and the minutes of the PSRC Executive Board meetings of September 23 and October 28, 1993 — have already been provided to us. The Panel has laid out in the three attachments to this Order a variety of requests for information from the FAA, the public and the POS in an effort to clarify and supplement the remaining requests we made during the hearings themselves.

All information submitted in response to these requests should be transmitted to the Puget Sound Regional Council, for distribution to the Panel and inspection by the public, no later than October 29, 1994.

III. COMMENT PERIOD.

The Panel solicits written comments from all members of the Coordinating Committee and from the public on its Phase I questions on Noise Issues. To be considered, comments for the Panel must be received by the PSRC by 5:00 p.m. on October 29, 1994. Any party wishing to submit comments may do so by sending eight (8) copies of their comments to the PSRC. No party should attempt to communicate in any other way with any member of the Panel.[3] Shortly after the close of the comment period, the PSRC will forward a complete set of all comments to each member of the Panel.

IV. NEXT STEPS.

The Panel will reconvene and hold a public hearing at the offices of the PSRC beginning on December 1, 1994 (at 9:30 a.m.) and continuing on December 2, 1994. The Panel will consider the following subjects during these two days of hearings:

1. The Panel will first turn to the question of the scope of its inquiry on Noise Issues, and will conduct an oral hearing on the question of whether the Panel has been asked to determine whether the goals of the Noise Budget and the Nighttime Limitations Program, if achieved, would produce a significant reduction in real noise impacts on-the-ground. The Panel will offer a brief opportunity to those who have submitted written arguments on *this* question to make an oral presentation to the Panel, and expects that it may have questions for the representatives of the Coordinating Committee, including the POS, and for members of the public who have submitted arguments. The Panel will not entertain oral argument from any party that has not submitted written comments on this question by October 29, 1994.

2. The Panel will next turn to the responses it receives to its requests for information (both during the hearings in August and in the attached requests), and expects to have questions for the POS and possibly for responding members of the public about their responses. The Panel urges the POS to make its noise consultant, Mestre Greve Associates, available to answer the Panel's questions.

[3] The Panel takes this opportunity to remind all interest parties that this is the *only* approved method of communicating with the Panel outside the hearings themselves. No party should send any communications directly to the Panel members.

3. Finally, on December 2, the Panel expects to receive presentations from the POS and the WSDOT on the Demand/System Management Issues, and to receive public comment on those Issues.

   In anticipation of this hearing on the Demand/System Management Issues, the Panel strongly encourages both the POS and WSDOT to submit to the PSRC (for distribution to the Panel and for public inspection) whatever written materials it intends to rely upon on the Demand/System Management Issues at least two weeks before the hearing, to provide the Panel and the public with a reasonable opportunity to review the material before the hearing begins.

In addition, as requested by the public at the hearings in August, the Panel will hold a public hearing at a location satisfactory both to interested members of the public and to the PSRC on December 1, 1994 beginning at 7:00 p.m. to provide an opportunity for the Panel to hear from members of the public who have been or will be unable to attend hearings of the Panel during regular business hours. The Panel invites, during this session, comments from the public on any subject before the Panel. The Panel, however, reserves the right in its sole discretion to limit comments to what it considers to be useful matters, and to adjourn the hearing at a time of its own choosing.

The Panel anticipates that it will render its Phase I decision on Noise Issues during or shortly after the December 1 and 2 hearings.

Scott P. Lewis, Chair

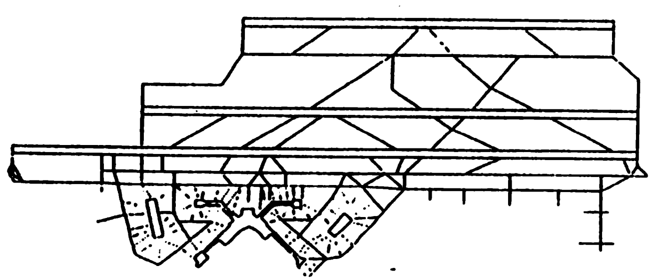
William Bowlby

Martha J. Langelan

Date: September 22, 1994

214

Impact of Boeing Field Interactions on the Benefits of a Proposed New Runway at Seattle-Tacoma International Airport



prepared for
FAA Northwest Mountain Region
under subcontract from
MITech Incorporated, Washington, D.C.

Aviation Simulations International, Inc.
Huntington, New York

July, 1992

214

214

Table of Contents

1. Introduction and Executive Summary

This evaluation of the impact of the interaction between Sea-Tac and Boeing Field International Airports on the benefits of a new air carrier runway at Sea-Tac has been performed by Aviation Simulations International, Inc. (ASI), of Huntington, New York, in fulfillment of a subcontract from the MiTech Corporation under FAA contract DTFA01-88-Y-01068.

1.1 Background

Previous studies by ASI[1] and others have concluded that the ability of the Sea-Tac International Airport (SEA) to accommodate forecast growth in air traffic demand is limited primarily by a capacity shortfall that occurs under low ceiling-visibility conditions when only a single stream can be used for arrivals to the airport. To relieve this condition, and thus extend the life of the airport, it would be necessary to construct a new runway that would permit the use of dual approach streams during these adverse weather conditions.

Under current FAA regulations, at least a 2500-foot separation is required between runways to permit simultaneous approaches. It has been proposed, therefore, that a new 7000-foot air carrier runway, 17/35, be located west of the existing pair of close parallel runways, 16L/34R and 16R/34L. The proposed new runway would be separated from eastmost Runway 16L/34R by 2500 feet, thus providing for dependent simultaneous approaches, and also eliminating the need for wake turbulence separation. A preliminary design for such a runway, along with the supporting taxiway system developed by The Port of Seattle (fig. 1-1) were used in this study.

The existence of King County/Boeing Field International Airport (BFI), only five miles north of SEA (fig. 1-2), however, presents a potential impediment to achieving full utility of the new runway. The vast majority of flights using BFI operate independently of SEA under Visual Flight Rules (VFR). Flights that use Instrument Flight Rules (IFR), however, are controlled so that proper separation is maintained from SEA flights. Special airspace procedures unique to SEA and BFI have been developed to lessen the impact of operations at one airport that affect operations at the other.

Adding a third runway at SEA would further complicate the airspace interaction between SEA and BFI. It may not be possible to develop procedures that will permit full use of the runways at both airports under all conditions. It may, therefore, be necessary to make policy decisions as to the use of runways and the relative priority of flights to these runways.

---

[1] "Evaluation of Airport/Airspace Alternatives for Sea-Tac International Airport", by Aviation Simulations Intl., Inc., under contract to P&D Technologies, April 1988.

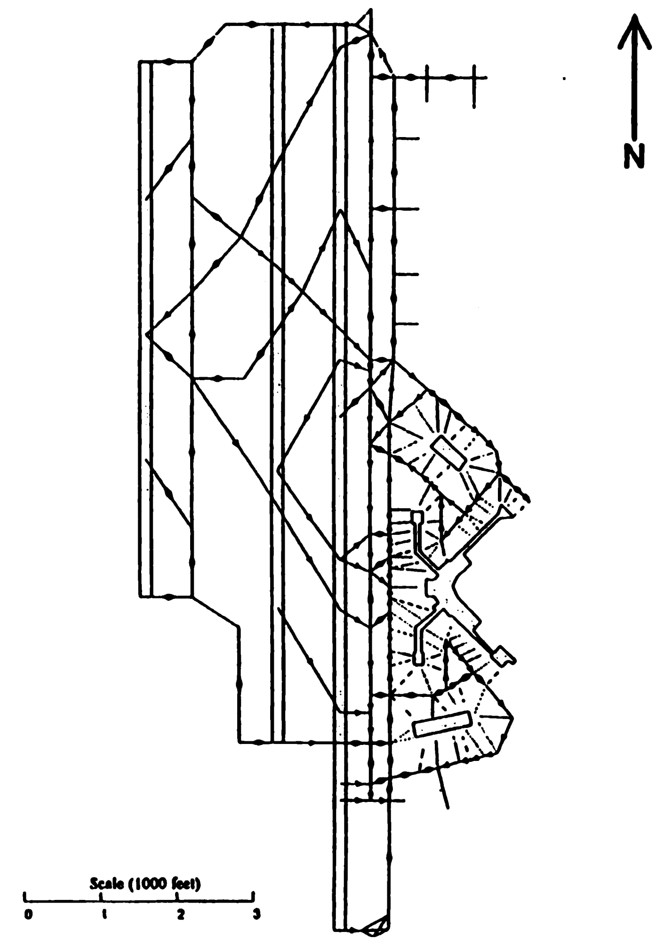


Figure 1-1 SEA With Proposed New Runway

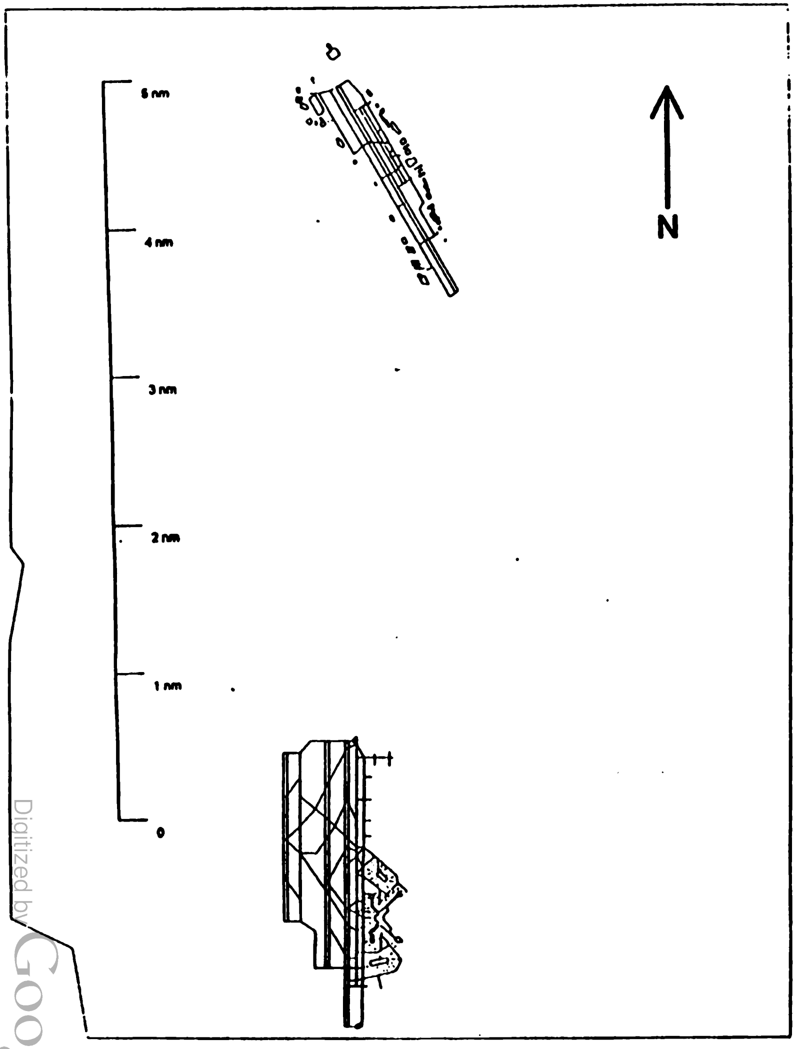


Figure 1-2 Location of BFI Relative to SEA

1.2 Project Objectives

The subject study was therefore commissioned to evaluate the impact of these SEA/BFI interactions on the benefits of the proposed new SEA runway. The specific objectives of this project were twofold:

a) to develop quantitative estimates of the user costs and delays for specified alternatives and assumptions;

b) to demonstrate graphically the hypothetical future operation so as to establish the validity of the analysis, and enhance understanding of the dynamics of the interaction between the two airports.

1.3 General Approach

The primary tool used to perform the required evaluations was The Airport Machine simulation model. Using this model, the two-airport system was simulated, with and without the new runway, for:

- both directions of flow,
  - north
  - south
- three traffic demand levels
  - year 1990 demand
  - year 2000 forecasted demand
  - year 2015 forecasted demand
- three ceiling-visibility conditions
  - visual approaches (VAPS):
    ceiling/visibility better than 5000' / 5 miles
  - visual meteorological conditions (VMC):
    ceiling/visibility better than 2500' / 3 miles but less than 5000' / 5 miles
  - instrument meteorological conditions (IMC):
    ceiling/visibility less than 2500' / 3 miles.

Multiple runs were performed for some of the above sets of conditions in order to determine the sensitivity to certain assumptions regarding operational rules and policies, so that a total of 48 simulation runs was performed.

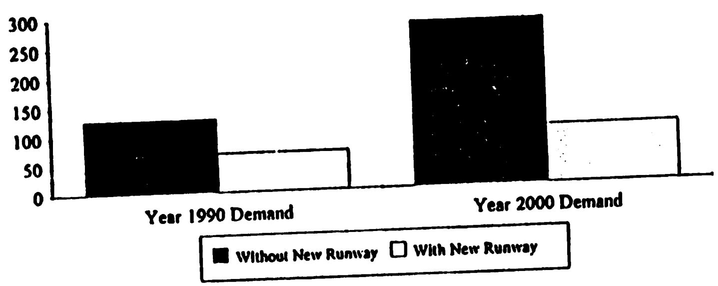
The data recorded for these experiments were combined to develop the annualized estimates of user costs and delay for each strategy and demand level. Also, each of the experiments can be viewed on the graphics screen as it runs, to better understand the dynamics of the operation. (The flow to both airports can be viewed simultaneously on the screen.) The model input required to replicate all experiments, and the output reports for each experiment, have been provided separately on disk.

1.4 Summary of Findings and Conclusions

The principal conclusions reached from the analysis of the results of the simulation experiments are as follows:

- The construction of the proposed new runway will alleviate the current constraints on IMC capacity in south flow, thus permitting SEA to economically accommodate forecast demand levels beyond year 2000.
- The airport will not adequately accommodate year 2015 traffic during north flow IMC conditions due to interaction of SEA departures with BFI operations, even with the new runway in place.
- Availability of the new runway, even if SEA and BFI do not operate independently under VAPS and VMC conditions, will reduce annual aircraft operating costs for the two airports as shown below:

Figure 1-3
Annual Aircraft Operating Costs
SEA and BFI combined
($ millions)



- If it is determined that the new runway is independent of BFI arrivals in south flow under VMC, then the benefits cited above will increase by about 0.5 percent.
- The forecast BFI traffic levels can be accommodated beyond the year 2000, at delay levels no larger than those at SEA, without significantly impacting SEA delay.

1.5 Organization of Report

Subsequent sections of this report will describe:

- the design of the simulation experiments
- the evaluation of operational strategies and the impact of SEA/BFI interactions
- quantification of the benefits of adding the new runway.

The Airport Machine simulation model, used to perform the experiments, is described in Appendix A. Listings of sample inputs and outputs of the simulations are in Appendixes B and C, respectively.

1.6 Acknowledgments

Dr. Everett Joline and Mr. Darrell Speck of ASI were the primary investigators and the authors of this report. Ms. Sarah Dalton was the project director for the FAA Northwest Mountain Region, and Mr. Roger Sloan of the Sea-Tac control tower provided guidance with respect to interpretation of FAA rules and procedures as applied to the SEA/BFI airspace.

2. Design of Experiments

This evaluation of the impact of SEA/BFI interaction on the benefits of a new air carrier runway at SEA was performed by simulating the SEA/BFI system of airports both with and without the new runway. The benefits of the new runway were thereby determined in terms of delay and cost savings relative to the 'do nothing' alternative. A preliminary design of the new runway and associated taxiways was obtained from The Port of Seattle for use in this evaluation.

This section will describe the set of experiments that was designed to accomplish project requirements.

2.1 Methodology for Estimation of Annualized Benefits

The quantitative measure of the benefits of the proposed new runway used in this study is the annualized savings of:

- Arrival delay
- Departure delay
- Taxi delay
- Runway crossing delay
- Taxi time

To obtain annualized results, simulation experiments were run for both the north and south directions of operation under three weather conditions. The results were then combined in accordance with the percentage of time that the specified conditions prevail over the course of the year. The definitions of the weather categories and demand levels used in this process are described below.

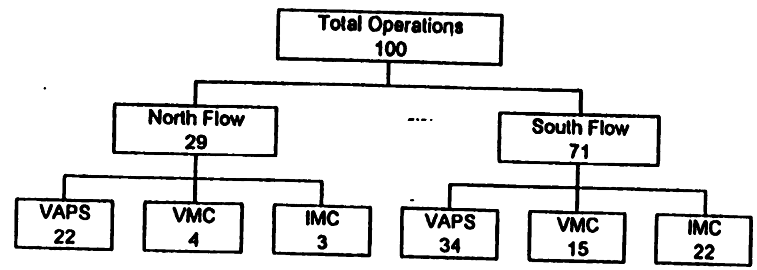
2.1.1 Weather Conditions

Three weather categories were defined for use in this study based on the application of FAA rules on how the runways can be used at SEA. These weather categories are defined as follows:

1. Visual Approaches (VAPS) - Ceiling/visibility is better than 5000' / 5 miles. Visual approaches are possible, therefore two arrival streams can land simultaneously on adjacent runways.
2. Visual Meteorological Conditions (VMC) - Ceiling/visibility is better than 2500' / 3 miles but less than 5000' / 5 miles. Two arrival streams can land simultaneously on runways 2500' apart when visual separation is applied.
3. Instrument Meteorological Conditions (IMC) - ceiling/visibility below VMC requirements. Two arrival streams can land simultaneously on runways 2500' apart with a two nm stagger between flights in the streams.

The percentage of time that each of these weather conditions is expected to exist over the course of a year for conditions of north and south flow is shown in the diagram below:

Figure 2-1 Percentage of Operations in Year



2.1.2 Demand Levels Used

Three different traffic demand levels were used for the simulation experiments. These levels, listed in table 2.1, are representative of the actual demand level of 1990, and forecast demand levels for year 2000 and year 2015. The demand estimates include all traffic to SEA (which is assumed to be the same for both VMC and IMC conditions) and the IFR component of BFI traffic. (VFR traffic at BFI is assumed to operate so as not to conflict with SEA traffic, or other IFR traffic to BFI, so was not included in the simulation.)

Schedules of operations for a 24-hour period, suitable for use as input to the simulation, were provided by The Port of Seattle for the three demand levels. The BFI flights were added to these schedules based on tower counts of BFI arrivals supplied by the TRACON, and forecasted traffic increases estimated by the FAA.

Table 2.1 – Assumed Traffic Demand Levels (operations per day)

	Year		
	1990	2000	2015
SEA	1077	1247	1507
BFI	178	186	228
Total	1255	1433	1735

The diagrams provided in figures 2-2 and 2-3 show the relationships of all experiments performed. The terms "independent" and "not independent" are defined and discussed in section 3.2. The terms "Equal Delay", "SEA Priority," and "BFI Priority" are defined and discussed in section 3.3.

2.1.3 Aircraft Equipment Categories

For purposes of applying air traffic control rules and estimation of operational costs, the traffic to the two airports was assigned to one of four aircraft equipment categories which are defined as follows:

- Heavy Jet Heavy aircraft weighing more than 300,000 pounds
- Large Large turboprop and turbofan aircraft weighing more than 12,000 pounds and up to 300,000 pounds
- Turboprop Large and small turboprop aircraft
- Small Small single- and twin-engine aircraft weighing less than 12,000 pounds

2.1.4 Estimation of Operational Costs

The operational costs estimated in this report include the extra aircraft operating costs resulting from arrival and departure delays plus taxi-in and taxi-out costs. Taxi time is included along with delay in order to account for the extra taxi time costs that would be incurred by flights using the 2500 foot displaced new runway rather than one of the close-in runways. Table 2.2 below shows the cost per hour used for each of the four equipment categories. The total annualized cost included all SEA flights plus IFR flights to/from BFI.

Table 2.2 Cost per Delay Hour

	Aircraft Equipment Category			
	Heavy	Large	Turboprop	Single-engine
air delay	$2100	$1500	$480	$60
ground delay	$1200	$960	$360	$30

Figure 2-2 North Flow Experiments

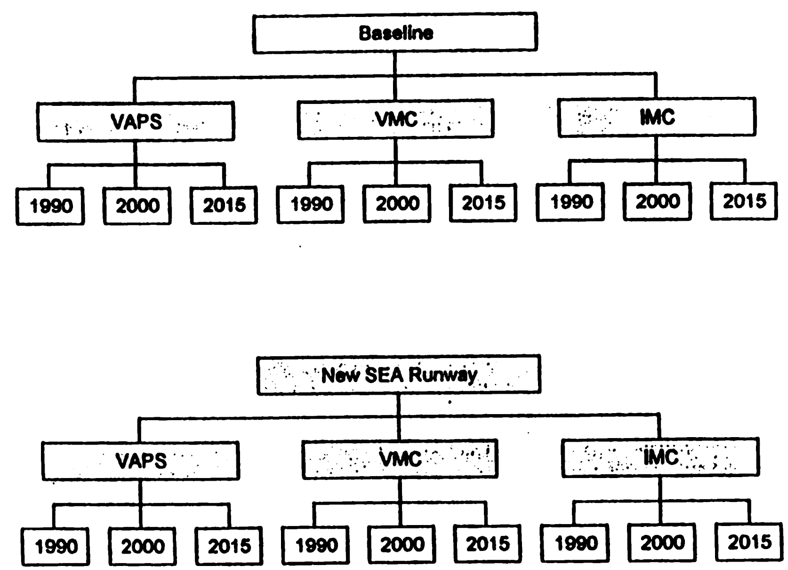
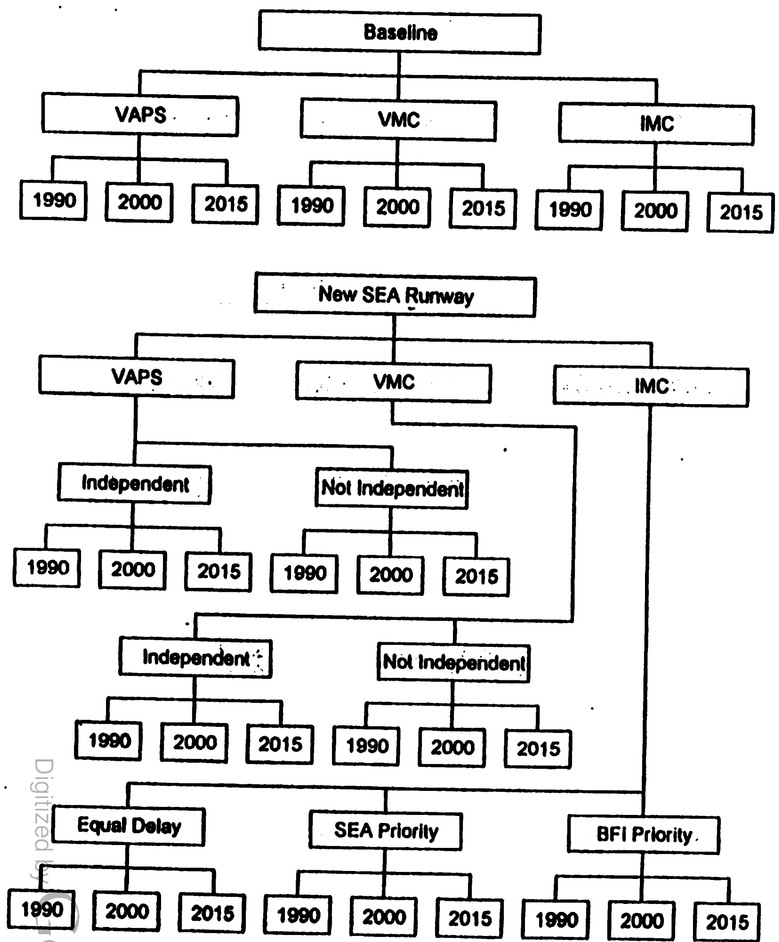


Figure 2-3 South Flow Experiments



3. Evaluation of Operational Strategies and the Impact of SEA/BFI Interactions

As a first step in performing the evaluation of the impact of SEA/BFI interactions, it was necessary to define, as far as possible, how the two-airport system would be operated with the new SEA runway in place. Certain of these operational procedures could not be completely defined at the present time, however, since they depend on FAA policy determinations that have not as yet been made. Experiments were therefore conducted for each of the alternative assumptions so that the sensitivity of results to these assumptions could be determined.

Three types of alternative assumptions and operational strategies were defined for operation of the SEA/BFI airport system with the proposed new runway. These assumptions and strategies had to do with:

- assignment of flights to runways at SEA
- independence of BFI arrivals with respect to SEA arrivals to the proposed new runway under south flow VAPS and VMC conditions
- management of interactions between arrivals to BFI and to the proposed new runway under south flow IMC conditions

The evaluations of each of these are described below.

3.1 Assignment of Flights to Runways at SEA

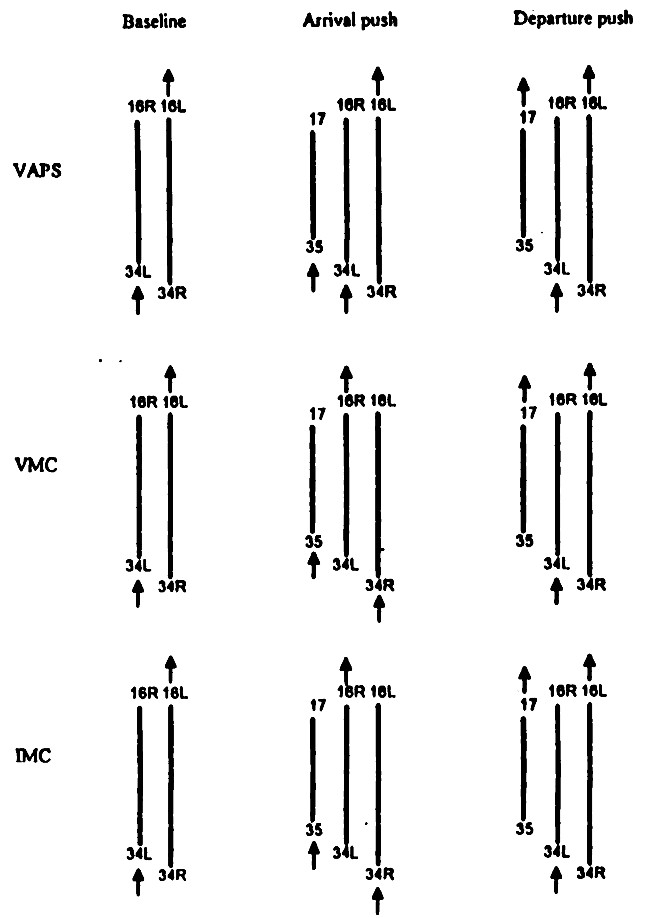
The optimum use of available runways at any time during a day is a function of the operational direction of the airport, the weather, and relative level of arrival/departure demand.

Possible ways of operating the SEA runways are summarized for south flow in figure 3-1 and for north flow in figure 3-2. Preliminary simulation experiments were performed to experimentally optimize the runway assignments to minimize delay for each set of conditions. A 'script' file was then written, using the results of these experiments, to control runway assignment in subsequent experiments. Figures 3-3 to 3-5 show the assignments that resulted.

For the baseline experiments (existing configuration) and for times of moderate demand, departures were assigned to use the inboard runway (SEA Runway 16L/34R) and a single approach stream was assumed leading to the middle runway (SEA Runway 16R/34L). If during VAPS conditions no departures were using the inboard departure runway, then arrivals were sidestepped to land on the inboard runway.

214

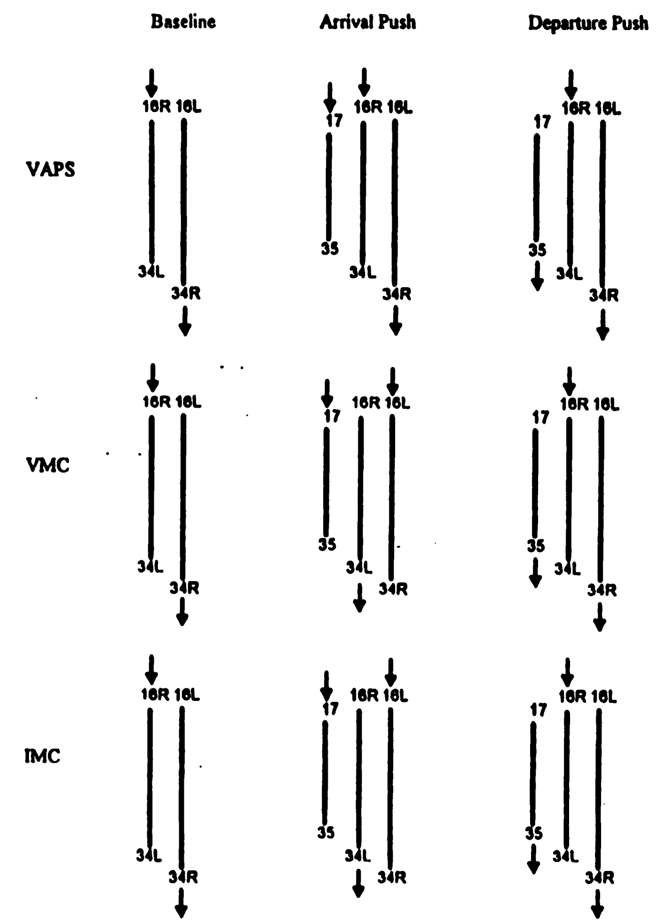
Figure 3-1
SEA Runway Assignments -- North Flow



13

214

Figure 3-2
SEA Runway Assignments -- South Flow



14

214

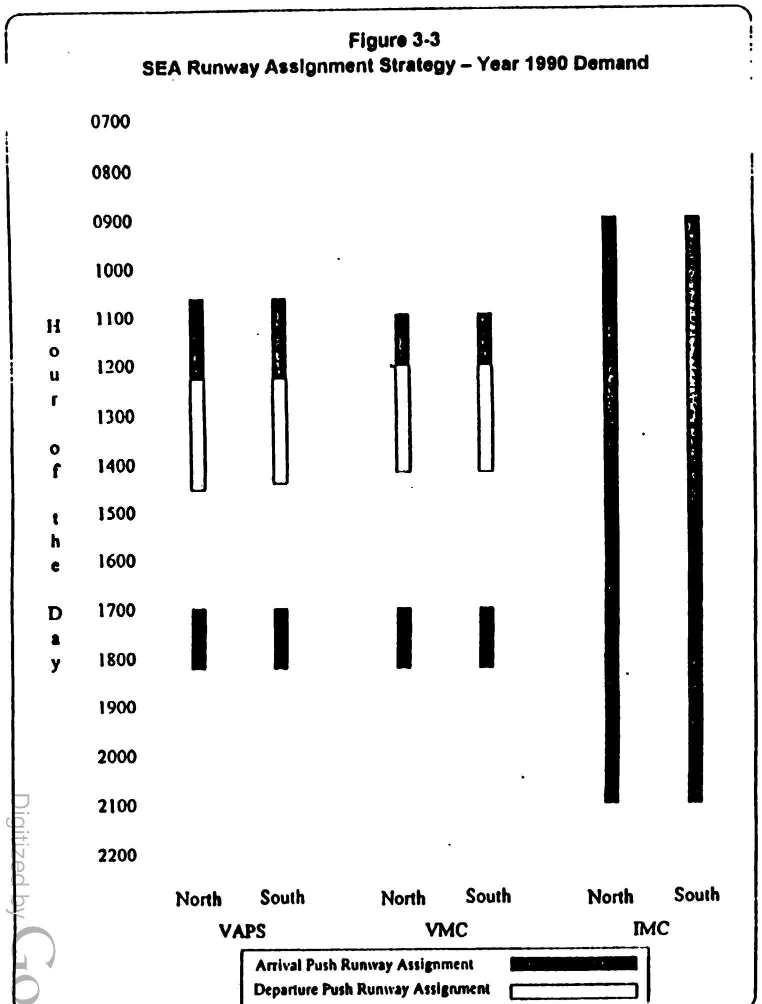


Figure 3-3
SEA Runway Assignment Strategy – Year 1990 Demand
0700
0800
0900
1000
1100
1200
1300
1400
1500
1600
1700
1800
1900
2000
2100
2200
Hour of the Day
North
South
North
South
North
South
VAPS
VMC
IMC
Arrival Push Runway Assignment
Departure Push Runway Assignment

214

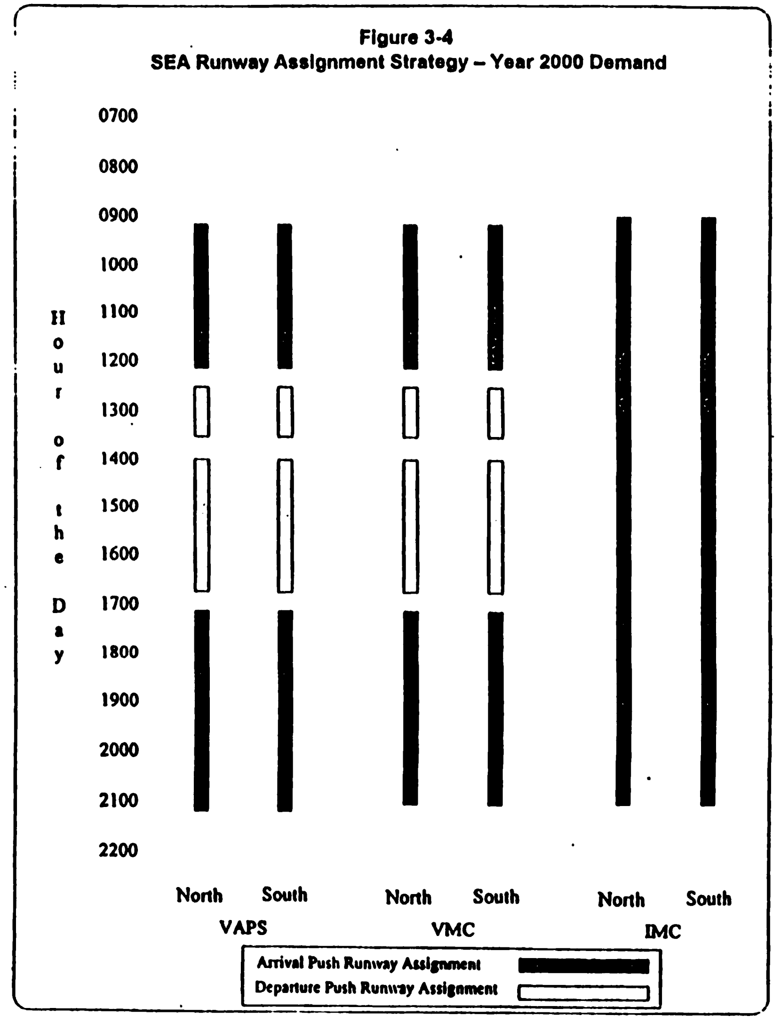
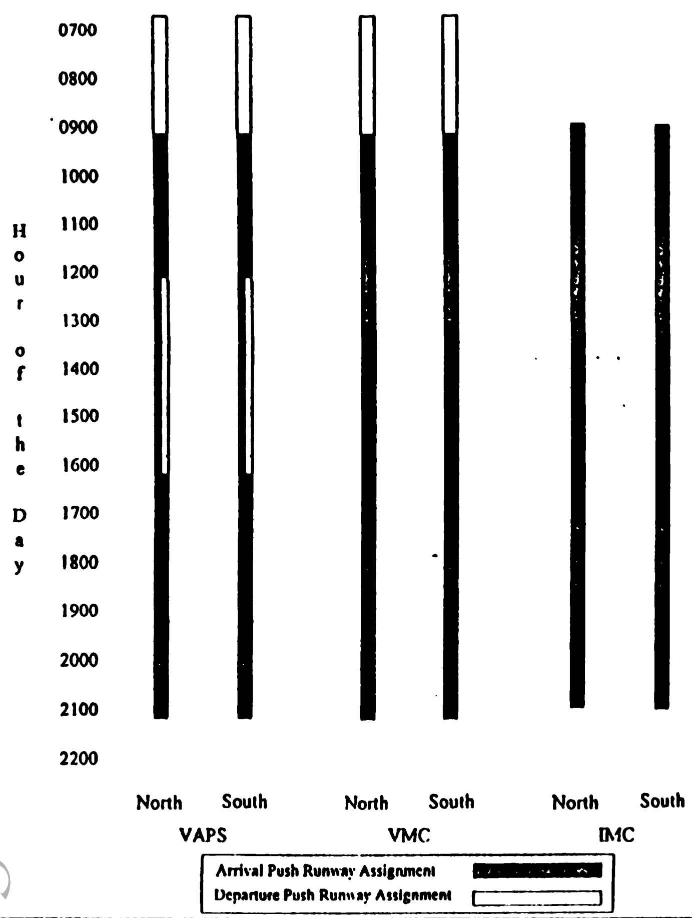


Figure 3-4
SEA Runway Assignment Strategy – Year 2000 Demand
0700
0800
0900
1000
1100
1200
1300
1400
1500
1600
1700
1800
1900
2000
2100
2200
Hour of the Day
North
South
North
South
North
South
VAPS
VMC
IMC
Arrival Push Runway Assignment
Departure Push Runway Assignment

Figure 3-5
SEA Runway Assignment Strategy – Year 2015 Demand



For experiments involving the proposed new runway, the new runway was used primarily during an arrival push. Since during both VMC and IMC conditions, the approach streams to two arrival runways require a 2500' separation, the first arrival stream was moved from the middle runway to the inboard runway. Departures were, in turn, moved from the inner runway to the middle runway.

In a departure push some turboprop departures were also assigned to the new runway.

The simulation usually had a longer queue of arrivals than departures at SEA, so the proposed new runway was used more often for arrivals. During IMC, the most efficient use of the proposed new runway was to use it exclusively for arrivals.

3.2 Impact of South Flow Interactions Under VAPS and VMC Conditions

Presently, because of special procedures, the south flow arrival streams to the existing runways at SEA do not require a gap for a BFI arrival because vertical separation exists between the normal approach streams, and controllers closely monitor the BFI arrivals for the first sign of a missed approach. SEA Runway 17, however, is approximately 1700 feet west of SEA Runway 16R so that arrivals to SEA Runway 17 will cross over the BFI arrival stream while the BFI flights are still airborne. It has not as yet determined whether the special procedures can be extended to permit the BFI arrivals to cross without a gap in the SEA Runway 17 arrival stream.

Both of the following alternative assumptions were therefore simulated in order to determine the sensitivity of results to this assumption:

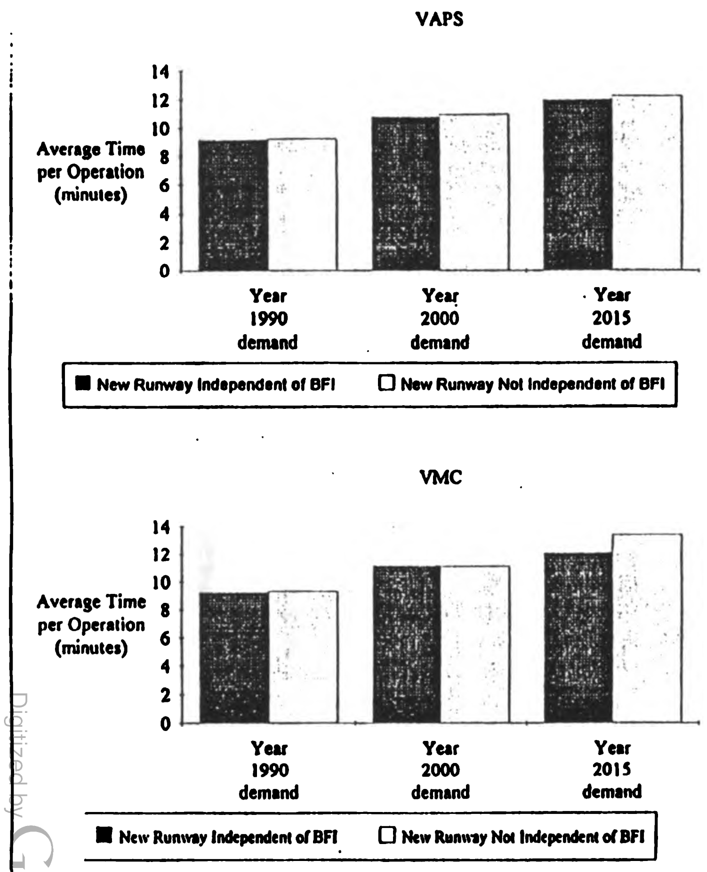
1. Arrivals to the proposed SEA Runway 17 are independent of arrivals to BFI under VAPS and VMC.
2. Arrivals to the proposed SEA Runway 17 are not independent of arrivals to BFI under VAPS and VMC (thus requiring a 5 nm separation between flights in the two arrival streams[2]).

The results, shown in figure 3-6, indicate that there is relatively little difference between the average time per operation obtained for the two cases. The small size of the difference is due to the fact that the new runway is used for arrivals under these weather conditions only when an arrival push is in progress. As demand levels increase to future levels the use of the new runway also increases, thus resulting in greater difference in time between the two assumptions.

For purposes of subsequent benefit comparisons, the more conservative higher value of the two time figures was used.

[2] This is described more thoroughly in section 3.3.

Figure 3-6 Sensitivity to Dependency Between New Runway and BFI in South Flow



3.3 Impact of South Flow Interactions Under IMC Conditions

Presently, because of special procedures, the south flow arrival streams to the existing runways at SEA do not require a gap for a BFI arrival. Under IMC, the special procedures will not be applicable to the new runway so that a gap would definitely be required in the arrival stream to SEA Runway 17 for each BFI arrival.

New technology may be in use at SEA that would allow the controllers to place a "ghost image" on their display to represent the BFI arrival in the SEA Runway 17 arrival stream, and should help maintain the gap. SEA controllers stated that with this technology they would use 5 nm separation between the streams. This means a single BFI arrival requires a 10 nm gap in the SEA Runway 17 arrival stream to achieve the necessary separation.

Figure 3-7 Two South Flow Arrival Streams to SEA During IMC

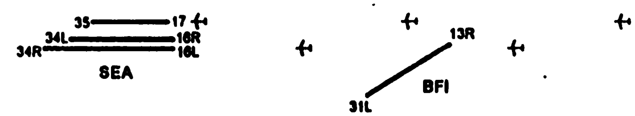
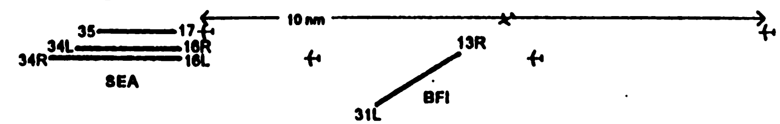


Figure 3-8 Two Arrival Streams to Sea with 10 nm Gap for a BFI Arrival



There are, however, a number of ways that these gaps may be managed that will affect the overall delay and the division of delay between the two airports.

Three strategies were evaluated:

1. Equal delay – Flights are cleared to land so that the delay to BFI arrivals and SEA Runway 17 arrivals are approximately equal.
2. SEA priority – SEA Runway 17 arrivals have priority and BFI arrivals must wait for a natural gap in the SEA Runway 17 arrival stream.
3. BFI priority – A gap is created in the SEA Runway 17 arrival stream whenever a BFI arrival approaches.

The results of these evaluations are summarized in figures 3-9 to 3-12. These results demonstrate that while the distribution of arrival delays to the two airports is changed the total average system delay is not greatly affected. Also the average time per operation (the time from pushback to start-roll for departures or the time from the scheduled arrival time

214

Figure 3-9
SEA and BFI Average Arrival Delay
South Flow – IMC – Year 1990 Demand

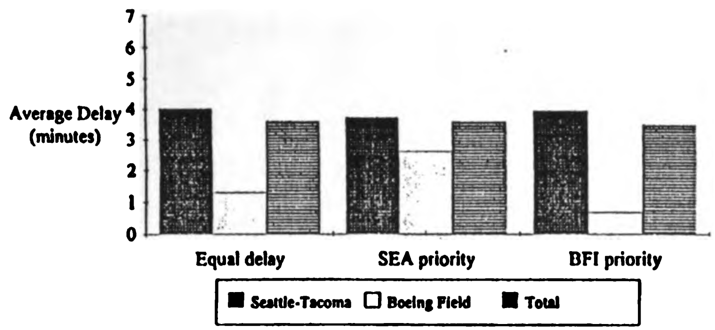
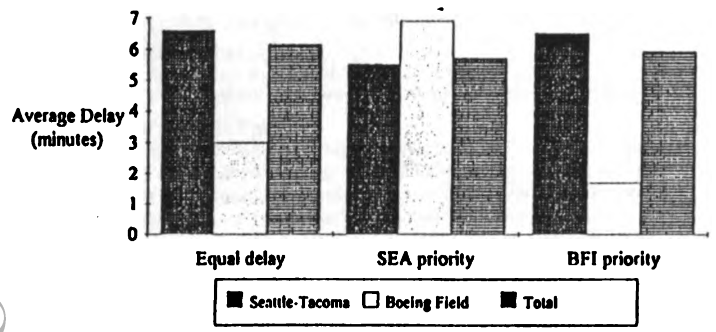


Figure 3-10
SEA and BFI Average Arrival Delay
South Flow – IMC – Year 2000 Demand



214

Figure 3-11
SEA and BFI Average Arrival Delay
South Flow – IMC – Year 2015 Demand

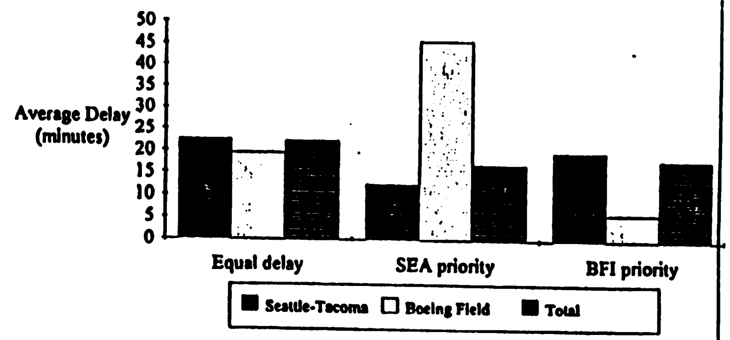
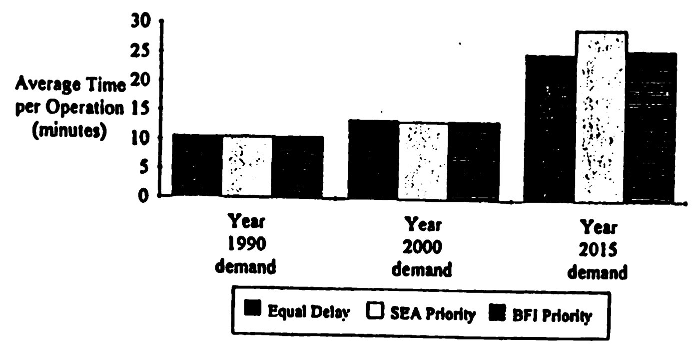


Figure 3-12 Sensitivity to Delay Sharing Strategy
South Flow – IMC



to docking at the gate for arrivals) for the system was sensitive to the strategy used only at the highest demand level.

3.4 Impact of North Flow Interactions Under IMC Conditions

Departures from SEA pass near, if not over, BFI. During VMC and VAPS, visual separation is used and no reduction in capacity is experienced. During IMC, horizontal separation must be maintained between SEA departures and BFI arrivals and between SEA departures and BFI departures. Basically, no flights may go into or out of BFI while flights depart from SEA during IMC.

In the simulation, no SEA departures from any runway were allowed when a BFI was within 4 nm of touchdown. No BFI departure was allowed after a SEA departure until the SEA departure had passed BFI.

The new runway did not alleviate the impact of north flow interactions so this would become the limiting capacity. At the highest, year 2015 demand level, the departure queue at SEA backed up, preventing all taxiing. It was therefore not possible to provide annualized cost data for this demand level.

4. Benefits of New Runway

The benefit of adding a third runway to SEA, in terms of annual aircraft operating costs, is shown in figure 1-3, while section 3 describes the evaluation of strategies for management of traffic with the new runway in place.

This section will describe in more detail the time and delay reduction benefits that contribute to the annual cost reduction. The estimated utilization of the new runway will also be described in terms of the number of flights that will be assigned to it under the different sets of conditions.

Table 4.2 summarizes some of the key results of the individual experiments. The results in the table are for the two airports combined and include average arrival delay, average departure delay, average time per operation (runway delay plus total taxi time), and operational cost per day. The detailed results are provided by the simulation output reports. A sample report is included as appendix C, and the reports for all of the experiments have been provided separately on disk.

4.1 Benefits at the Year 1990 Demand Level

Figure 4-1 shows the extent to which the addition of the proposed new runway reduced the average time per operation of the SEA/BFI system for both south and north flow with the year 1990 demand level. It can be seen from these results that while there is some minor reduction for VAPS and VMC, the primary benefit occurs during IMC. Under IMC conditions, without the new runway, arrival demand exceeds capacity for part of the day resulting in an average arrival delay of over 40 minutes. This is reduced to under four minutes by adding the new runway.

Table 4.1 below lists the percent of the 539 arrivals, or 538 departures that were assigned to the new runway for each of the operating directions and visibility conditions shown in figure 4-1.

Table 4.1 Percent of SEA Operations Assigned to New Runway for Year 1990 Demand.

	South			North		
	VAPS	VMC	IMC	VAPS	VMC	IMC
Arrivals	6.7	4.3	16.7	6.3	4.3	16.5
Departures	3.0	2.8	0.0	1.5	2.4	0.0

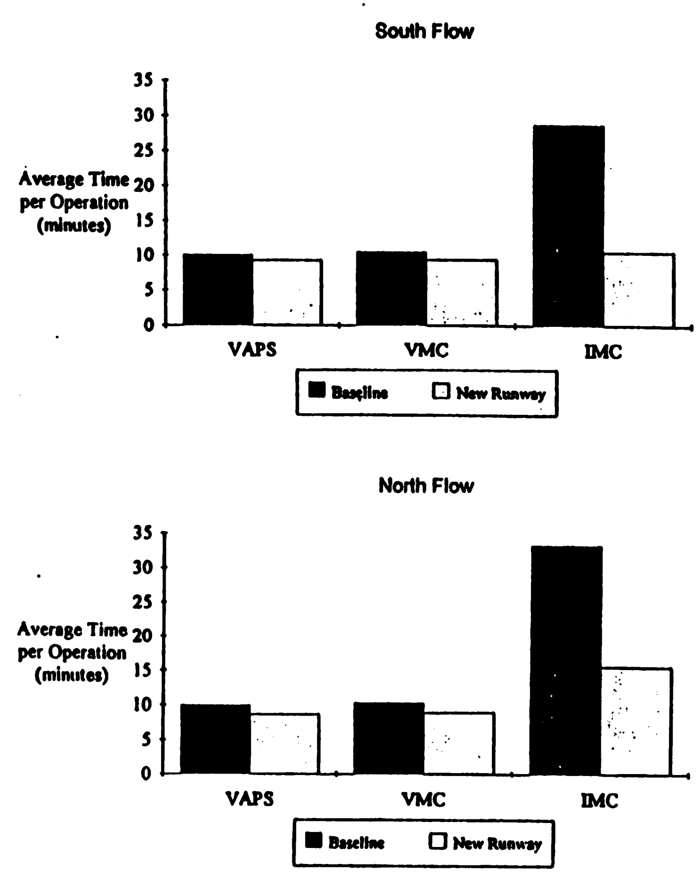
214

Table 4.2
Summary of Results
for Each Experiment

				SEA & BFI			
				Average Arrival Delay	Average Departure Delay	Average Time per Operation	Operational Cost/Day ($1000)
1990	South	VAPS	Baseline	3.0	1.3	10.0	202.0
			Independent	1.5	1.0	9.2	178.0
			Not Independent	1.6	1.0	9.2	179.0
		VMC	Baseline	4.2	1.2	10.5	220.0
			Independent	2.0	0.9	9.3	182.0
			Not Independent	2.1	0.9	9.3	184.0
		IMC	Baseline	40.6	1.0	28.6	775.0
			Equal Delay	3.6	0.8	10.5	214.0
			SEA Pri	3.6	0.8	10.5	213.0
			BFI Pri	3.5	0.9	10.5	214.0
	North	VAPS	Baseline	3.3	1.4	9.9	200.0
			New Rw	1.4	1.0	8.7	166.0
		VMC	Baseline	4.2	1.3	10.3	213.0
			New Rw	2.0	1.0	9.0	176.0
		IMC	Baseline	40.6	10.5	33.3	804.0
			New Rw	2.9	11.2	15.6	241.0
2000	South	VAPS	Baseline	5.7	2.0	12.6	313.0
			Independent	1.7	2.0	10.8	245.0
			Not Independent	2.0	1.9	10.9	249.0
		VMC	Baseline	9.0	2.6	14.7	385.0
			Independent	2.3	2.5	11.2	259.0
			Not Independent	2.5	2.3	11.1	258.0
		IMC	Baseline	103.3	1.8	60.7	2066.0
			Equal Delay	6.1	1.4	13.4	331.0
			SEA Pri	5.7	1.4	13.2	316.0
			BFI Pri	5.9	1.4	13.4	331.0
	North	VAPS	Baseline	6.1	3.8	13.6	335.0
			New Rw	1.7	2.5	10.8	243.0
		VMC	Baseline	9.0	4.1	15.1	390.0
			New Rw	2.3	2.5	10.7	248.0
		IMC	Baseline	103.3	26.6	78.1	2218.0
			New Rw	4.7	36.0	52.8	741.0
2015	South	VAPS	Baseline	62.2	4.2	42.0	1605.0
			Independent	1.3	2.6	11.9	320.0
			Not Independent	1.9	2.8	12.2	329.0
		VMC	Baseline	62.3	3.9	41.8	1600.0
			Independent	2.1	1.2	12.1	329.0
			Not Independent	2.5	1.3	12.8	350.0
		IMC	Baseline	194.4	3.5	107.1	4407.0
			Equal Delay	22.1	2.8	25.3	800.0
			SEA Pri	16.8	3.0	29.4	816.0
			BFI Pri	17.9	2.9	26.0	812.0
	North	VAPS	Baseline	62.2	15.5	49.2	1781.0
			New Rw	1.3	2.9	11.5	306.0
		VMC	Baseline	62.3	15.8	49.8	1796.0
			New Rw	2.0	2.0	13.6	369.0
		IMC	Baseline	During 2015, north flow, IMC, departure demand exceeded capacity.			
			New Rw				

214

Figure 4-1 Reduction in Average Time per Operation with New Runway – Year 1990 Demand



4.2 Benefits at the Year 2000 Demand Level

The results for the year 2000 demand level, as shown in figure 4-2, are similar to those of the year 1990 level except that the baseline times for IMC conditions are now about double what they were for year 1990. With the proposed new runway, however, the average time per operation of the SEA/BFI system for south flow is again reduced to nearly as low a level as achieved with the year 1990 demand.

For north flow, however, the reduction is not as great, and IMC time remains at over 60 minutes. This is because of the build-up of departure delay as north flow demand approaches departure capacity. The departure capacity is not increased by addition of the new runway. Departure delay, in fact, actually increases when the new runway is added. This is because departure demand, without the new runway, is stretched out due to the high arrival delay that occurs. With the new runway the flights can land on time and the departure demand is more sharply peaked.

Table 4.3 below lists the percent of the 624 arrivals, or 623 departures that were assigned to the new runway for each of the operating directions and visibility conditions shown in figure 4-2.

Table 4.3 Percent of SEA Operations Assigned to New Runway for Year 2000 Demand.

	South			North		
	VAPS	VMC	IMC	VAPS	VMC	IMC
Arrivals	14.4	9.5	22.4	15.2	9.6	22.3
Departures	3.7	4.3	0.0	3.5	3.7	0.0

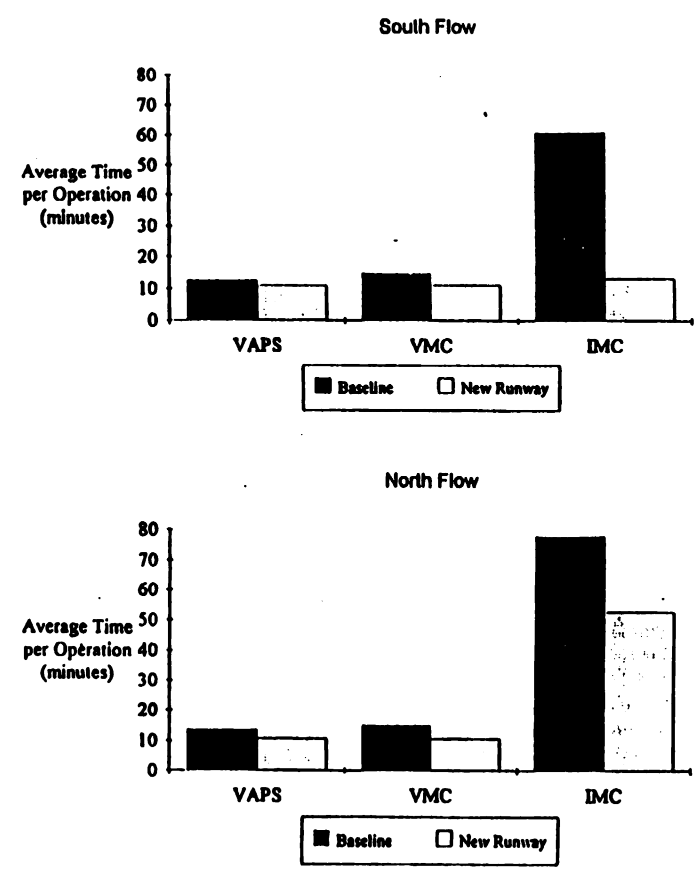
4.3 Benefits at the Year 2015 Demand Level

Figure 4-3 shows the extent to which the addition of the proposed new runway reduced the average time per operation of the SEA/BFI system for both south and north flow with the year 2015 demand level.

With the high demand of the estimated 2015 schedule, even with the proposed runway, SEA operated at the boundaries of its capacity. Without the new runway, even in the best weather, flights queued up for an average 62 minutes to land.

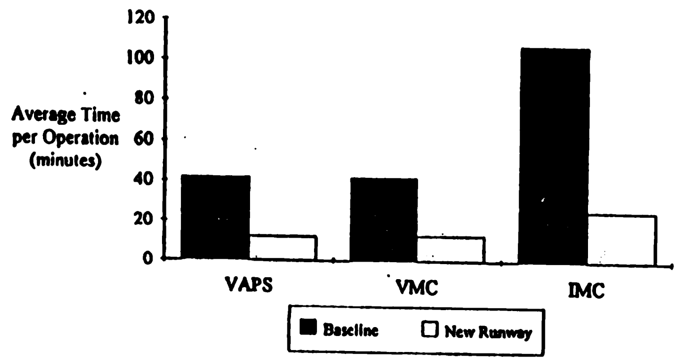
In IMC, the departure capacity of SEA was exceeded with or without the new runway since the new runway did not increase departure capacity. At the estimated year 2015 daily demand level of 1500 SEA operations and 130 BFI operations, there were so many SEA departures and BFI operations that the SEA departure queue backed up to gridlock all operations at the airport.

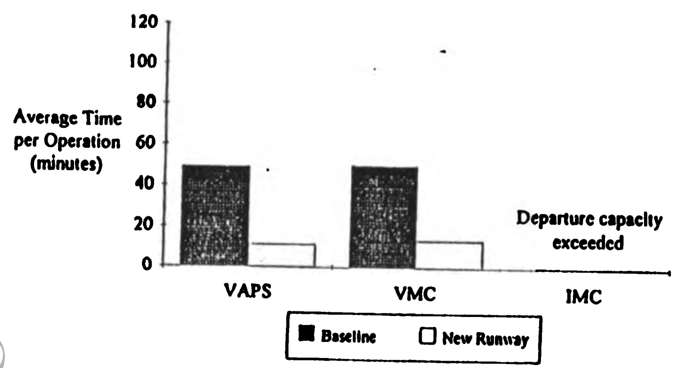
Figure 4-2 Reduction In Average Time per Operation with New Runway – Year 2000 Demand



214

Figure 4-3 Reduction in Average Time per Operation with New Runway – Year 2015 Demand





214

Table 4.4 below lists the percent of the 752 arrivals, or 755 departures that were assigned to the new runway for each of the operating directions and visibility conditions shown in the figure 4-3.

Table 4.4 Percent of SEA Operations Assigned to New Runway for Year 2015 Demand.

	South			North		
	VAPS	VMC	IMC	VAPS	VMC	IMC
Arrivals	23.1	17.6	31.6	23.9	17.4	*
Departures	10.6	3.8	0.0	11.3	4.1	*

* In north IMC the SEA departure capacity was exceeded.

Appendix A

Description of The Airport Machine Simulation Model

The airport simulation model used on this project is called The Airport Machine. The Airport Machine is a general purpose airport simulation that has been designed for use at any airport without the need for program changes. Data input to the program describes the airfield layout, air traffic control rules and procedures, and aircraft performance characteristics.

Actual schedules may be used to drive the model, or a separate schedule generator program can be used to generate random schedules in accordance with a prescribed hourly arrival/departure rate and aircraft mix.

The Airport Machine is implemented in a desk-top computer and uses a high resolution color graphic terminal to display the operation of the simulation in animated graphic form, and to permit the user to interact with the simulation as it progresses.

This interactive desk-top implementation has been designed to reduce the start-up costs and delays that have limited the application of simulations in the past and to enhance the accessibility of this valuable tool to analysts and planners.

The data bases for one or more airports can be assembled and stored on disk so they are instantly available for use in reviewing and analyzing operational or planning problems as the needs arise.

Assembly of the data base is facilitated by an ancillary program that makes extensive use of interactive computer graphics to edit geometry related data such as taxiway geometry and directions. Taxiway routings can also be edited interactively while running the simulation itself.

This project used a customized version of the model that was developed to investigate the special SEA/BFI priority strategies for interleaving flights to BFI and the new SEA runway 17/35, during south flow in IMC conditions.

The versatility and integrity of The Airport Machine have been demonstrated by the ability of others, not involved in its development, to use this tool effectively. Valuable feedback from users, gained through applications at a variety of U.S and foreign airports, has helped to enhance operation of the model. The design of the model is not frozen but is continually being enhanced by improvements based on user experience and the demands of new applications.

Current licensees of the model include:

- U.S. DOT Federal Aviation Administration for 12 regional offices and supporting agencies such as:
  - FAA Technical Center
  - Transportation Systems Center
  - Mitre Corporation.
- Transport Canada (for use at all Canadian Airports)
- Dallas/Ft. Worth International Airport Board
- British Civil Aviation Authority (Heathrow)
- Amsterdam Airport Authority (Schiphol)
- Flughafen Frankfurt/Main AG
- Baltimore/Washington International Airport
- Civil Aviation Administration of Sweden for all Stockholm airports
- City and County of Denver for the New Denver Airport
- City and County of Denver for Stapleton International Airport
- Port of Seattle for Sea-Tac International Airport and Boeing Field
- Aeroports de Paris for Charles de Gaulle Airport
- Norwegian Civil Aviation Administration for the New Oslo Airport and other Norwegian airports
- Republic of Singapore CAA for Changi International Airport

Appendix B

Sample Input Data (ECHO file listing)

SEATAC & KCI   SOUTH-FLOW IFR
Run duration of 1 day(s), with selection ratios of 1.00 to 1.00 by 1.00
Weather is IFR1

Runway and aircraft data from file: SEATAC & KCI Strategy 3 IMC arrivals
FIFO dependent

```
VMC Barrier distance =  1.5 nm
IMC Barrier distance =  2.5 nm
Departure setup time = 10.  sec
Landing head wind    =  0.0 knots
COAST_R              =  0.50
Depart taxi ratio    =  1.00
Clearance delay      =  0.  sec
Controller lag       =  2.  sec
FIFO penalty         =  0.10 (ratio)
Node offset          =  25  ft
Runway offset        = 255  ft
```

In-trail separations (lead/trail) mins=

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

Attributes of Aircraft Types

Type	Appr Dist	Appr Speed	Land Speed	Speed Var	Td Dist	Land Decel	Land Dist	Land Occ	Lnth
D	6.	140.	130.	20.	1000	7.0	10000.	60.	300
C	6.	130.	120.	20.	500	7.0	8000.	52.	225
B	3.	120.	110.	20.	350	7.0	8000.	52.	200
A	2.	95.	85.	15.	200	5.0	8000.	45.	150

Type	Taxi Speed	P.B. Time	Tkof Accel	Climb Speed	Wing Span	Alt Route	Term Speed	Grnd Cost	Air Cost
D	18.	420.	7.0	145.	255	FALSE	250.	1200	2100
C	16.	180.	7.0	140.	200	FALSE	220.	960	1500
B	14.	120.	6.0	130.	150	FALSE	200.	360	480
A	10.	30.	6.0	100.	100	FALSE	180.	30	60

COAST_R is 0.50

Runway Exit Speeds

Type	(H) High Speed	(N) Normal	(R) Right Angle	(A) Acute
D	50.	40.	10.	2.
C	45.	35.	12.	2.
B	35.	30.	15.	10.
A	35.	30.	15.	10.

Parameters of Each Runway

Runway No	Runway Name	Comm Dist	Recip Rw	CP Rw	No Exits	Thresh Offset	Hold Short	Start Exit	End Exit
1	34R	5.0	2	3	14	0	0	1	14
2	16L	5.0	1	4	13	0	0	1	13
3	34L	5.0	4	1	9	0	0	1	9
4	16R	5.0	3	2	9	0	0	1	9
5	35	5.0	6	0	5	0	0	1	5
6	17	5.0	5	0	5	0	0	1	5
7	31R	5.0	8	9	7	0	0	1	7
8	13L	5.0	7	10	7	0	0	1	7
9	31L	5.0	10	7	8	0	0	1	8
10	13R	5.0	9	8	8	0	0	1	8

RW	Departure Intersections DFL	D	C	B	A	Touchdown Distances D	C	B	A
34R	1	1	1	3	6	0	0	0	0
16L	1	1	1	6	6	0	0	0	0
34L	1	1	1	1	1	0	0	0	0
16R	1	1	1	1	1	0	0	0	0
35	1	1	1	1	1	0	0	0	0
17	1	1	1	1	1	0	0	0	0
31R	1	1	1	1	1	0	0	0	0
13L	1	1	1	1	1	0	0	0	0
31L	1	1	1	1	1	0	0	0	0
13R	1	1	1	1	1	0	0	0	0

214

Runway Exit Nodes

1	1	2	3R	4R	5R	6A	7H	8N	48R	9A	10A	46R	11R	99
2	11	46	10N	9N	48	8A	7N	6N	5R	4R	3R	2R	1R	
3	20R	22A	23A	42N	24H	25A	43H	26R	98					
4	26R	43	25N	24A	42N	23H	22H	20R	97					
5	68	66A	64H	61N	60R									
6	60	61A	64N	66N	68R									
7	550	545	544	543	542	541	540							
8	540	541	542	543	544	545	550							
9	501	502	503	504	505	506	507	508						
10	508	507	506	505	504	503	502	501						

Runway Crossings

No	1	2	3	4	5	6	7	8	9	10	11	12
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												

Runway Utilization

34R	16L	34L	16R	35	17	31R	13L	31L	13R
CLSD	MIXD	CLSD	MIXD	CLSD	MIXD	CLSD	MIXD	CLSD	MIXD

Stream Assignments to Runways

1	2	3	4	5	6	7	8	9	10	11	12
Arrival Stream Assignments 0, Alt = FALSE											
4	4	4	4	4	4	4	4	4	4	10	8
4	4	4	4	4	4	4	4	4	4	10	8
4	4	4	4	4	4	4	4	4	4	10	8
4	4	4	4	4	4	4	4	4	4	10	8
Departure Stream Assignments 0, Alt = FALSE											
2	2	2	2	2	2	2	2	2	2	10	8
2	2	2	2	2	2	2	2	2	2	10	8
2	2	2	2	2	2	2	2	2	2	10	8
2	2	2	2	2	2	2	2	2	2	10	8

214

Arrival Stream Assignments 0, Alt = TRUE											
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
Departure Stream Assignments 0, Alt = TRUE											
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
Arrival Stream Assignments 1, Alt = FALSE											
2	2	2	2	2	2	2	2	2	2	10	8
2	2	2	2	2	2	2	2	2	2	10	8
2	2	2	2	2	2	2	2	2	2	10	8
2	2	2	2	2	2	2	2	2	2	10	8
Departure Stream Assignments 1, Alt = FALSE											
4	4	4	4	4	4	4	4	4	4	10	8
4	4	4	4	4	4	4	4	4	4	10	8
4	4	4	4	4	4	4	4	4	4	10	8
4	4	4	4	4	4	4	4	4	4	10	8
Arrival Stream Assignments 1, Alt = TRUE											
0	0	0	0	0	0	0	0	0	0	0	0
6	6	6	6	6	6	6	6	6	6	0	0
6	6	6	6	6	6	6	6	6	6	0	0
6	6	6	6	6	6	6	6	6	6	0	0
Departure Stream Assignments 1, Alt = TRUE											
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
Arrival Stream Assignments 2, Alt = FALSE											
4	4	4	4	4	4	4	4	4	4	10	8
4	4	4	4	4	4	4	4	4	4	10	8
4	4	4	4	4	4	4	4	4	4	10	8
4	4	4	4	4	4	4	4	4	4	10	8
Departure Stream Assignments 2, Alt = FALSE											
2	2	2	2	2	2	2	2	2	2	10	8
2	2	2	2	2	2	2	2	2	2	10	8
2	2	2	2	2	2	2	2	2	2	10	8
2	2	2	2	2	2	2	2	2	2	10	8
Arrival Stream Assignments 2, Alt = TRUE											
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0

Departure Stream Assignments 2, Alt = TRUE

0	0	0	0	0	0	0	0	0	0	0	0
6	6	6	6	6	6	6	6	6	6	0	0
6	6	6	6	6	6	6	6	6	6	0	0
6	6	6	6	6	6	6	6	6	6	0	0

Arrival Stream Assignments 3, Alt = FALSE

2	2	2	2	2	2	2	2	2	2	10	8
2	2	2	2	2	2	2	2	2	2	10	8
2	2	2	2	2	2	2	2	2	2	10	8
2	2	2	2	2	2	2	2	2	2	10	8

Departure Stream Assignments 3, Alt = FALSE

4	4	4	4	4	4	4	4	4	4	10	8
4	4	4	4	4	4	4	4	4	4	10	8
4	4	4	4	4	4	4	4	4	4	10	8
4	4	4	4	4	4	4	4	4	4	10	8

Arrival Stream Assignments 3, Alt = TRUE

6	6	6	6	6	6	6	6	6	6	0	0
6	6	6	6	6	6	6	6	6	6	0	0
6	6	6	6	6	6	6	6	6	6	0	0
6	6	6	6	6	6	6	6	6	6	0	0

Departure Stream Assignments 3, Alt = TRUE

0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0

Runway Exit Distances

1	0	1700	1920	2450	2850	4200	4860	6720	7480	7880	9450	11540	11840	13353
2	0	300	2390	3960	4360	5120	6980	7640	8990	9390	9920	10140	11840	
3	0	1770	3110	3550	5430	6230	7590	9390	11178					
4	0	1800	3160	3960	5840	6280	7620	9390	11160					
5	0	1800	3450	5200	7000									
6	0	1800	3550	5200	7000									
7	0	599	1157	1246	1877	2265	3532							
8	0	1267	1655	2286	2375	2933	3532							
9	0	2469	4214	4929	5531	7056	8477	9690						
10	0	1213	2634	4159	4761	5476	7222	9690						

Runway Exit Probabilities

1 - 34R FALSE

D	0	0	0	0	0	0	5	48	65	69	99	100	100	0
C	0	0	0	0	0	6	9	62	82	94	99	100	100	0
B	0	0	0	0	0	30	70	90	95	100	100	100	100	0
A	0	0	0	0	0	30	70	90	95	100	100	100	100	0

1 - 34R TRUE

D	0	0	0	0	0	0	5	48	65	69	99	100	100	0
C	0	0	0	0	0	24	69	82	95	100	100	100	100	0
B	0	0	0	0	0	30	70	90	95	100	100	100	100	0
A	0	0	0	0	0	30	70	90	95	100	100	100	100	0

2 - 16L FALSE

D	0	0	0	0	0	0	38	57	90	100	100	100	100
C	0	0	0	3	5	7	68	94	100	100	100	100	100
B	0	0	10	30	35	45	85	100	100	100	100	100	100
A	0	0	20	40	45	55	95	100	100	100	100	100	100

2 - 16L TRUE

D	0	0	0	0	0	0	38	57	95	100	100	100	100
C	0	0	0	23	25	33	80	100	100	100	100	100	100
B	0	0	10	30	35	45	85	100	100	100	100	100	100
A	0	0	20	40	45	55	95	100	100	100	100	100	100

3 - 34L FALSE

D	0	0	0	0	50	0	100	100	0
C	0	0	0	60	84	0	100	100	0
B	0	0	0	90	95	0	100	100	0
A	0	0	0	90	9	0	100	100	0

3 - 34L TRUE

D	0	0	0	0	50	0	0	100	0
C	0	0	0	90	95	0	100	100	0
B	0	0	0	90	95	0	0	100	0
A	0	0	0	90	95	0	0	100	0

4 - 16R FALSE

D	0	0	0	0	5	76	0	100	0
C	0	0	0	2	60	94	0	100	0
B	0	0	13	26	70	100	0	100	0
A	0	0	26	36	80	100	0	100	0

4 - 16R TRUE

D	0	0	0	0	5	76	95	100	0
C	0	0	10	22	70	100	100	100	0
B	0	0	13	26	80	100	100	100	0
A	0	0	26	36	90	100	100	100	0

5 - 35 FALSE

D	0	0	0	30	100
C	0	0	10	80	100
B	0	0	100	100	100
A	0	0	100	100	100

5 - 35 TRUE

D	0	0	0	30	100
C	0	0	50	80	100
B	0	0	100	100	100
A	0	0	100	100	100

6 - 17 FALSE

D	0	0	0	30	100
C	0	0	10	80	100
B	0	0	100	100	100
A	0	0	100	100	100

6 - 17 TRUE

D	0	0	0	30	100
C	0	0	50	80	100
B	0	0	100	100	100
A	0	0	100	100	100

7 - 31R FALSE

D	0	0	0	0	0	0	0
C	0	0	0	0	0	0	0
B	0	0	0	0	0	7	100
A	0	0	0	0	32	85	100

8 - 13L FALSE

D	0	0	0	0	0	0	0
C	0	0	0	0	0	0	0
B	0	0	0	10	20	82	100
A	0	0	0	87	99	100	100

9 - 31L FALSE

D	0	0	0	0	0	80	0	100
C	0	0	0	0	100	100	100	100
B	0	0	0	0	100	100	100	100
A	0	0	0	0	100	100	100	100

10 - 13R FALSE

D	0	0	0	54	0	0	100	100
C	0	0	0	100	0	0	100	100
B	0	0	50	100	0	0	100	100
A	0	0	100	100	0	0	100	100

Runway Arrival Occupancy Times

1 - 34R FALSE

D					36.	52.	61.	65.	77.	91.
C				42.	43.	60.	66.	70.	84.	100.
B				44.	45.	61.	70.	74.		
A				58.	60.	81.	91.	97.		

1 - 34R TRUE

D					36.	52.	61.	65.	77.	91.
C				41.	40.	55.	64.	69.		
B				44.	45.	61.	70.	74.		
A				58.	60.	81.	91.	97.		

2 - 16L FALSE

D					55.	59.	72.	74.
C		34.	38.	51.	62.	63.	77.	
B	21.	38.	41.	52.	66.	69.		
A	28.	49.	54.	67.	85.	90.		

2 - 16L TRUE

D					55.	59.	72.	73.
C		33.	37.	49.	60.	62.		
B	21.	38.	41.	52.	66.	69.		
A	28.	49.	54.	67.	85.	90.		

3 - 34L FALSE

D			40.		55.	
C		28.	42.		61.	
B		31.	47.		68.	
A		42.			89.	

3 - 34L TRUE

D			40.			76.
C		27.	41.		60.	
B		31.	47.			88.
A		42.	62.			115.

4 - 16R FALSE

D			46.	46.		74.
C		39.	51.	50.		81.
B	30.	41.	56.	56.		
A	39.	53.	72.	73.		

4 - 16R TRUE

D			46.	46.	54.	73.
C	25.	38.	50.	49.		
B	30.	41.	55.	55.		
A	39.	53.	72.	73.		

5 - 35 FALSE

D		39.	56.
C	28.	43.	60.
B	30.		
A	40.		

5 - 35 TRUE

D		39.	56.
C	27.	42.	60.
B	30.		
A	40.		

6 - 17 FALSE

D		39.	56.
C	29.	43.	60.
B	31.		
A	42.		

6 - 17 TRUE

D		39.	56.
C	28.	42.	60.
B	31.		
A	42.		

7 - 31R FALSE

D					
C					
B				20.	31.
A			20.	23.	38.

8 - 13L FALSE

D					
C					
B		20.	20.	24.	28.
A		24.	23.	29.	

```
 9 - 31L FALSE
D                            54.        72.
C                      46.
B                      52.
A                      69.
 10 - 13R FALSE
D                 28.              52.
C                 33.
B            23.  36.
A            29.
```

1 34R Exit	Node	Dist	Cum Prob of Use by AC Cat 1	2	3	4	5	6	Mean ROT by AC Cat 1	2	3	4	5	6
1	1	0	0	0	0	0			•	•	•	•		
2	2	1700	0	0	0	0			•	•	•	•		
3	3	1920	0	0	0	0			•	•	•	•		
4	4	2450	0	0	0	0			•	•	•	•		
5	5	2850	0	0	0	0			•	•	•	•		
6	6	4200	0	6	30	30			•	42	44	58		
7	7	4860	5	9	70	70			36	43	45	60		
8	8	6720	48	62	90	90			52	60	61	81		
9	48	7480	65	82	95	95			61	66	70	91		
10	9	7880	69	94	100	100			65	70	74	97		
11	10	9450	99	99	100	100			77	84	89	117		
12	46	11540	100	100	100	100			91	100	109	142		
13	11	11840	100	100	100	100			94	103	112	146		
14	99	13353	0	0	0	0			•	•	•	•		

1 34R -Alt Exit	Node	Dist	Cum Prob of Use by AC Cat 1	2	3	4	5	6	Mean ROT by AC Cat 1	2	3	4	5	6
1	1	0	0	0	0	0			•	•	•	•		
2	2	1700	0	0	0	0			•	•	•	•		
3	3	1920	0	0	0	0			•	•	•	•		
4	4	2450	0	0	0	0			•	•	•	•		
5	5	2850	0	0	0	0			•	•	•	•		
6	6	4200	0	24	30	30			•	41	44	58		
7	7	4860	5	69	70	70			36	40	45	60		
8	8	6720	48	82	90	90			52	55	61	81		
9	48	7480	65	95	95	95			61	64	70	91		
10	9	7880	69	100	100	100			65	69	74	97		
11	10	9450	99	100	100	100			77	83	89	117		
12	46	11540	100	100	100	100			91	100	109	142		
13	11	11840	100	100	100	100			94	103	112	146		
14	99	13353	0	0	0	0			•	•	•	•		

2 16L Exit	Node	Dist	Cum Prob of Use by AC Cat 1	2	3	4	5	6	Mean ROT by AC Cat 1	2	3	4	5	6
1	11	0	0	0	0	0			•	•	•	•		
2	46	300	0	0	0	0			•	•	•	•		
3	10	2390	0	0	10	20			•	•	21	28		
4	9	3960	0	3	30	40			•	34	38	49		
5	48	4360	0	5	35	45			•	38	41	54		
6	8	5120	0	7	45	55			•	51	52	67		
7	7	6980	38	68	85	95			55	62	66	85		
8	6	7640	57	94	100	100			59	63	69	90		
9	5	8990	90	100	100	100			72	77	84	110		
10	4	9390	100	100	100	100			74	81	88	115		
11	3	9920	100	100	100	100			77	86	93	122		
12	2	10140	100	100	100	100			79	88	95	124		
13	1	11840	100	100	100	100			94	103	112	146		

2 16L -Alt Exit	Node	Dist	Cum Prob of Use by AC Cat 1	2	3	4	5	6	Mean ROT by AC Cat 1	2	3	4	5	6
1	11	0	0	0	0	0			•	•	•	•		
2	46	300	0	0	0	0			•	•	•	•		
3	10	2390	0	0	10	20			•	•	21	28		
4	9	3960	0	23	30	40			•	33	38	49		
5	48	4360	0	25	35	45			•	37	41	54		
6	8	5120	0	33	45	55			•	49	52	67		
7	7	6980	38	80	85	95			55	60	66	85		
8	6	7640	57	100	100	100			59	62	69	90		
9	5	8990	95	100	100	100			72	77	84	110		
10	4	9390	100	100	100	100			73	81	88	115		
11	3	9920	100	100	100	100			77	86	93	122		
12	2	10140	100	100	100	100			79	88	95	124		
13	1	11840	100	100	100	100			94	103	112	146		

3 34L Exit	Node	Dist	Cum Prob of Use by AC Cat 1	2	3	4	5	6	Mean ROT by AC Cat 1	2	3	4	5	6
1	20	0	0	0	0	0			•	•	•	•		
2	22	1770	0	0	0	0			•	•	•	•		
3	23	3110	0	0	0	0			•	•	•	•		
4	42	3550	0	60	90	90			•	28	31	42		
5	24	5430	50	84	95	9			40	42	47	•		
6	25	6230	0	0	0	0			•	•	•	•		
7	43	7590	100	100	100	100			55	61	68	89		
8	26	9390	100	100	100	100			73	81	88	115		
9	98	11178	0	0	0	0			•	•	•	•		

214

3 34L -Alt

Exit	Node	Dist	Cum Prob of Use by AC Cat 1	2	3	4	5	6	Mean ROT by AC Cat 1	2	3	4	5	6
1	20	0	0	0	0	0			•	•	•	•		
2	22	1770	0	0	0	0			•	•	•	•		
3	23	3110	0	0	0	0			•	•	•	•		
4	42	3550	0	86	90	90			•	27	31	42		
5	24	5430	50	95	95	95			40	41	47	62		
6	25	6230	0	0	0	0			•	•	•	•		
7	43	7590	0	100	0	0			•	60	•	•		
8	26	9390	100	100	100	100			76	81	88	115		
9	98	11178	0	0	0	0			•	•	•	•		

4 16R

Exit	Node	Dist	Cum Prob of Use by AC Cat 1	2	3	4	5	6	Mean ROT by AC Cat 1	2	3	4	5	6
1	26	0	0	0	0	0			•	•	•	•		
2	43	1800	0	0	0	0			•	•	•	•		
3	25	3160	0	0	13	26			•	•	30	39		
4	24	3960	0	2	26	36			•	39	41	53		
5	42	5840	5	60	70	80			46	51	56	72		
6	23	6280	76	94	100	100			46	50	56	73		
7	22	7620	0	0	0	0			•	•	•	•		
8	20	9390	100	100	100	100			74	81	88	115		
9	97	11160	0	0	0	0			•	•	•	•		

4 16R -Alt

Exit	Node	Dist	Cum Prob of Use by AC Cat 1	2	3	4	5	6	Mean ROT by AC Cat 1	2	3	4	5	6
1	26	0	0	0	0	0			•	•	•	•		
2	43	1800	0	0	0	0			•	•	•	•		
3	25	3160	0	10	13	26			•	25	30	39		
4	24	3960	0	22	26	36			•	38	41	53		
5	42	5840	5	70	80	90			46	50	55	72		
6	23	6280	76	100	100	100			46	49	55	73		
7	22	7620	95	100	100	100			54	60	68	89		
8	20	9390	100	100	100	100			73	81	88	115		
9	97	11160	0	0	0	0			•	•	•	•		

5 35

Exit	Node	Dist	Cum Prob of Use by AC Cat 1	2	3	4	5	6	Mean ROT by AC Cat 1	2	3	4	5	6
1	68	0	0	0	0	0			•	•	•	•		
2	66	1800	0	0	0	0			•	•	•	•		
3	64	3450	0	10	100	100			•	28	30	40		
4	61	5200	30	80	100	100			39	43	44	58		
5	60	7000	100	100	100	100			56	60	64	84		

214

5 35 -Alt

Exit	Node	Dist	Cum Prob of Use by AC Cat 1	2	3	4	5	6	Mean ROT by AC Cat 1	2	3	4	5	6
1	68	0	0	0	0	0			•	•	•	•		
2	66	1800	0	0	0	0			•	•	•	•		
3	64	3450	0	50	100	100			•	27	30	40		
4	61	5200	30	80	100	100			39	42	44	58		
5	60	7000	100	100	100	100			56	60	64	84		

6 17

Exit	Node	Dist	Cum Prob of Use by AC Cat 1	2	3	4	5	6	Mean ROT by AC Cat 1	2	3	4	5	6
1	60	0	0	0	0	0			•	•	•	•		
2	61	1800	0	0	0	0			•	•	•	•		
3	64	3550	0	10	100	100			•	29	31	42		
4	66	5200	30	80	100	100			39	43	44	58		
5	68	7000	100	100	100	100			56	60	64	84		

6 17 -Alt

Exit	Node	Dist	Cum Prob of Use by AC Cat 1	2	3	4	5	6	Mean ROT by AC Cat 1	2	3	4	5	6
1	60	0	0	0	0	0			•	•	•	•		
2	61	1800	0	0	0	0			•	•	•	•		
3	64	3550	0	50	100	100			•	28	31	42		
4	66	5200	30	80	100	100			39	42	44	58		
5	68	7000	100	100	100	100			56	60	64	84		

7 31R

Exit	Node	Dist	Cum Prob of Use by AC Cat 1	2	3	4	5	6	Mean ROT by AC Cat 1	2	3	4	5	6
1	550	0	0	0	0	0			•	•	•	•		
2	545	599	0	0	0	0			•	•	•	•		
3	544	1157	0	0	0	0			•	•	•	•		
4	543	1246	0	0	0	0			•	•	•	•		
5	542	1877	0	0	0	32			•	•	•	20		
6	541	2265	0	0	7	85			•	•	20	23		
7	540	3532	0	0	100	100			•	•	31	38		

8 13L

Exit	Node	Dist	Cum Prob of Use by AC Cat 1	2	3	4	5	6	Mean ROT by AC Cat 1	2	3	4	5	6
1	540	0	0	0	0	0			•	•	•	•		
2	541	1267	0	0	0	0			•	•	•	•		
3	542	1655	0	0	0	0			•	•	•	•		
4	543	2286	0	0	10	87			•	•	20	24		
5	544	2375	0	0	20	99			•	•	20	23		
6	545	2933	0	0	82	100			•	•	24	29		
7	550	3532	0	0	100	100			•	•	28	37		

214

9 31L

Exit	Node	Dist	Cum Prob of Use by AC Cat 1	2	3	4	5	6	Mean ROT by AC Cat 1	2	3	4	5	6
1	501	0	0	0	0	0			*	*	*	*		
2	502	2469	0	0	0	0			*	*	*	*		
3	503	4214	0	0	0	0			*	*	*	*		
4	504	4929	0	0	0	0			*	*	*	*		
5	505	5531	0	100	100	100			*	46	52	69		
6	506	7056	80	100	100	100			54	56	63	82		
7	507	8477	0	100	100	100			*	69	77	100		
8	508	9690	100	100	100	100			72	80	89	116		

10 13R

Exit	Node	Dist	Cum Prob of Use by AC Cat 1	2	3	4	5	6	Mean ROT by AC Cat 1	2	3	4	5	6
1	508	0	0	0	0	0			*	*	*	*		
2	507	1213	0	0	0	0			*	*	*	*		
3	506	2634	0	0	50	100			*	*	23	29		
4	505	4159	54	100	100	100			28	33	36	45		
5	504	4761	0	0	0	0			*	*	*	*		
6	503	5476	0	0	0	0			*	*	*	*		
7	502	7222	100	100	100	100			52	57	64	84		
8	501	9690	100	100	100	100			71	80	89	116		

ATC Separation Data (lead/trail)

Arr-Arr Separation in VFR1 weather with a variation of 20. sec, FIFO is TRUE
is:

	Miles D	C	B	A		Seconds D	C	B	A

Adjusted for 26812. ft offset of runway pair 13R /17 -F

	D	C	B	A		D	C	B	A
D	5.0	5.0	5.0	5.0	D	242.	264.	276.	327.
C	5.0	5.0	5.0	5.0	C	242.	261.	279.	332.
B	5.0	5.0	5.0	5.0	B	242.	261.	282.	338.
A	5.0	5.0	5.0	5.0	A	242.	261.	282.	357.

Adjusted for -26812. ft offset of runway pair 17 /13R -F

	D	C	B	A
D	15.	28.	43.	95.
C	15.	16.	31.	83.
B	15.	16.	18.	46.
A	15.	16.	18.	22.

214

Arr-Arr Separation in VFR1 weather with a variation of 20. sec, FIFO is FALSE
Applies to runway pairs...
34R /34R -F 16L /16L -F 34L /34L -F 16R /16R -F
35 /35 -F 17 /17 -F 31R /31R -F 13L /13L -F
31L /31L -F 13R /13R -F is:

	Miles D	C	B	A		Seconds D	C	B	A
D	3.9	4.7	5.5	5.5	D	99.	141.	178.	234.
C	3.0	3.0	3.7	3.5	C	78.	82.	118.	154.
B	3.0	3.0	2.9	2.7	B	78.	82.	87.	119.
A	3.0	3.0	2.9	2.7	A	78.	82.	87.	103.

Arr-Arr Separation in VFR2 weather with a variation of 20. sec, FIFO is TRUE
is:

	Miles D	C	B	A		Seconds D	C	B	A

Adjusted for 2450. ft offset of runway pair 34R /34L -F

	D	C	B	A		D	C	B	A
D	3.9	4.7	5.5	5.5	D	110.	152.	188.	244.
C	3.0	3.0	3.7	3.5	C	89.	93.	129.	165.
B	3.0	3.0	2.9	2.7	B	89.	93.	99.	131.
A	3.0	3.0	2.9	2.7	A	89.	93.	99.	118.

Adjusted for -2450. ft offset of runway pair 34L /34R -F

	D	C	B	A
D	89.	130.	167.	224.
C	68.	71.	106.	143.
B	68.	71.	75.	107.
A	68.	71.	75.	88.

Adjusted for 1900. ft offset of runway pair 34L /35 -F

	D	C	B	A
D	107.	149.	186.	242.
C	86.	91.	126.	163.
B	86.	91.	96.	128.
A	86.	91.	96.	115.

Adjusted for -1900. ft offset of runway pair 35 /34L -F

	D	C	B	A
D	91.	133.	170.	226.
C	70.	74.	109.	146.
B	70.	74.	77.	109.
A	70.	74.	77.	91.

Adjusted for -0. ft offset of runway pair 16L /16R -F

	D	C	B	A
D	99.	141.	178.	234.
C	78.	82.	118.	154.
B	78.	82.	87.	119.
A	78.	82.	87.	103.

Adjusted for 0. ft offset of runway pair 16R /16L -F

D	99.	141.	178.	234.
C	78.	82.	118.	154.
B	78.	82.	87.	119.
A	78.	82.	87.	103.

Adjusted for 490. ft offset of runway pair 16R /17 -F

D	101.	143.	180.	236.
C	81.	84.	120.	156.
B	81.	84.	89.	121.
A	81.	84.	89.	106.

Adjusted for -490. ft offset of runway pair 17 /16R -F

D	97.	139.	175.	232.
C	76.	80.	115.	152.
B	76.	80.	84.	116.
A	76.	80.	84.	100.

Dpt-Arr Separation in VFR1 weather with a variation of 10. sec, FIFO is FALSE
Applies to runway pairs...
34R -F/34R -F 16L -F/16L -F 34L -F/34L -F 16R -F/16R -F
35 -F/35 -F 17 -F/17 -F 31R -F/31R -F 13L -F/13L -F
31L -F/31L -F 13R -F/13R -F 34R -T/34R -F 16L -T/16L -F
is:

	Miles					Seconds			
	D	C	B	A		D	C	B	A
D	1.2	1.2	1.2	1.2	D	31.	33.	36.	45.
C	1.2	1.2	1.2	1.2	C	31.	33.	36.	45.
B	1.2	1.2	1.2	1.2	B	31.	33.	36.	45.
A	1.2	1.2	1.2	1.2	A	31.	33.	36.	45.

Dpt-Dpt Separation in VFR1 weather with a variation of 10. sec, FIFO is FALSE
Applies to runway pairs...
34R -F/34R -F 16L -F/16L -F 34L -F/34L -F 16R -F/16R -F
35 -F/35 -F 17 -F/17 -F 31R -F/31R -F 13L -F/13L -F
31L -F/31L -F 13R -F/13R -F 34R -F/34L -F 34L -F/34R -F
16L -F/16R -F 16R -F/16L -F is:

	Miles					Seconds			
	D	C	B	A		D	C	B	A
					D	90.	120.	120.	120.
					C	60.	60.	50.	50.
					B	50.	45.	35.	35.
					A	50.	45.	35.	35.

Dpt-Dpt Separation in VFR1 weather with a variation of 10. sec, FIFO is FALSE
Applies to runway pairs...
34R -F/34R -T 16L -F/16L -T 34R -T/34R -T 16L -T/16L -T
34L -F/34R -T 16R -F/16L -T is:

	Miles					Seconds			
	D	C	B	A		D	C	B	A
					D	90.	120.	120.	120.
					C	60.	60.	50.	50.
					B	50.	45.	35.	35.
					A	50.	45.	35.	35.

Dpt-Dpt Separation in VFR1 weather with a variation of 10. sec, FIFO is FALSE
Applies to runway pairs...
34R -T/34R -F 16L -T/16L -F 34R -T/34L -F 16L -T/16R -F
is:

	Miles					Seconds			
	D	C	B	A		D	C	B	A
					D	120.	120.	120.	120.
					C	60.	60.	50.	50.
					B	60.	60.	50.	50.
					A	60.	60.	50.	50.

Arr-Arr Separation in IFR1 weather with a variation of 20. sec, FIFO is TRUE
is:

	Miles					Seconds			
	D	C	B	A		D	C	B	A

Adjusted for -26812. ft offset of runway pair 17 /13R -F

D	5.0	5.0	5.0	5.0	D	15.	28.	43.	95.
C	5.0	5.0	5.0	5.0	C	15.	16.	31.	83.
B	5.0	5.0	5.0	5.0	B	15.	16.	18.	46.
A	5.0	5.0	5.0	5.0	A	15.	16.	18.	22.

Adjusted for 26812. ft offset of runway pair 13R /17 -F

D	242.	264.	276.	327.
C	242.	261.	279.	332.
B	242.	261.	282.	338.
A	242.	261.	282.	357.

Arr-Arr Separation in IFR1 weather with a variation of 0. sec, FIFO is FALSE
is:

	Miles D	Miles C	Miles B	Miles A		Seconds D	Seconds C	Seconds B	Seconds A

Adjusted for -26983. ft offset of runway pair 16L /13R -F

	D	C	B	A		D	C	B	A
D	0.0	0.0	0.0	0.0	D	-114.	-111.	-108.	-95.
C	0.0	0.0	0.0	0.0	C	-114.	-123.	-119.	-107.
B	0.0	0.0	0.0	0.0	B	-114.	-123.	-133.	-145.
A	0.0	0.0	0.0	0.0	A	-114.	-123.	-133.	-160.

Adjusted for -26771. ft offset of runway pair 16R /13R -F

	D	C	B	A
D	-113.	-110.	-106.	-94.
C	-113.	-122.	-118.	-106.
B	-113.	-122.	-132.	-143.
A	-113.	-122.	-132.	-167.

Arr-Arr Separation in IFR1 weather with a variation of 20. sec, FIFO is FALSE
Applies to runway pairs...
34R /34R -F 16L /16L -F 34L /34L -F 16R /16R -F
35 /35 -F 17 /17 -F 31R /31R -F 13L /13L -F
31L /31L -F 13R /13R -F is:

	Miles D	Miles C	Miles B	Miles A		Seconds D	Seconds C	Seconds B	Seconds A
D	5.2	6.1	7.0	6.8	D	133.	180.	223.	283.
C	4.2	4.1	5.0	4.8	C	107.	113.	157.	203.
B	4.2	4.1	4.0	3.8	B	107.	113.	120.	161.
A	4.2	4.1	4.0	2.8	A	107.	113.	120.	107.

Arr-Arr Separation in IFR1 weather with a variation of 20. sec, FIFO is TRUE
is:

	Miles D	Miles C	Miles B	Miles A		Seconds D	Seconds C	Seconds B	Seconds A

Adjusted for 2450. ft offset of runway pair 34R /34L -F

	D	C	B	A		D	C	B	A
D	5.2	6.1	7.0	6.8	D	143.	190.	233.	293.
C	4.2	4.1	5.0	4.8	C	117.	124.	168.	214.
B	4.2	4.1	4.0	3.8	B	117.	124.	132.	173.
A	4.2	4.1	4.0	2.8	A	117.	124.	132.	122.

Adjusted for -2450. ft offset of runway pair 34L /34R -F

	D	C	B	A
D	122.	169.	212.	272.
C	97.	102.	145.	192.
B	97.	102.	108.	148.
A	97.	102.	108.	92.

Adjusted for -0. ft offset of runway pair 16L /16R -F

	D	C	B	A
D	133.	180.	223.	283.
C	107.	113.	157.	203.
B	107.	113.	120.	161.
A	107.	113.	120.	107.

Adjusted for 0. ft offset of runway pair 16R /16L -F

	D	C	B	A
D	133.	180.	223.	283.
C	107.	113.	157.	203.
B	107.	113.	120.	161.
A	107.	113.	120.	107.

Adjusted for 1900. ft offset of runway pair 34L /35 -F

	D	C	B	A
D	141.	188.	231.	291.
C	115.	121.	165.	212.
B	115.	121.	129.	170.
A	115.	121.	129.	119.

Adjusted for -1900. ft offset of runway pair 35 /34L -F

	D	C	B	A
D	125.	171.	215.	275.
C	99.	104.	148.	194.
B	99.	104.	110.	151.
A	99.	104.	110.	95.

Adjusted for 490. ft offset of runway pair 16R /17 -F

	D	C	B	A
D	135.	182.	225.	285.
C	109.	115.	159.	205.
B	109.	115.	122.	163.
A	109.	115.	122.	110.

Adjusted for -490. ft offset of runway pair 17 /16R -F

	D	C	B	A
D	131.	178.	220.	281.
C	105.	110.	154.	201.
B	105.	110.	117.	158.
A	105.	110.	117.	104.

Arr-Arr Separation in IFR1 weather with a variation of 20. sec, FIFO is FALSE
is:

	Miles D	Miles C	Miles B	Miles A		Seconds D	Seconds C	Seconds B	Seconds A

Adjusted for 4350. ft offset of runway pair 34R /35 -F

	D	C	B	A		D	C	B	A
D	2.0	2.0	2.0	2.0	D	70.	86.	91.	119.
C	2.0	2.0	2.0	2.0	C	70.	75.	87.	116.
B	2.0	2.0	2.0	2.0	B	70.	75.	81.	113.
A	2.0	2.0	2.0	2.0	A	70.	75.	81.	103.

Adjusted for -4350. ft offset of runway pair 35 /34R -F

	D	C	B	A
D	33.	47.	54.	82.
C	33.	36.	47.	76.
B	33.	36.	39.	70.
A	33.	36.	39.	49.

Adjusted for 490. ft offset of runway pair 16L /17 -F

	D	C	B	A
D	54.	69.	75.	102.
C	54.	58.	69.	98.
B	54.	58.	62.	94.
A	54.	58.	62.	79.

Adjusted for -490. ft offset of runway pair 17 /16L -F

	D	C	B	A
D	49.	65.	71.	98.
C	49.	53.	65.	94.
B	49.	53.	58.	89.
A	49.	53.	58.	73.

Dpt-Dpt Separation in IFR1 weather with a variation of 20. sec, FIFO is FALSE
Applies to runway pairs...
34R -F/34R -F 16L -F/16L -F 34L -F/34L -F 16R -F/16R -F
35 -F/35 -F 17 -F/17 -F 31R -F/31R -F 13L -F/13L -F
31L -F/31L -F 13R -F/13R -F 34R -F/34L -F 34L -F/34R -F
16L -F/16R -F 16R -F/16L -F 34L -F/35 -F 35 -F/34L -F
16R -F/17 -F 17 -F/16R -F is:

Miles: D C B A

Seconds	D	C	B	A
D	90.	120.	120.	120.
C	60.	60.	60.	60.
B	60.	60.	60.	60.
A	60.	60.	60.	60.

Dpt-Dpt Separation in IFR1 weather with a variation of 10. sec, FIFO is FALSE
Applies to runway pairs...
34R -T/34R -T 16L -T/16L -T 34R -T/34R -F 16L -T/16L -F
34R -T/34L -F 16L -T/16R -F is:

Miles: D C B A

Seconds	D	C	B	A
D	90.	120.	120.	120.
C	60.	60.	60.	60.
B	60.	60.	60.	60.
A	60.	60.	60.	60.

Dpt-Dpt Separation in IFR1 weather with a variation of 10. sec, FIFO is FALSE
Applies to runway pairs...
34R -F/34R -T 16L -F/16L -T 34L -F/34R -T 16R -F/16L -T
is:

Miles: D C B A

Seconds	D	C	B	A
D	120.	180.	180.	180.
C	60.	60.	60.	60.
B	60.	60.	60.	60.
A	60.	60.	60.	60.

Dpt-Dpt Separation in IFR1 weather with a variation of 10. sec, FIFO is FALSE
Applies to runway pairs...
34R -F/35 -F 35 -F/34R -F 16L -F/17 -F 17 -F/16L -F
34R -T/35 -F 16L -T/17 -F 35 -F/34R -T 17 -F/16L -T
is:

Miles: D C B A

Seconds	D	C	B	A
D	60.	60.	60.	60.
C	60.	60.	60.	60.
B	60.	60.	60.	60.
A	60.	60.	60.	60.

Dpt-Dpt Separation in IFR1 weather with a variation of 10. sec, FIFO is FALSE
Applies to runway pairs...
34R -F/31L -F 34R -T/31L -F 34L -F/31L -F 35 -F/31L -F
is:

Miles: D C B A

Seconds	D	C	B	A
D	170.	170.	170.	170.
C	180.	180.	180.	180.
B	195.	195.	195.	195.
A	210.	210.	210.	210.

Dpt-Arr Separation in IFR1 weather with a variation of 10. sec, FIFO is FALSE
is:

Miles: D C B A

Seconds: D C B A

Adjusted for 29133. ft offset of runway pair 34R -F/31L -F

Miles	D	C	B	A	Seconds	D	C	B	A
D	4.0	4.0	4.0	4.0	D	103.	111.	120.	152.
C	4.0	4.0	4.0	4.0	C	103.	111.	120.	152.
B	4.0	4.0	4.0	4.0	B	103.	111.	120.	152.
A	4.0	4.0	4.0	4.0	A	103.	111.	120.	152.

Adjusted for 29133. ft offset of runway pair 34R -T/31L -F

D	103.	111.	120.	152.
C	103.	111.	120.	152.
B	103.	111.	120.	152.
A	103.	111.	120.	152.

Adjusted for 26471. ft offset of runway pair 34L -F/31L -F

D	103.	111.	120.	152.
C	103.	111.	120.	152.
B	103.	111.	120.	152.
A	103.	111.	120.	152.

Adjusted for 24122. ft offset of runway pair 35 -F/31L -F

D	103.	111.	120.	152.
C	103.	111.	120.	152.
B	103.	111.	120.	152.
A	103.	111.	120.	152.

Gate Name	Entry Node	Airlines AS	UA	US	AA	NW	DL	CO	HZ	UX	AB	IN	CG	GA	BF	BV	Aircraft D	C	B	A			Hold Node	Rmks
1	306	.	P	.	.	.	.	.	.	.	.	.	.	.	.	.	P	P	P	P	.	.	0	N1
2	308	.	P	.	.	.	.	.	.	.	.	.	.	.	.	.	P	P	P	P	.	.	0	N2
3	310	.	P	.	.	.	.	.	.	.	.	.	.	.	.	.	P	P	P	P	.	.	0	N3
4	312	.	P	.	.	.	.	.	.	.	.	.	.	.	.	.	P	P	P	P	.	.	0	N3
5	320	.	P	.	.	.	.	.	.	.	.	.	.	.	.	.	P	P	P	P	.	.	0	N6
6	322	.	P	.	.	.	.	.	.	.	.	.	.	.	.	.	P	P	P	P	.	.	0	N7
7	334	.	P	.	.	.	.	.	.	.	.	.	.	.	.	.	P	P	P	P	.	.	0	N8
8	336	.	P	.	.	.	.	.	.	.	.	.	.	.	.	.	P	P	P	P	.	.	0	N1
9	338	.	P	.	.	.	.	.	.	.	.	.	.	.	.	.	P	P	P	P	.	.	0	N1
10	340	.	P	.	.	.	.	.	.	.	.	.	.	.	.	.	P	P	P	P	.	.	0	N1
11	344	.	P	.	.	.	.	.	.	P	.	.	.	.	.	.	P	P	P	P	.	.	0	N1
12	346	.	P	.	.	.	.	.	.	P	.	.	.	.	.	.	P	P	P	P	.	.	0	N1
13	302	.	.	.	.	.	.	.	.	P	.	.	.	.	.	.	P	P	P	P	.	.	0	N1
14	304	.	P	.	.	.	.	.	.	.	.	.	.	.	.	.	P	P	P	P	.	.	0	N1
31	318	S	.	.	S	.	.	.	.	.	.	.	.	.	.	.	P	P	P	P	.	.	0	D1
32	316	S	.	.	S	.	.	.	.	.	.	.	.	.	.	.	P	P	P	P	.	.	0	D9
33	314	S	.	.	S	.	.	.	.	.	.	.	.	.	.	.	P	P	P	P	.	.	0	D8
34	312	S	.	.	S	.	.	.	.	.	.	.	.	.	.	.	P	P	P	P	.	.	0	D8
35	320	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	P	P	P	P	.	.	0	D7
36	322	P	.	.	.	.	.	.	.	.	.	.	.	.	.	.	P	P	P	P	.	.	0	D6
37	324	P	.	.	.	.	.	.	.	.	.	.	.	.	.	.	P	P	P	P	.	.	0	D5
38	324	P	.	.	.	.	.	.	.	.	.	.	.	.	.	.	P	P	P	P	.	.	0	D4
39	326	P	.	.	.	.	.	.	.	.	.	.	.	.	.	.	P	P	P	P	.	.	0	D3
40	328	P	.	.	.	.	.	.	.	.	.	.	.	.	.	.	P	P	P	P	.	.	0	D2
51	328	P	.	.	.	.	.	.	.	.	.	.	.	.	.	.	P	P	P	P	.	.	0	C1
52	328	P	.	.	.	.	.	.	.	.	.	.	.	.	.	.	P	P	P	P	.	.	0	C3
53	328	P	.	.	.	.	.	.	.	.	.	.	.	.	.	.	P	P	P	P	.	.	0	C9

54	330	P	.	.	.	.	.	.	.	.	.	.	.	.	.	.	P	P	P	P	.	.	0	C1
55	332	P	.	.	.	.	.	.	.	.	.	.	.	.	.	.	P	P	P	P	.	.	0	C1
56	334	.	.	.	.	.	.	P	.	.	.	.	.	.	.	.	P	P	P	P	.	.	0	C1
57	350	.	.	.	.	.	.	P	.	.	.	.	.	.	.	.	P	P	P	P	.	.	0	C1
58	352	.	.	.	.	.	.	P	.	.	.	.	.	.	.	.	P	P	P	P	.	.	0	C1
59	353	P	.	.	S	.	.	.	.	.	.	.	.	.	.	.	P	P	P	P	.	.	0	C1
60	354	P	.	.	S	.	.	.	.	.	.	.	.	.	.	.	P	P	P	P	.	.	0	C8
61	356	.	.	.	.	.	.	P	.	.	.	.	.	.	.	.	P	P	P	P	.	.	0	C6
62	356	.	.	.	.	.	.	P	.	.	.	.	.	.	.	.	P	P	P	P	.	.	0	C4
63	358	.	.	.	.	.	.	P	.	.	.	.	.	.	.	.	P	P	P	P	.	.	0	C4
64	358	.	.	.	.	.	.	.	P	.	.	.	.	.	.	.	P	P	P	P	.	.	0	C2
70	364	.	.	.	.	.	P	.	.	.	.	.	.	.	.	.	P	P	P	P	.	.	0	B1
71	364	.	.	.	.	.	P	.	.	.	.	.	.	.	.	.	P	P	P	P	.	.	0	B3
72	366	.	.	.	.	.	P	.	.	.	.	.	.	.	.	.	P	P	P	P	.	.	0	B5
73	367	.	.	.	.	.	P	.	.	.	.	.	.	.	.	.	P	P	P	P	.	.	0	B7
74	368	.	.	.	P	.	.	.	.	.	.	.	.	.	.	.	P	P	P	P	.	.	0	B9
75	370	.	.	.	P	.	.	.	.	.	.	.	.	.	.	.	P	P	P	P	.	.	0	B1
76	374	.	.	.	.	.	.	.	.	.	P	.	.	.	.	.	P	P	P	P	.	.	0	B1
77	376	.	.	.	.	.	.	.	.	.	P	S	.	.	.	.	P	P	P	P	.	.	0	B1
78	380	.	.	.	.	.	.	.	.	.	P	S	.	.	.	.	P	P	P	P	.	.	0	B1
79	382	.	.	.	P	.	.	.	.	.	.	.	.	.	.	.	P	P	P	P	.	.	0	B1
80	382	.	.	.	.	.	P	.	.	.	.	.	.	.	.	.	P	P	P	P	.	.	0	B8
81	384	.	.	.	.	.	P	.	.	.	.	.	.	.	.	.	P	P	P	P	.	.	0	B4
90	384	.	.	P	.	.	.	.	.	.	.	.	.	.	.	.	P	P	P	P	.	.	0	A1
91	384	.	.	P	.	.	.	.	.	.	.	.	.	.	.	.	P	P	P	P	.	.	0	A2
92	386	.	.	P	.	.	.	.	.	.	.	.	.	.	.	.	P	P	P	P	.	.	0	A3
93	388	.	.	P	.	.	.	.	.	.	.	.	.	.	.	.	P	P	P	P	.	.	0	A4
94	390	.	.	P	.	.	.	.	.	.	.	.	.	.	.	.	P	P	P	P	.	.	0	NE
95	392	.	.	P	.	.	.	.	.	.	.	.	.	.	.	.	P	P	P	P	.	.	0	A5
96	396	.	.	P	.	.	.	.	.	.	.	.	.	.	.	.	P	P	P	P	.	.	0	A7
100	393	.	.	.	.	P	.	.	.	.	.	.	.	.	.	.	P	P	P	P	.	.	0	S2
101	395	.	.	.	.	P	.	.	.	.	.	.	.	.	.	.	P	P	P	P	.	.	0	S3
102	397	.	.	.	.	P	.	.	.	.	.	.	.	.	.	.	P	P	P	P	.	.	0	S3
103	399	.	.	.	.	P	.	.	.	.	.	.	.	.	.	.	P	P	P	P	.	.	0	S4
104	398	.	.	.	.	P	.	.	.	.	.	.	.	.	.	.	P	P	P	P	.	.	0	S6
105	396	.	.	.	.	P	.	.	.	.	.	.	.	.	.	.	P	P	P	P	.	.	0	S6
106	394	.	.	.	.	P	.	.	.	.	.	.	.	.	.	.	P	P	P	P	.	.	0	S7
107	378	.	.	.	.	P	.	.	.	.	.	.	.	.	.	.	P	P	P	P	.	.	0	S8
108	376	.	P	.	.	.	.	.	.	.	.	.	.	.	.	.	P	P	P	P	.	.	0	S9
109	376	.	P	.	.	.	.	.	.	.	.	.	.	.	.	.	P	P	P	P	.	.	0	S1
110	374	.	.	.	.	.	.	.	.	.	.	P	.	.	.	.	P	P	P	P	.	.	0	S1
111	381	.	.	.	.	.	.	.	.	.	.	P	.	.	.	.	P	P	P	P	.	.	0	S1
112	381	.	.	.	.	.	.	.	.	.	.	P	.	.	.	.	P	P	P	P	.	.	0	S1
113	387	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	P	P	P	P	.	.	0	S1
114	391	.	.	.	.	.	.	.	P	.	.	S	.	.	.	.	P	P	P	P	.	.	0	S1
120	203	.	.	.	.	.	.	.	.	.	.	.	P	.	.	.	P	P	P	P	.	.	0	CG
121	205	.	.	.	.	.	.	.	.	.	.	.	P	.	.	.	P	P	P	P	.	.	0	CG
122	208	.	.	.	.	.	.	.	.	.	.	.	P	.	.	.	P	P	P	P	.	.	0	CG
123	209	.	.	.	.	.	.	.	.	.	.	.	P	.	.	.	P	P	P	P	.	.	0	CG
124	210	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	P	P	P	P	.	.	0	CG

214

```
125   211   . . . . . . . . . . . . . . .     P  P  P  P  .  .    0   CG
129   362   . . . . . . . . . . . . . . .     .  .  .  .  .  .    0   TX
130   104   . . . . . . . . . . . . . P . .   P  P  P  P  .  .    0   GA
201   517   . . . . . . . . . . . . . . P P   P  P  P  P  .  .    0
202   530   . . . . . . . . . . . . . . P P   P  P  P  P  .  .    0
203   531   . . . . . . . . . . . . . . P P   P  P  P  P  .  .    0
204   563   . . . . . . . . . . . . . . P P   P  P  P  P  .  .    0
205   559   . . . . . . . . . . . . . . P P   P  P  P  P  .  .    0
206   565   . . . . . . . . . . . . . . P P   P  P  P  P  .  .    0
207   564   . . . . . . . . . . . . . . P P   P  P  P  P  .  .    0
208   554   . . . . . . . . . . . . . . P P   P  P  P  P  .  .    0
```

Airline Gate Use Parameters

Airline Parameters

Airln	Alt Exits	Inter Tkof	Gate Mode	Max Wait	Park Node	Hanger Node	Alt Route
AS	FALSE	FALSE	1	0.0	211	211	FALSE
UA	FALSE	FALSE	1	0.0	211	211	FALSE
US	FALSE	FALSE	1	0.0	210	210	FALSE
AA	FALSE	FALSE	1	0.0	209	211	FALSE
NW	FALSE	FALSE	1	0.0	401	401	FALSE
DL	FALSE	FALSE	1	0.0	208	208	FALSE
CO	FALSE	FALSE	1	0.0	401	401	FALSE
HZ	TRUE	TRUE	0	0.0	362	362	FALSE
UX	TRUE	FALSE	0	0.0	210	210	FALSE
AB	TRUE	FALSE	0	0.0	362	362	FALSE
IN	FALSE	FALSE	1	0.0	211	401	FALSE
CG	FALSE	FALSE	0	0.0	211	211	FALSE
GA	TRUE	TRUE	0	0.0	401	401	FALSE
BF	FALSE	FALSE	0	0.0	559	559	FALSE
BV	FALSE	FALSE	0	0.0	559	559	FALSE

Minimum Gate Occupancy Times

AC Cat	THRU	TURN	UNLOAD	LOAD
D	0.4	0.4	0.4	0.8
C	0.3	0.3	0.3	0.4
B	0.3	0.3	0.3	0.4
A	0.2	0.2	0.2	0.2

214

Appendix C

Sample Output Report

Year 1990 demand level, IMC, With New Runway, Equal Delay Strategy

SEATAC & KCI SOUTH-FLOW IMC
demand level 1.00

Airport Activity and Delay by Hour

	ARRIVAL			DEPARTURE			TOTAL		
	no.	DELAY (hrs)	AVG (min)	no.	DELAY (hrs)	AVG (min)	no.	DELAY (hrs)	AVG (min)
7	31	0.6	1.23	54	1.8	2.06	85	2.5	1.76
8	29	1.9	4.03	36	0.2	0.38	65	2.2	2.01
9	30	3.9	7.79	38	0.7	1.08	68	4.6	4.04
10	37	3.0	4.79	33	0.2	0.27	70	3.1	2.66
11	55	7.7	8.38	36	0.4	0.64	91	8.1	5.32
12	40	5.8	8.65	38	0.7	1.15	78	6.5	5.00
13	33	1.1	1.96	51	1.0	1.18	84	2.1	1.48
14	28	0.7	1.45	37	0.5	0.85	65	1.2	1.11
15	32	1.1	2.02	33	0.4	0.74	65	1.5	1.37
16	32	0.7	1.28	39	0.5	0.74	71	1.2	0.98
17	44	2.4	3.32	26	0.2	-0.36	70	2.6	2.22
18	43	2.0	2.79	28	0.3	0.73	71	2.3	1.98
19	35	2.3	3.96	39	0.4	0.59	74	2.7	2.18
20	40	1.4	2.16	38	0.4	0.67	78	1.9	1.44
21	27	1.1	2.35	23	0.3	0.73	50	1.3	1.60
22	23	0.7	1.74	18	0.1	0.32	41	0.8	1.12
23	8	0.1	0.98	15	0.1	0.24	23	0.2	0.50
ttl	628	37.5	3.58	627	8.7	0.83	1255	46.1	2.21

Runway Activity and Delay

	ARRIVAL			DEPARTURE			TOTAL		
	no.	DELAY (hrs)	AVG (min)	no.	DELAY (hrs)	AVG (min)	no.	DELAY (hrs)	AVG (min)
34R	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
16L	305	25.5	5.03	158	2.9	1.11	463	28.5	3.69
34L	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
16R	146	5.9	2.42	380	5.2	0.83	526	11.1	1.27
35	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
17	88	4.2	2.85	0	0.0	0.00	88	4.2	2.85
31R	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
13L	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
31L	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
13R	89	1.9	1.26	89	0.5	0.35	178	2.4	0.80
ttl	628	37.5	3.58	627	8.7	0.83	1255	46.1	2.21

Delay by Equipment Type

	ARRIVAL			DEPARTURE			TOTAL		
	no.	DELAY (hrs)	AVG (min)	no.	DELAY (hrs)	AVG (min)	no.	DELAY (hrs)	AVG (min)
D	46	4.1	5.30	42	0.7	0.98	88	4.7	3.24
C	468	29.5	3.78	471	6.7	0.85	939	36.2	2.31
B	59	1.7	1.76	59	0.7	0.76	118	2.5	1.26
A	55	2.2	2.41	55	0.6	0.60	110	2.8	1.51
ttl	628	37.5	3.58	627	8.7	0.83	1255	46.1	2.21

Delay by Airline

	ARRIVAL			DEPARTURE			TOTAL		
	no.	DELAY (hrs)	AVG (min)	no.	DELAY (hrs)	AVG (min)	no.	DELAY (hrs)	AVG (min)
AS	76	3.9	3.05	76	1.2	0.92	152	5.0	1.99
UA	59	5.6	5.67	60	1.0	0.95	119	6.5	3.29
US	41	2.3	3.39	41	0.8	1.22	82	3.1	2.30
AA	23	0.8	2.08	22	0.3	0.87	45	1.1	1.49
NW	35	2.7	4.64	33	0.6	1.18	68	3.4	2.96
DL	26	1.5	3.36	25	0.3	0.67	51	1.7	2.04

214

Delay by Airline continued

	ARRIVAL			DEPARTURE			TOTAL		
	no.	DELAY (hrs)	AVG (min)	no.	DELAY (hrs)	AVG (min)	no.	DELAY (hrs)	AVG (min)
CO	20	1.3	3.93	20	0.3	0.99	40	1.6	2.46
HZ	123	8.3	4.03	126	1.8	0.84	249	10.0	2.41
UX	62	5.1	4.95	62	0.7	0.65	124	5.8	2.80
AB	22	0.9	2.59	22	0.2	0.66	44	1.2	1.62
IN	7	0.7	5.96	6	0.1	1.02	13	0.8	3.68
CG	30	1.3	2.68	30	0.6	1.10	60	1.9	1.89
GA	15	1.2	4.91	15	0.3	1.24	30	1.5	3.07
BF	89	1.9	1.26	89	0.5	0.35	178	2.4	0.80
BV	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
ttl	628	37.5	3.58	627	8.7	0.83	1255	46.1	2.21

Average taxi-in statistics by aircraft type (miles, mins)

Cat	No.	Dist	Time	Delay	RXDly	Sum	Stops
D	46	0.73	2.92	0.85	0.15	3.92	0.6
C	468	0.86	3.61	0.54	0.82	4.97	0.4
B	59	0.77	3.36	0.09	0.39	3.84	0.1
A	55	0.72	4.27	0.02	0.54	4.82	0.1
Avg	628	0.83	3.59	0.47	0.70	4.77	0.4

Average taxi-out statistics by aircraft type (miles, mins)

Cat	No.	Dist	Time	Delay	RXDly	Sum	Stops
D	42	1.87	13.27	1.51	2.14	16.93	1.4
C	471	1.78	9.49	1.45	1.48	12.42	1.1
B	59	1.15	6.40	0.32	0.57	7.29	0.3
A	55	1.16	6.75	1.02	0.28	8.06	0.5
Avg	627	1.67	9.22	1.31	1.33	11.86	1.0
All	1255	1.25	6.40	0.89	1.02	8.31	0.7

214

Average taxi-in statistics by airline (mins)

Cat	No.	Dist	Time	Delay	RXDly	Sum	Stops
AS	76	1.11	5.28	0.92	0.46	6.66	0.6
UA	59	0.93	4.10	0.71	0.49	5.29	0.9
US	41	0.90	3.93	0.62	1.11	5.66	0.3
AA	23	0.65	2.56	0.49	0.69	3.74	0.2
NW	35	0.99	4.22	1.08	0.58	5.89	0.6
DL	26	0.51	2.02	0.02	0.14	2.18	0.1
CO	20	0.69	2.95	0.28	1.00	4.23	0.2
HZ	123	0.79	3.00	0.53	1.35	4.88	0.3
UX	62	0.71	2.77	0.32	0.70	3.80	0.3
AB	22	0.75	2.99	0.36	0.87	4.22	0.5
IN	7	0.37	1.31	0.00	0.23	1.53	0.0
CG	30	1.37	5.36	0.32	0.43	6.12	0.4
GA	15	1.11	6.03	0.02	1.97	8.01	0.1
BF	89	0.58	3.00	0.04	0.00	3.03	0.0
BV	0						
Avg	628	0.83	3.59	0.47	0.70	4.77	0.4

Average taxi-out statistics by airline (mins)

Cat	No.	Dist	Time	Delay	RXDly	Sum	Stops
AS	76	1.62	9.00	1.29	1.73	12.01	0.8
UA	60	1.68	9.53	1.24	1.96	12.72	1.0
US	41	2.23	12.26	2.30	1.00	15.56	1.9
AA	22	2.05	11.03	0.65	1.72	13.40	0.6
NW	33	2.35	13.28	2.90	1.65	17.84	2.8
DL	25	1.92	10.45	1.78	1.30	13.53	1.6
CO	20	1.58	9.62	0.76	1.55	11.92	0.5
HZ	126	1.96	10.17	1.65	1.36	13.17	1.2
UX	62	1.43	7.45	0.58	1.75	9.77	0.4
AB	22	2.19	11.35	2.49	1.53	15.37	2.6
IN	6	2.13	12.33	1.95	4.07	18.35	1.2
CG	30	0.58	5.19	0.38	1.22	6.78	0.2
GA	15	1.91	12.24	3.38	1.03	16.65	1.3

214

Average taxi-out statistics by airline (mins) continued

Cat	No.	Dist	Time	Delay	RXDly	Sum	Stops
BF	89	0.98	5.39	0.15	0.00	5.54	0.1
BV	0						
Avg	627	1.67	9.22	1.31	1.33	11.86	1.0
All	1255	1.25	6.40	0.89	1.02	8.31	0.7

Taxi statistics by aircraft type... (miles and hrs)

	Taxi In			Taxi Out			Total		
Cat	Dist	Delay	Stops	Dist	Delay	Stops	Dist	Delay	Stops
D	33.	0.7	27	78.	1.1	58	112.	1.7	85
C	404.	4.2	192	838.	11.4	533	1242.	15.6	725
B	45.	0.1	7	68.	0.3	16	113.	0.4	23
A	40.	0.0	3	64.	0.9	26	104.	1.0	29
Total	522.	5.0	229	1048.	13.7	633	1571.	18.7	862

Average taxi statistics... (miles, mins)

	Taxi In			Taxi Out			Total		
Cat	Dist	Delay	Stops	Dist	Delay	Stops	Dist	Delay	Stops
D	0.73	0.85	0.6	1.87	1.51	1.4	2.60	2.37	2.0
C	0.86	0.54	0.4	1.78	1.45	1.1	2.64	1.99	1.5
B	0.77	0.09	0.1	1.15	0.32	0.3	1.92	0.40	0.4
A	0.72	0.02	0.1	1.16	1.02	0.5	1.88	1.04	0.5
Total	0.83	0.47	0.4	1.67	1.31	1.0	2.50	1.78	1.4

214

Taxi statistics by airline... (miles and hrs)

	Taxi In			Taxi Out			Total		
Cat	Dist	Delay	Stops	Dist	Delay	Stops	Dist	Delay	Stops
AS	84.	1.2	48	123.	1.6	62	208.	2.8	110
UA	55.	0.7	52	101.	1.2	60	156.	1.9	112
US	37.	0.4	12	91.	1.6	77	128.	2.0	89
AA	15.	0.2	4	45.	0.2	14	60.	0.4	18
NW	35.	0.6	22	78.	1.6	92	112.	2.2	114
DL	13.	0.0	3	48.	0.7	39	61.	0.8	42
CO	14.	0.1	3	32.	0.3	10	45.	0.3	13
HZ	97.	1.1	37	247.	3.5	152	345.	4.5	189
UX	44.	0.3	19	89.	0.6	25	133.	0.9	44
AB	16.	0.1	11	48.	0.9	57	65.	1.0	68
IN	3.	0.0	0	13.	0.2	7	15.	0.2	7
CG	41.	0.2	13	17.	0.2	5	58.	0.3	18
GA	17.	0.0	2	29.	0.8	20	45.	0.9	22
BF	51.	0.1	3	87.	0.2	13	139.	0.3	16
BV	0.	0.0	0	0.	0.0	0	0.	0.0	0
Total	522.	5.0	229	1048.	13.7	633	1571.	18.7	862

Average taxi statistics... (miles, mins)

	Taxi In			Taxi Out			Total		
Cat	Dist	Delay	Stops	Dist	Delay	Stops	Dist	Delay	Stops
AS	1.11	0.92	0.6	1.62	1.29	0.8	2.73	2.20	1.4
UA	0.93	0.71	0.9	1.68	1.24	1.0	2.61	1.95	1.9
US	0.90	0.62	0.3	2.23	2.30	1.9	3.13	2.92	2.2
AA	0.65	0.49	0.2	2.05	0.65	0.6	2.70	1.14	0.8
NW	0.99	1.08	0.6	2.35	2.90	2.8	3.34	3.98	3.4
DL	0.51	0.02	0.1	1.92	1.78	1.6	2.43	1.80	1.7
CO	0.69	0.28	0.2	1.58	0.76	0.5	2.27	1.03	0.6
HZ	0.79	0.53	0.3	1.96	1.65	1.2	2.75	2.17	1.5
UX	0.71	0.32	0.3	1.43	0.58	0.4	2.14	0.90	0.7
AB	0.75	0.36	0.5	2.19	2.49	2.6	2.94	2.86	3.1
IN	0.37	0.00	0.0	2.13	1.95	1.2	2.50	1.95	1.2
CG	1.37	0.32	0.4	0.58	0.38	0.2	1.95	0.70	0.6
GA	1.11	0.02	0.1	1.91	3.38	1.3	3.02	3.41	1.5
BF	0.58	0.04	0.0	0.98	0.15	0.1	1.56	0.19	0.2
BV	0.00	0.00	0.0	0.00	0.00	0.0	0.00	0.00	0.0
Total	0.83	0.47	0.4	1.67	1.31	1.0	2.50	1.78	1.4

SEATAC & KCI SOUTH-FLOW IFR
demand level 1.00

T a x i w a y I n t e r s e c t i o n U s e a n d D e l a y

node	ac	delay	node	ac	delay	node	ac	delay	node	ac	delay
1	0	0	2	0	0	3	0	0	4	39	39
5	1	0	6	72	143	7	70	50	8	9	12
9	49	51	10	1	1	11	529	285	20	32	48
22	0	0	23	24	47	24	30	14	25	0	0
26	380	183	28	50	5	42	0	0	43	2	2
46	2	1	48	0	0	49	74	0	60	0	0
61	0	0	64	0	0	66	0	0	68	0	0
97	0	0	98	0	0	99	0	0	100	0	0
101	0	0	102	0	0	103	0	0	104	30	1
105	15	0	106	75	1	107	116	0	108	172	0
109	251	2	110	222	0	111	184	4	112	92	0
113	600	3	114	505	3	115	502	3	116	501	51
117	531	108	118	0	0	119	529	440	120	77	0
121	61	0	122	61	0	200	44	0	201	25	0
202	25	0	203	13	0	204	0	0	205	12	0
206	0	0	207	0	0	208	22	11	209	16	0
210	0	0	211	11	1	215	39	0	217	37	0
219	29	0	221	48	0	222	696	8	301	189	23
302	167	5	304	124	0	306	112	0	308	112	2
310	110	3	312	113	2	314	1	0	316	1	0
318	0	0	320	110	0	322	119	6	324	123	8
326	40	0	328	60	1	330	41	1	332	114	26
334	112	22	336	109	9	338	111	21	340	593	159
344	686	66	346	73	19	350	486	16	352	484	17
353	486	33	354	365	14	356	363	34	358	378	164
360	306	76	362	0	0	364	264	33	366	261	20
367	228	6	368	234	5	370	236	7	374	353	113
376	206	9	378	175	8	380	56	1	381	144	17
382	60	6	384	75	5	385	159	46	386	53	0
387	144	0	388	55	0	390	54	0	391	144	24
392	106	5	393	28	0	394	116	2	395	24	0
396	38	0	397	27	4	398	26	0	399	27	0
400	0	0	401	4	0	410	32	4	412	32	0
420	37	0	422	40	0	424	56	0	428	2	0
429	0	0	430	0	0	435	0	0	438	30	0

Taxiway Intersection Use and Delay continued

node	ac	delay	node	ac	delay	node	ac	delay	node	ac	delay
440	2	0	445	0	0	501	0	0	502	0	0
503	0	0	504	0	0	505	0	0	506	0	0
507	0	0	508	89	23	511	0	0	516	24	2
517	24	0	518	24	0	519	24	0	520	31	0
521	50	2	522	14	0	523	14	0	530	25	0
531	35	3	532	44	0	533	58	1	534	58	0
535	66	0	540	0	0	541	0	0	542	29	0
543	0	0	544	0	0	545	17	0	550	0	0
552	25	0	553	25	3	554	24	1	556	55	2
557	60	0	558	70	0	559	27	0	560	64	0
561	72	1	562	51	0	563	23	0	564	38	0
565	18	2									

Runway Crossing Delay (hrs)

RW	IN	OUT	TOTAL
1	0.00	0.00	0.00
2	5.27	13.91	19.18
3	0.00	0.00	0.00
4	2.10	0.00	2.10
5	0.00	0.00	0.00
6	0.00	0.00	0.00
7	0.00	0.00	0.00
8	0.00	0.00	0.00
9	0.00	0.00	0.00
10	0.00	0.00	0.00
	7.37	13.91	21.28

214

SEATAC & KCI SOUTH-FLOW IFR
demand level 1.00

Gate Use and Delay (hours)

	Airline														
	AS	UA	US	AA	NW	DL	CO	HZ	UX	AB	IN	CG	GA	BF	BV
7	4.6	5.4	1.6	2.3	3.2	3.0	1.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0
8	3.6	3.4	1.2	2.0	2.7	2.4	1.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0
9	5.0	2.4	0.1	1.8	1.0	1.2	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	5.5	3.4	0.8	1.0	4.0	1.8	1.3	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0
11	4.3	2.5	0.9	1.1	6.5	2.1	4.4	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0
12	6.0	4.0	2.1	1.1	6.9	1.1	3.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0
13	7.0	3.6	0.8	1.3	3.7	1.0	0.2	0.0	0.0	0.0	2.4	0.0	0.0	0.0	0.0
14	7.4	1.8	0.8	2.7	1.4	1.8	1.6	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0
15	2.3	1.0	1.0	1.6	1.2	1.6	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	3.3	2.0	1.3	1.1	1.7	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	3.0	2.2	2.8	1.1	0.0	0.3	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0
18	5.4	4.6	1.9	1.6	0.4	0.0	0.5	0.0	0.0	0.0	1.1	0.0	0.0	0.0	0.0
19	2.8	0.8	1.9	1.9	1.0	1.7	0.7	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0
20	0.8	1.4	0.6	0.4	2.3	0.0	0.3	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0
21	0.7	0.9	2.3	0.0	2.1	1.8	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22	0.0	1.0	1.6	0.0	1.8	1.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23	0.0	0.9	1.1	0.0	0.0	0.8	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dly	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Total Gate Delay is 0.4 hours

	Equipment						
	1	2	3	4	5	6	total
7	4.8	17.3	0.0	0.0			22.1
8	4.1	13.2	0.0	0.0			17.2
9	2.3	9.6	0.0	0.0			11.8
10	7.1	11.1	0.0	0.0			18.2
11	10.8	11.9	0.0	0.0			22.7
12	7.7	18.5	0.0	0.0			26.2
13	4.7	15.3	0.0	0.0			20.0
14	0.8	17.2	0.0	0.0			17.9
15	0.0	9.0	0.0	0.0			9.0

214

Equipment continued

	1	2	3	4	5	6	total
16	0.7	9.6	0.0	0.0			10.3
17	1.0	9.4	0.1	0.0			10.4
18	0.9	14.1	0.5	0.0			15.5
19	0.0	11.9	0.0	0.0			11.9
20	0.0	6.4	0.0	0.0			6.4
21	1.9	6.5	0.0	0.0			8.3
22	0.5	5.2	0.0	0.0			5.7
23	0.4	2.8	0.0	0.0			3.2
Delay	0.0	0.4	0.0	0.0			0.4

Stream Counts by Aircraft Category

		Arrivals						Departures				
RW	STRM	1	2	3	4	5	6	1	2	3	4	5
2	1	2	22	4	1			0	13	1	0	
2	2	5	28	0	0			1	15	1	2	
2	3	4	24	1	2			1	13	2	0	
2	4	2	33	1	1			1	10	1	0	
2	5	3	27	2	3			2	15	2	0	
2	6	2	29	1	0			1	15	1	2	
2	7	2	28	0	0			2	10	1	0	
2	8	5	21	0	1			2	12	1	0	
2	9	3	20	0	0			3	16	0	0	
2	10	2	24	2	0			1	9	1	1	
4	1	2	18	0	0			6	33	1	1	
4	2	3	12	3	2			2	32	2	1	
4	3	3	15	1	0			1	35	1	0	
4	4	0	6	0	0			2	30	2	0	
4	5	2	10	0	0			1	47	2	0	
4	6	3	12	0	1			3	30	2	3	
4	7	1	9	0	1			3	26	0	2	
4	8	1	15	0	0			1	42	1	1	
4	9	0	17	1	0			4	26	0	0	
4	10	0	7	1	0			4	30	1	2	
6	1	0	4	1	0			0	0	0	0	
6	2	0	4	0	1			0	0	0	0	
6	3	0	13	0	0			0	0	0	0	

Stream Counts by Aircraft Category continued

RW	STRM	Arrivals 1	2	3	4	5	6	Departures 1	2	3	4	5
6	4	0	5	1	0			0	0	0	0	
6	5	0	9	4	0			0	0	0	0	
6	6	0	8	0	0			0	0	0	0	
6	7	0	3	0	0			0	0	0	0	
6	8	0	10	0	1			0	0	0	0	
6	9	0	10	0	1			0	0	0	0	
6	10	0	13	0	0			0	0	0	0	
10	11	1	12	36	40			1	12	36	40	

Cost Summary

	Runway Arrival	Runway Depart	Taxiway In	Taxiway Out	Total
Total (hrs)					
COUNT	628	627	628	627	1255
DELAY	37.5	8.7	12.3	27.6	86.1
TIME	0.0	0.0	37.6	96.3	133.9
COST ($K)	54	8	42	111	214
Average (mins)					
DELAY	3.58	0.83	1.18	2.64	4.12
TIME	0.00	0.00	3.59	9.22	6.40
COST ($)	86	12	67	176	171

Arrival-Arrival Runway Incursions

RW	Incursions	Exit Blocked
1	0	0
2	0	0
3	0	0
4	0	3
5	0	0
6	0	0
7	0	0
8	0	0
9	0	0
10	0	0

SOCIAL SURVEY OF COMMUNITY RESPONSE TO NOISE EXPOSURE NEAR SEATTLE-TACOMA INTERNATIONAL AIRPORT

Sanford Fidell, Laura Silvati, and Karl Pearsons

BBN Technical Report Number 8070

18 April 1995

Prepared by:

Bolt Beranek and Newman Systems and Technologies
21120 Vanowen Street
Canoga Park, California 91303

Submitted to:

Airport Communities Coalition
City of Burien, Washington
City of Des Moines, Washington
City of Normandy Park, Washington
City of Tukwila, Washington
Highline School District

TABLE OF CONTENTS

LIST OF FIGURES

214

BBN SYSTEMS AND TECHNOLOGIES TECHNICAL REPORT 8070

LIST OF TABLES

1.0 INTRODUCTION AND SUMMARY

The Port of Seattle ("the Port") has been engaged since 1991 in a program intended to reduce aircraft noise from Seattle-Tacoma International Airport. The Port's 1991 Noise Exposure Map predicted a gradual decline in average aircraft noise exposure levels in the vicinity of the airport of about 1.5 dB over the course of several years (Port of Seattle, 1993). The Port recently reported that the mean value of measured Day-Night Average Sound levels (DNL) in the vicinity of the airport declined from 1991 to 1994 by 2.9 dB. The Port has noted, however, that further noise reduction through the year 2001 cannot be expected to continue at this rate, since the number of relatively noisy aircraft still operating at Seattle-Tacoma International Airport is small.

Notwithstanding the Port's program, considerable community concerns have been raised about the absolute levels of airport noise and the extent to which the Port's noise reduction program has been efficacious in improving the noise environment in airport neighborhoods.

Partially in response to these concerns, the General Assembly of the Puget Sound Regional Council (PSRC) directed its Executive Board in April 1993 to establish an independent process to determine whether, by 1996, the Port has "scheduled, pursued and achieved" a reduction in "real noise impacts." The PSRC Expert Arbitration Panel on Noise and Demand/System Management Issues ("the Panel") has convened several meetings to address these questions and issued, in January 1995, its "Order on Phase 1 Noise Issues." This Order discusses the procedures which the Panel will use to determine whether there has been a significant or meaningful reduction in on-the-ground noise and further imposes on the Port the "burden of showing that whatever reduction it has achieved by 1996 is significant and meaningful in the sense that residents of the affected communities could, or should, appreciate it."

In its hearings of December 1994 and in its January 1995 Order, the Panel recognized that noise measurements alone may not be determinative of meaningful noise reductions but are of value principally as a means of estimating community response to noise exposure. The Panel's January 1995 Order notes the uncertainties associated with predicting community response to aircraft noise from noise measurements alone, raising issues of source specificity, accuracy of prediction, utility of alternate noise metrics as predictors of community response, and locations of measurements. Only a direct, empirical determination of the views of affected

residents can reduce the inherent uncertainties of predicting community response from noise exposure estimates alone.

Social surveys provide a well established means for quantifying community response to aircraft noise exposure. More than 300 such surveys of community response to transportation noise have been conducted in the last several decades. This scientific literature is the basis for the Panel's observation that a survey of the opinions of residents of the areas affected by airport-related noise could provide the Panel with information which would be useful in its deliberations about whether the Port has met its burden of demonstrating significant and meaningful noise reduction. (Although acknowledging the utility of social survey data, the Panel explicitly did not direct the Port to conduct such a survey.)

The Airport Communities Coalition (the Cities of Burien, Des Moines, Normandy Park and Tukwila and the Highline School District) commissioned the effort described in this document to assist the Panel and the public in an objective assessment of noise impacts. This report describes the design and results of a survey of residents' opinions about neighborhood living conditions in four areas near Seattle-Tacoma International Airport and in two other areas at greater distances from the airport. The survey was designed to elicit information about community perception of both absolute noise levels and changes in noise level in the recent past. The survey was conducted in neighborhoods with a range of noise exposure levels, as described by the Port in its 1991 Noise Exposure Map.

The results of the survey are discussed in detail in the accompanying report. These results can be summarized as follows:

> A large majority of survey respondents in neighborhoods both near and distant from the airport have not noticed any reduction in aircraft noise in recent years.
>
> Many respondents have noticed an increase in aircraft noise in recent years. Among these respondents, many describe the increase as substantial.
>
> About half of all respondents report that they are no less annoyed today by aircraft noise than they have been in past years. Among those who report changes in their annoyance, a large majority are more annoyed today than in past years.

It also is useful to compare the communities in the vicinity of Seattle-Tacoma International Airport with other noise-affected communities in the United States and elsewhere. The present survey revealed that:

Survey respondents are not abnormally sensitive to aircraft noise.

Approximately the same percentages of respondents are highly annoyed by aircraft noise in the present interviewing areas as in other neighborhoods elsewhere with comparable noise exposure.

Prior research has shown that nonacoustic factors often influence community response to aircraft noise. These factors include attitudes toward the airport proprietor, sense of community influence over noise issues, fear of crashes, and belief in malfeasance or misfeasance by the airport. The present survey revealed that nonacoustic factors play a relatively smaller role in determining annoyance in the present interviewing areas than in other communities elsewhere. Because the prevalence of annoyance among respondents is not as greatly affected by nonacoustic factors as is the case in communities elsewhere, reduction in the prevalence of annoyance in neighborhoods near Seattle-Tacoma International Airport should closely track noticeable reductions in noise exposure.

2.0 BACKGROUND

Quantitative assessment of community response to environmental noise exposure has long been a matter of societal interest. Fields (1991) notes that more than 300 social surveys of the effects of noise exposure on communities have been conducted in the last five decades. The first major synthesis of this body of information was completed by Schultz (1978), who adopted several now-standard conventions for treatment of such data. The three most important of these conventions are:

reliance on an EPA-developed metric of cumulative, time-weighted average noise levels ("Day-Night Average Sound Level", or DNL) as a predictor variable;

treatment of "community response" to noise exposure as the prevalence of a consequential degree of noise-induced annoyance; and

expression of noise effects on communities in terms of a dosage-response relationship.

Schultz adopted the first of these conventions as a matter of necessity, since the alphabet soup of environmental noise metrics of the 1960s and 1970s was a major impediment to understanding and interpreting community response information.

The practice of characterizing community response to noise exposure in terms of the prevalence of a consequential degree (rather than some other degree) of annoyance followed from a belief that policy analyses and criteria for interpreting noise-induced annoyance might be trivialized if they were sensitive in some degree to reports of petty annoyances. Schultz also believed that some people who were not annoyed to a consequential degree by environmental sounds may not have been meaningfully exposed to them in the first place.

Schultz adopted the third convention in the interests of supporting a systematic and broadly based rationale for policy interpretations (so-called "noise effects criteria").

Schultz's pioneering meta-analysis, since updated several times by various organizations, has provided the *de facto* underpinning for federal regulatory policy dealing with aircraft noise effects. Figure 1, adapted from Fidell (1992), shows the prevalence of noise-induced annoyance in more than four hundred communities world-wide. Figure 2, a dosage-response relationship produced by the U.S. Federal Interagency Committee on Noise (FICON, 1992), is one well-known summary of these data that is often cited as an interpretive criterion.

The present survey was designed to yield information interpretable in the context of this conventional framework for quantitative assessment of community response to noise exposure.

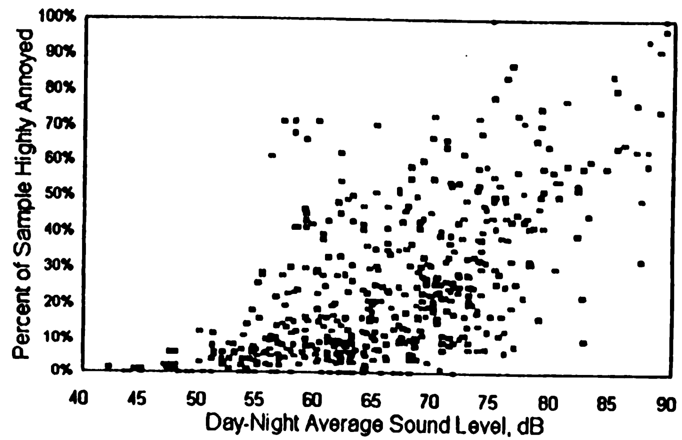


Figure 1 Summary of observations of prevalence of noise-induced annoyance due to general transportation noise (including aircraft).

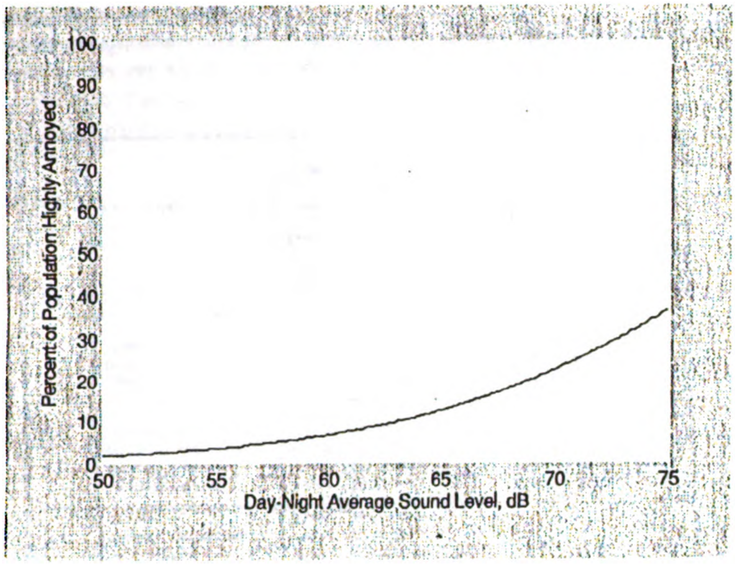


Figure 2 Relationship between Day-Night Average Sound Level and a consequential degree of annoyance as described by a dosage-response relationship recommended by FICON (1992).

3.0 METHOD

3.1 Design of Questionnaire

A brief, structured questionnaire composed of closed response category questions about neighborhood conditions was constructed to provide an appropriate context for questions about the salience and consequences of changes in aircraft noise exposure. To facilitate comparisons of the present findings with those of earlier studies, the wording of questionnaire items was modeled closely on that of prior studies of community response to transportation noise. The complete set of questionnaire items is reproduced in Appendix A.

The first explicit mention of noise occurred in Item 5 ("Would you say that your neighborhood was quiet or noisy?"), following preliminary questions about duration of residence, about the most and least favored aspects of neighborhood living conditions, and about annoyance with traffic congestion. The next item ("Have you noticed any more or any less aircraft noise in your neighborhood over the past year, just since last February?") solicited opinions about the issue of central concern. The remaining questions focused on specifics of short and long term annoyance with neighborhood street traffic and aircraft noise.

3,2 Sampling and Interviewing

A sampling frame of households with listed telephone numbers was constructed for each interviewing area from the February 1994[1] Cole Numerical Telephone Directory for Greater Seattle and Vicinity. On 16 through 19 February 1995, several dozen centrally supervised telephone interviewers made seven contact attempts (an initial attempt followed by six callbacks at different times of day over the four day period) to each listed household. The opinions of one English-speaking, adult, verified household member were sought from each.

3.3 Selection of Interviewing Areas

The primary criteria for selecting interviewing areas were (1) range and spatial distribution of aircraft noise exposure with respect to the Port's 1991 NEM contours for Seattle-Tacoma International Airport, and (2) homogeneity of aircraft noise exposure within interviewing areas. Secondary criteria for selecting interviewing areas included exposure to specific types

[1] The sampling frame was intentionally constructed from information contained in a year-old directory so that the bulk of respondents would be long term neighborhood residents.

Table 1 Boundaries of interviewing areas.

Area	Approximate location	Street Boundaries	Relationship to 1991 NEM Contours
1	Immediately north of airport (includes portions of Burien, Seatac, Boulevard Park, and Tukwila): "Burien/Tukwila"	South: 146th Street West: Highway 509 North: 116th Street East: Highway 99	Largely within 1991 L_{dn} = 70 and 75 dB contours
2	Immediately south of airport (within Des Moines): "North Des Moines"	South: 223rd Street West: Marine View Drive North: 208th Street East: 24th Avenue	Mostly within 1991 L_{dn} = 75 dB contour
3	Southwest of airport (includes portions of North Hill and Normandy Park): "North Hill"	South: 208th Street West: 2nd Avenue SW North: 199th Street East: Des Moines Memorial Drive	Within 1991 L_{dn} = 65 and 70 dB contours
4	Farther south of airport (within Des Moines) "South Des Moines"	South: 252nd Street West: 16th Avenue North: 240th Street East: Highway 99	Within 1991 L_{dn} = 70 and 75 dB contours
5	Federal Way	South: 288th Street West: Highway 99 North: 272nd Street East: 12th Avenue S	Predominantly within 1991 L_{dn} = 65 dB contour
6	Mercer Island	South: SE 36th Street West: 60th Avenue SE North: Highway 90 East: 76th Avenue SE	Outside probable 1991 L_{dn} = 55 dB contour

of aircraft noise and avoidance of major non-aircraft noise sources. Interviewing area boundaries and their approximate relationships to the 1991 aircraft noise contours are described in Table 1 and shown in Figure 3.

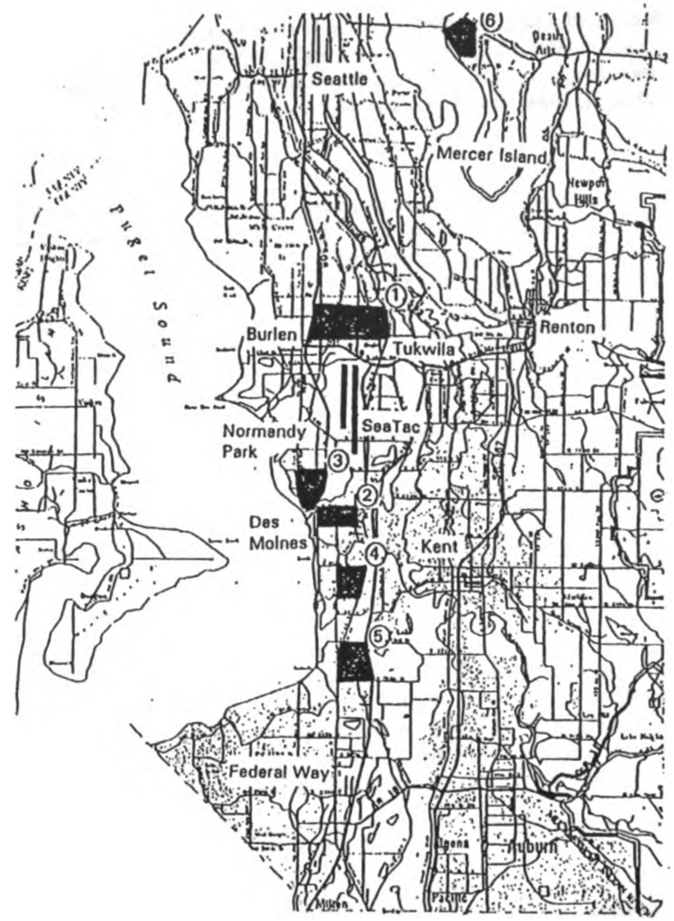


Figure 3 Map showing approximate locations of interviewing areas.

3.4 Noise Measurements

Unattended, A-weighted noise measurements were made at locations within each of the four airport vicinity interviewing areas and in Federal Way during the week prior to interviewing. Six Larson-Davis 870 digital noise monitors were installed within the boundaries of these interviewing areas. These instruments were configured to record hourly A-weighted noise levels, Day-Night Average Sound Levels (DNL), and a number of statistical descriptors of noise levels in excess of site-specific threshold levels. Locations of these sites are shown in Table 2. No noise measurements were made in the Mercer Island interviewing area.

Table 2 Locations of noise monitoring sites (9 - 18 February, 1995).

Interviewing Area	Location of Noise Monitors
1: Burien/Tukwila	13700 block, 13th Place S.
2: North Des Moines	Immediately south of intersection of 20th Avenue S. and S. 216th Street
3: North Hill	20700 block of 8th Avenue S.
4: South Des Moines	1800 block of S. 246th Place
5: Federal Way	Site A: 2200 block of S. Star Lake Road Site B: 2700 block of S. 248th

Noise measurements were made (1) to complement and confirm information on community noise levels based on the Port's 1991 Noise Exposure Map; and (2) to permit comparison of the actual prevalence of noise-induced annoyance among survey respondents with those predicted by a dosage-response relationship recommended by FICON (see Figure 2) and by a theoretically derived relationship described below (Fidell, Schultz, and Green, 1988; Green and Fidell, 1991). Supplementary measurements of high level noise events were made to yield additional information useful for several purposes, including distinguishing aircraft noise from street traffic noise.

4.0 RESULTS

4.1 Summary of Interviewing

Table 3 summarizes the mechanics of interviewing. The overall percentage of completed interviews was 54%, with only minor variation from site to site. The large number of non-sample telephone numbers shown in Table 3 is a consequence of the age of the information from which the sampling frame was constructed. Failure to complete an interview was due in most cases to refusals and non-contacts after seven attempts, rather than to language difficulties. Approximately 46% of the respondents were male, while 54% were female.

Table 3 Summary of dialing results.

	Burien / Tukwila (Area 1)	North Des Moines (Area 2)	North Hill (Area 3)	South Des Moines (Area 4)	Federal Way (Area 5)	Mercer Island (Area 6)	Total
Total residential telephone numbers in sampling frame	1553	606	452	392	1080	687	4770
Non-sample†	281	93	55	61	340	99	929
Non-contacts (7 attempts)‡	339	154	95	93	258	204	1143
Refusals	407	188	141	121	218	176	1251
Completed Interviews	526	171	161	114	264	208	1444
Completion Rate●	56%	48%	53%	49%	55%	54%	54%

† Includes disconnects, businesses, fax machines, modem lines, wrong addresses, and non-English speaking households.

‡ Includes busy, no answer, or answering machines after dialing 7 times.

● Completion rate calculated as:

completed interviews ÷ [total - (non-sample + non-contact)]

4.2 Summary of Noise Measurements

Table 4[2] summarizes the results of noise measurements made during the week prior to interviewing. Noise exposure attributable to aircraft overflights in interviewing areas was distinguished from that attributable to street traffic noise by the level and duration of individual noise events in excess of site-specific thresholds. The error associated with noise exposure estimates derived in this fashion (shown in Table 4) is on the order of ± 1.5 dB.

Table 4 Summary of weekly averages of measured Day-Night Average Sound Levels during week prior to interviewing.

Interviewing Area	Day-Night Average Sound Level from All Sources	Day-Night Average Sound Level due to Aircraft	Day-Night Average Sound Level due to Street Traffic
1: Burien/Tukwila	68.4 dB	67.4 dB	61.7 dB
2: North Des Moines	74.0	73.5	60.1
3: North Hill	65.7	65.2	56.0
4: South Des Moines	68.2	68.0	56.1
5: Federal Way (Mean)	62.9	61.7	56.4
Site A	63.2	62.4	55.4
Site B	62.6	61.1	57.4

The ratio of southerly to northerly air traffic flow time periods at Seattle-Tacoma International Airport was about four to one during the week prior to interviewing. A predominance of southerly flight operations is consistent with that noted for the month of February in the Noise Assessment Study accompanying the Port Flight Plan Final Programmatic Environmental Impact Statement (at Table 2, page 24, Appendix C).

[2] Note that several tables and figures omit information from interviewing area 6 (on Mercer Island), in which no noise measurements were made.

4.3 Narrative Account of Findings

This section summarizes patterns of responses to the principal questionnaire items. A complete tabular account of responses to individual items may be found in Table 8 through Table24 of Appendix B. Figure 4 through Figure 12 (in this section) present related information graphically.

4.3.1 Duration of Residence (Questionnaire Item 1)

As shown in Figure 4, the bulk of respondents in all interviewing areas had lived at their current addresses at least two years. Overall, 64% of all respondents had lived at their current addresses for 5 or more years; 26% for two to five years; 7% for one to two years; and 4% for less than 1 year. The distributions of duration of residence in the six interviewing areas were generally similar.

4.3.2 Annoyance due to Traffic Congestion (Questionnaire Item 4)

Figure 5 and Table 9 show the percentage of respondents at each site who described themselves as highly annoyed[3] by traffic congestion in their daily lives. These percentages varied little among interviewing sites.

4.3.3 Characterization of Neighborhood as Quiet or Noisy (Questionnaire Item 5)

Percentages of respondents at each site who described their neighborhoods as quiet varied considerably, from a high of 95% on Mercer Island to a low of 60% in the Burien/Tukwila area (see Table 10). Figure 6 shows the percentage of respondents at each site who described their neighborhoods as noisy as a function of Day-Night Average Sound Levels from street traffic noise in their neighborhoods measured during the week prior to interviewing.

[3] Degrees of noise-induced annoyance were gauged on an absolute judgment scale that contained five categories: "not at all annoying", "slightly annoying", "moderately annoying", "very annoying", and "extremely annoying". Only responses in the latter two categories were considered as indications of a consequential degree of annoyance for purposes of comparing the present results with predictive relationships such as that of FICON (1992). Note that percentages of highly annoyed respondents are based on the total number of respondents per site, not on the number of respondents who reported annoyance in any degree.

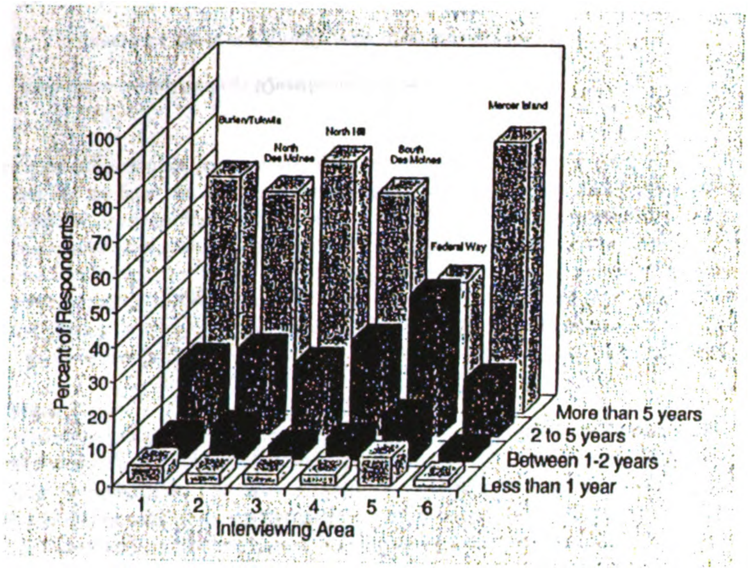


Figure 4 Distributions of duration of residence in interviewing areas.

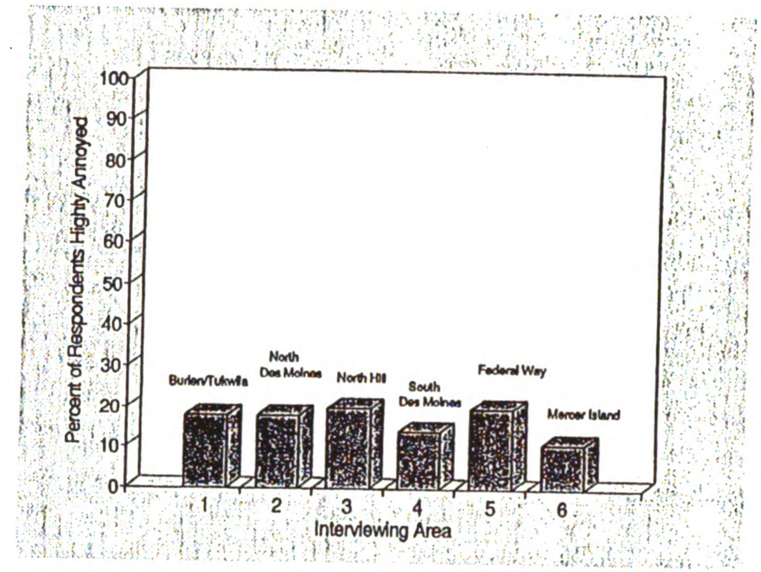


Figure 5 Percentage of respondents highly annoyed by traffic congestion.

Among respondents in the interviewing areas closest to Seattle-Tacoma International Airport who described their neighborhoods as noisy, half or more described their neighborhoods as very or extremely noisy (see Table 11). Smaller percentages of respondents in Federal Way and on Mercer Island described the noisiness of their neighborhoods in such terms.

4.3.4 Notice of Changes in Aircraft Noise (Questionnaire Item 6)

As shown in Table 12 and Figure 7, no more than 10% of the respondents in any interviewing area reported noticing less aircraft noise in their neighborhoods during the year prior to interviewing. Large majorities of respondents at all sites either reported noticing *no* changes in aircraft noise, or noticing *increases* in aircraft noise in their neighborhoods in the year prior to interviewing. As shown in Table 13, of those respondents who had noticed increases in aircraft noise in their neighborhoods in the year prior to interviewing, roughly a third believed that aircraft noise had increased "considerably" in their neighborhoods during this time period.

Respondents who (1) had noticed any change (either an increase or a decrease) in aircraft noise during the prior year, and (2) had resided at their current addresses for two or more years, also were asked whether they had noticed an increase or a decrease in aircraft noise during the *two* years prior to interviewing. As shown in Table 14, large majorities of these respondents in all interviewing areas reported noticing increases in aircraft noise during the two years prior to interviewing. A comparison of the opinions of respondents who had noticed increases in the prior year and the prior two years indicates that greater percentages of the latter than of the former respondents reported "considerably" more aircraft noise annoyance (see Table 15).

4.3.5 Annoyance-related findings (Questionnaire Items 8 - 11)

4.3.5.1 *Annoyance due to street traffic noise (Questionnaire Item 8)*

Table 16 shows that no more than 14% of the respondents in any interviewing area were annoyed in any degree by street traffic noise in the week prior to interviewing. Table 5 shows that relatively small percentages of respondents (7% or less) in each interviewing area had been bothered or annoyed to a consequential degree by street traffic noise in the week preceding interviewing.

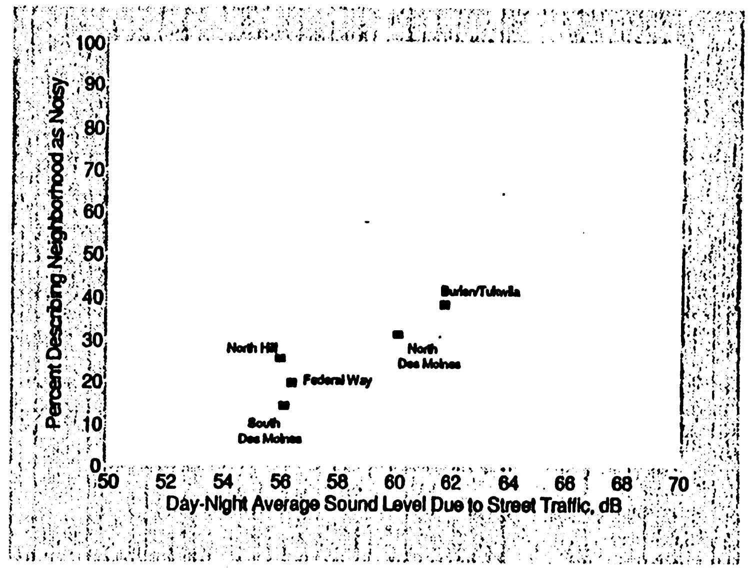


Figure 6 Percentage of respondents describing their neighborhoods as noisy as a function of Day-Night Average Sound Level due to street traffic noise level in the week prior to interviewing.

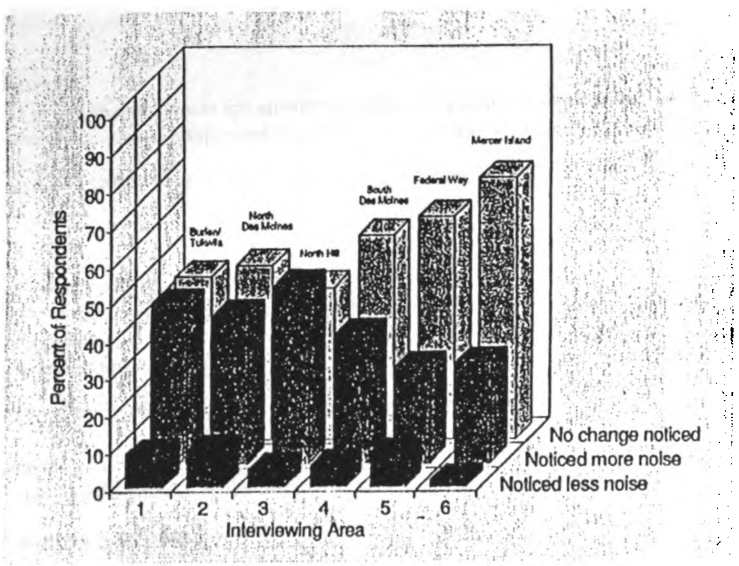


Figure 7 Percentage of respondents noticing changes in aircraft noise over past year.

Table 5 Summary of percentage of respondents highly annoyed by street traffic and aircraft noise.

Area	Percentage of Respondents Highly Annoyed by Street Traffic Noise (Prior Week)	Percentage of Respondents Highly Annoyed by Aircraft Noise (Prior Week)	Percentage of Respondents Highly Annoyed by Aircraft Noise (Prior Year)
1: Burien/Tukwila	5%	21%	31%
2: North Des Moines	2	26	27
3: North Hill	3	17	25
4: South Des Moines	7	9	16
5: Federal Way	3	9	16
6: Mercer Island	1	3	8

4.3.5.2 *Annoyance due to aircraft noise (past week) (Questionnaire Item 9)*

A greater percentage of respondents at all sites had been annoyed in any degree during the prior week by aircraft noise than by street traffic noise (see Table 18). Further, as shown in Table5, the percentage of respondents reporting a consequential degree of annoyance to aircraft noise during the past week ranged from 9% to 26% in the various interviewing areas. Figure 8 compares the percentages of respondents highly annoyed by street traffic noise and aircraft noise during the prior week.

4.3.5.3 *Annoyance due to aircraft noise (prior year) Questionnaire Item 10)*

Even greater percentages of respondents had been annoyed in some degree during the prior year by aircraft noise than by either aircraft or street traffic noise during the prior week. Table 5 shows that the percentage of respondents reporting a consequential degree of annoyance from aircraft noise during the prior year ranged from 16% to 31% across all sites. Figure 9 shows the percentage of respondents highly annoyed by street traffic noise and by aircraft noise during the prior week and prior year as a function of DNL values.[4]

4.3.5.4 *Changes in aircraft noise annoyance within prior two years (Questionnaire Item 11)*

As shown in Figure 10, a majority of respondents reported that their annoyance attributable to aircraft noise had not changed over the prior two years. About a third reported that their annoyance had increased, while small numbers of respondents reported that their annoyance attributable to aircraft noise had decreased.

4.4 Selected Cross-Tabulations

Two cross-tabulations of responses to certain combinations of questionnaire items are noteworthy.

4.4.1 Notice of changes in aircraft noise by duration of residence

A greater percentage of longer term residents than of shorter term residents reported noticing either no change or more aircraft noise over the prior year, as shown in Figure 11. The percentages of respondents noticing either no change or more aircraft noise over the prior year increased directly with duration of residence.

4.4.2 Notice of change in aircraft noise by annoyance due to aircraft noise

Among respondents highly annoyed by aircraft noise in the year prior to interviewing, majorities in all interviewing areas also reported noticing more aircraft noise over the prior year (see Figure 12).

4 Yearly DNL values were approximated from the spatial distribution of respondents' households with respect to the 1991 NEM aircraft noise contours, adjusted by 1.5 dB to correspond with reductions forecasted by the Port of Seattle.

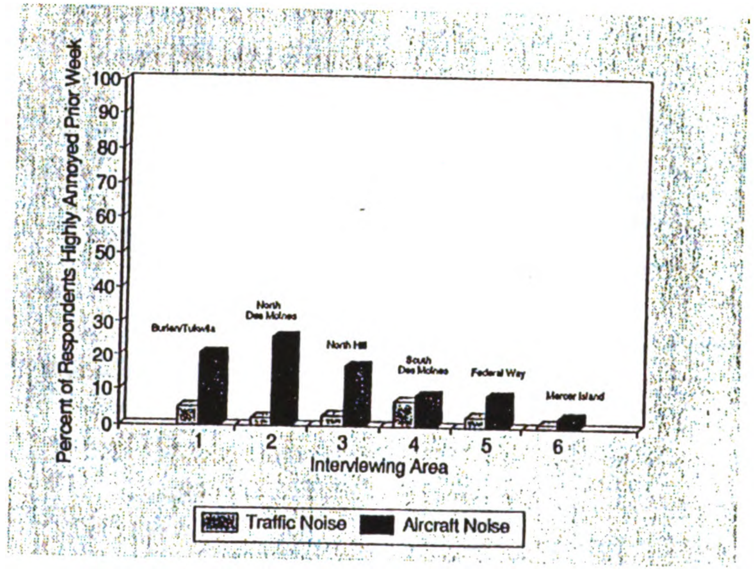


Figure 8 Percentage of respondents highly annoyed by street traffic noise and by aircraft noise during the week prior to interviewing.

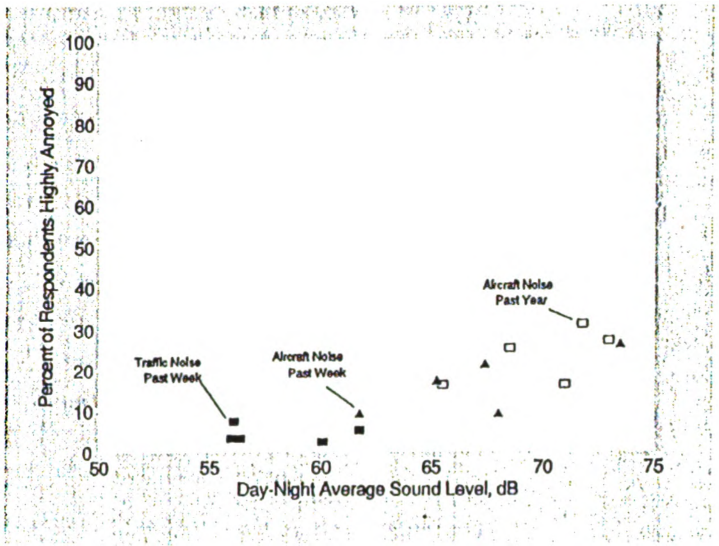


Figure 9 Percentage of respondents highly annoyed by street traffic noise and by aircraft noise during the prior week and year.

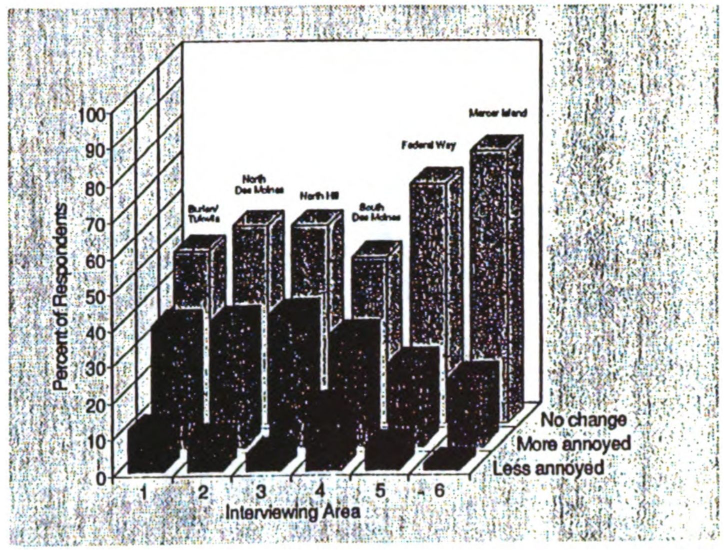


Figure 10 Distribution of percentage of respondents reporting changes in aircraft noise annoyance in the prior two years. (Percentages based on numbers of respondents in residence two years or longer.)

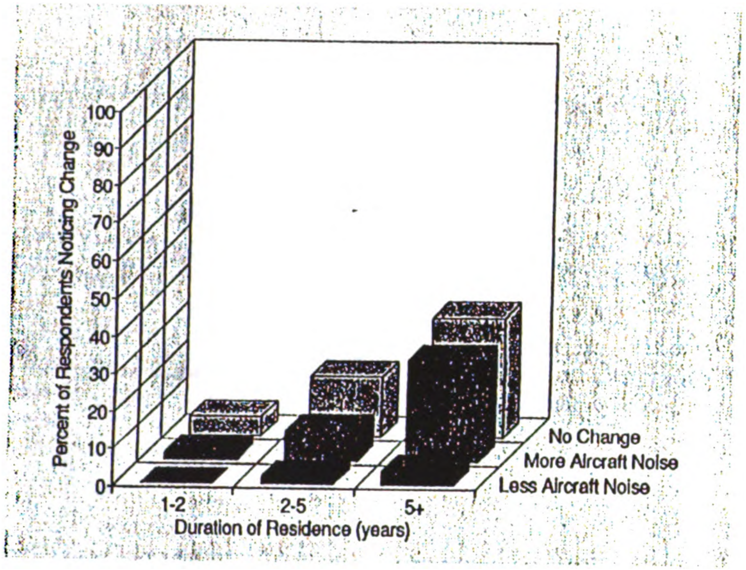


Figure 11 Percentage of respondents noticing change in aircraft noise during the year prior to interviewing, as a function of duration of residence.

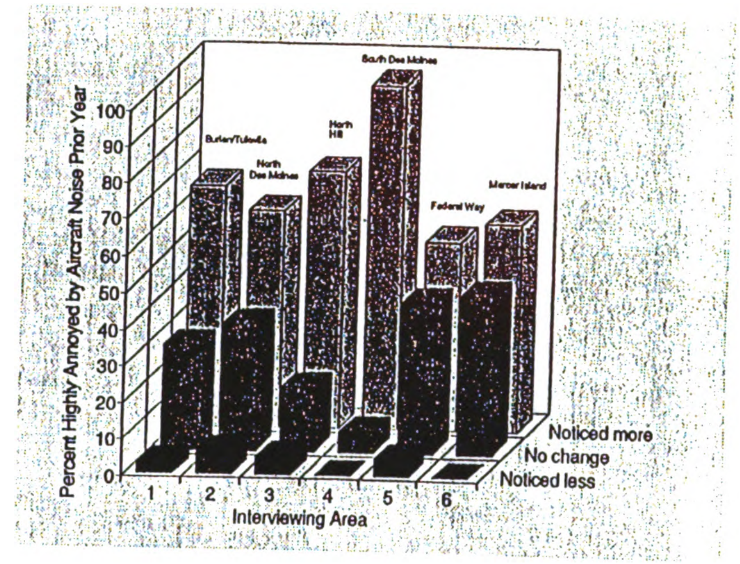


Figure 12 Percentage of highly annoyed respondents who noticed changes in aircraft noise during the prior year. (Percentages based on numbers of respondents highly annoyed in Questionnaire Item 10.)

5.0 DISCUSSION

The overall pattern of findings about the opinions of respondents in the present survey is consistent with those observed in prior studies of community response to noise exposure. As described below, this consistency suggests both (1) that the current respondents' opinions about noise exposure are similar to those of residents of other American communities, and (2) that the present survey methods did not introduce notable bias in estimating effects of community noise on residents of areas near Seattle-Tacoma International Airport.

5.1 Characterization of Neighborhood as Noisy

Figure 13 shows the five data points plotted in Figure 6 in the context of data from prior social surveys (*e.g.*, Fidell, 1978). The solid line in the figure is a linear regression of DNL due to neighborhood traffic noise on the percentage of respondents describing their neighborhoods as noisy.[5] This regression accounts for more than 60% of the variance in the data set. The proximity of the current data points to the regression line is one illustration of the similarity of the opinions of the current respondents to those reported in surveys of community response to noise exposure conducted in other American urban areas.

5.2 Relative Salience of Annoyance due to Aircraft Noise and Traffic Congestion

Traffic congestion in daily life is a concern of many residents of the Puget Sound region, for which complex and expensive solutions have long been sought. The current survey was conducted during the final stages of a long, contentious and highly publicized campaign for the imposition of new taxes to create a regional transit authority. Thus, traffic congestion was almost certainly among the more salient political issues to respondents at the time of interviewing.

Judging from the relative prevalence of annoyance with aircraft noise and with traffic congestion, however, aircraft noise was an even greater concern than traffic congestion among respondents living near the airport. Figure 14 compares the percentage of respondents at each

5 A weaker relationship is observed if the percentage of respondents describing their neighborhoods as quiet is plotted against Day-Night Average Sound Levels due to aircraft noise. A common form of response to the questionnaire item "Would you say that your neighborhood is quiet or noisy?" is "Quiet, except for the aircraft noise." A response of this form suggests that respondents do not consider aircraft noise intrusions as elements of neighborhood noise environments.

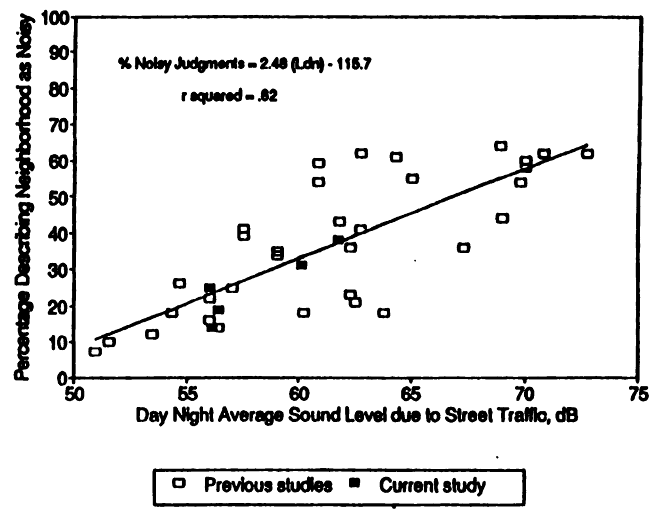


Figure 13 Percentage of respondents describing their neighborhoods as noisy as a function of Day-Night Average Sound Level due to street traffic noise (Fidell, 1978).

site who described themselves as highly (very or extremely) annoyed by traffic congestion and aircraft noise. A greater percentage of respondents was highly annoyed by aircraft noise than by traffic congestion at all points lying above the diagonal in this figure. Other than in Mercer Island and Federal Way, aircraft noise annoyed more respondents than traffic congestion.

5.3 Notice of Changes in Aircraft Noise

As shown in Table 12, the pattern of findings with respect to the notice of changes in aircraft noise among respondents who had lived at their present addresses for at least a year is similar in each interviewing area: no more than 10% of the respondents in any interviewing area noticed a *decrease* in aircraft noise during the prior year, while as many as 70% of respondents in one area reported no change in aircraft noise in the same time period. This pattern of findings is illustrated in Figure 7, which shows the distribution of responses to Questionnaire Item 6 across interviewing areas.

Figure 15 shows that a large majority of respondents at all sites who reported noticing increases in aircraft noise believed these increases to be of notable ("moderate" or "considerable") magnitude. Among longer term (minimum of two years) residents who noticed any change in aircraft noise exposure in the year prior to interviewing, an even greater percentage of respondents reported noticing increases in aircraft noise in their neighborhoods within the two years prior to interviewing.

The pattern of responses to Questionnaire Items 6 and 7 indicates that little benefit was perceived by respondents from any reductions that may have occurred in aircraft noise exposure during the years prior to interviewing.

5.4 Annoyance Due to Aircraft Noise in Week and Year Prior to Interviewing

As shown in Table 5, greater percentages of respondents at all sites described themselves as highly annoyed by aircraft noise in the year prior to interviewing than during the week prior to interviewing. In the interviewing area to the north of Seattle-Tacoma International Airport (Burien/Tukwila), this difference may be related to the predominance of southerly air traffic flow in the week prior to interviewing, since this area was exposed disproportionately (with respect to the year as a whole) to the lower noise exposure levels of approach operations. Virtually identical percentages of respondents reported high annoyance during the week and year prior to interviewing in the interviewing site to the south of Seattle Tacoma International Airport (North

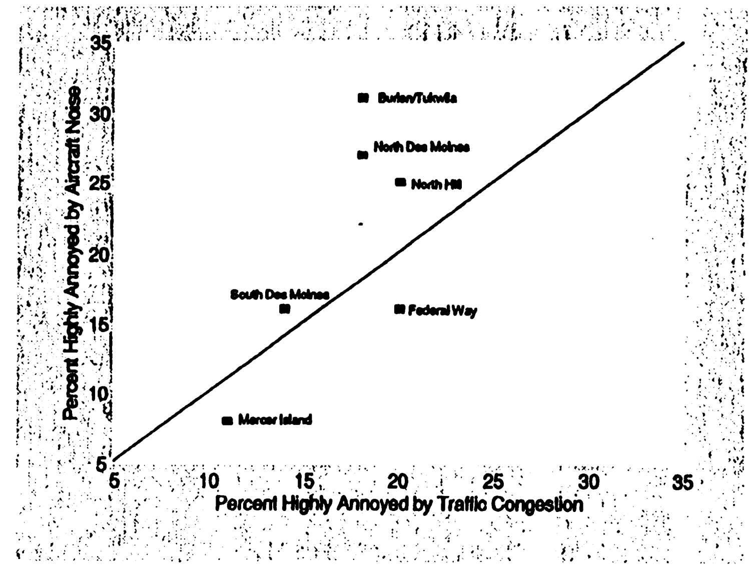


Figure 14 Percentage of respondents highly annoyed by aircraft noise and by traffic congestion.

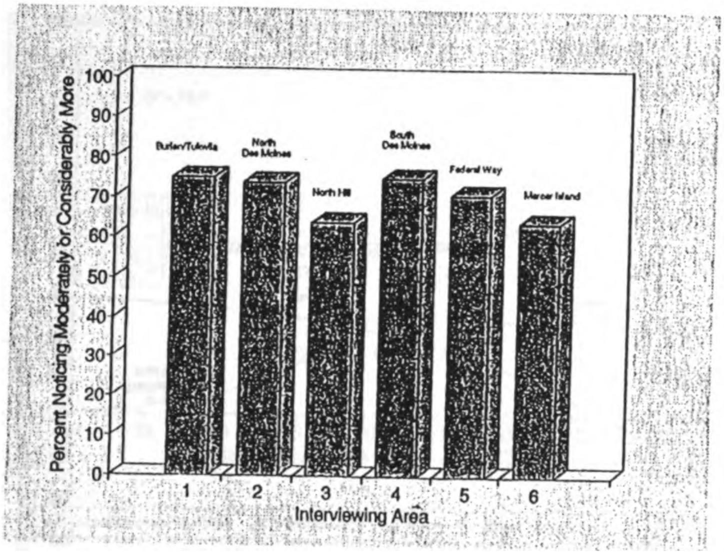


Figure 15 Percentage of respondents noticing moderately or considerably more aircraft noise during the prior year. (Percentages based on "yes" response to Questionnaire Item 6).

Des Moines), which was exposed largely to noise from departure operations during the week prior to interviewing. Differences between the prevalence of annoyance during the week and year prior to interviewing at the southerly sites (South Des Moines, Federal Way) were generally smaller in magnitude. Few respondents at the Mercer Island interviewing site reported high annoyance during the year or week prior to interviewing.

5.5 Relative Sensitivities to Community Noise Exposure of Current Respondents and those in Other Communities

5.5.1 Comparison with FICON Dosage-Response Relationship

Figure 16 shows the relationship between the observed prevalence of high annoyance in the interviewing areas and a dosage-response relationship identified by the Federal Interagency Committee on Noise (FICON, 1992). Figure 16 contains information from three separate questionnaire items. The filled squares in the lower left hand corner of the figure show the prevalence of annoyance with street traffic noise in the week prior to interviewing (Item 8A), plotted against average DNL values derived from the measurements made in the same time frame. The triangular data points show the prevalence of annoyance with aircraft noise in the week prior to interviewing (Item 9A), also plotted against average DNL values derived from the measurements made in the same time frame. The hollow squares represent the prevalence of annoyance with aircraft noise in the year prior to interviewing (Item 10A), plotted against estimated annual DNL values inferred from the Port's 1991 Noise Exposure Map contours.

The prevalence of high annoyance with street traffic and aircraft noise among respondents is generally consistent with that predicted by FICON.

5.5.2 Further Perspective on the Prevalence of Noise-Induced Annoyance among Respondents

A simple comparison of Figure 1 and Figure 2 illustrates that cumulative noise exposure alone does not account for all of the observed variability in the prevalence of noise-induced annoyance in different communities. In fact, no reasonable dosage-response relationship based on a purely acoustic predictor variable constructed from the data shown in Figure 1 is likely to account for more than about half of the variance in the data set, leaving the other half unexplained by noise measurements. Nonacoustic factors which might account for the remainder of the variance include the economic dependence of a community on the operation of a noise

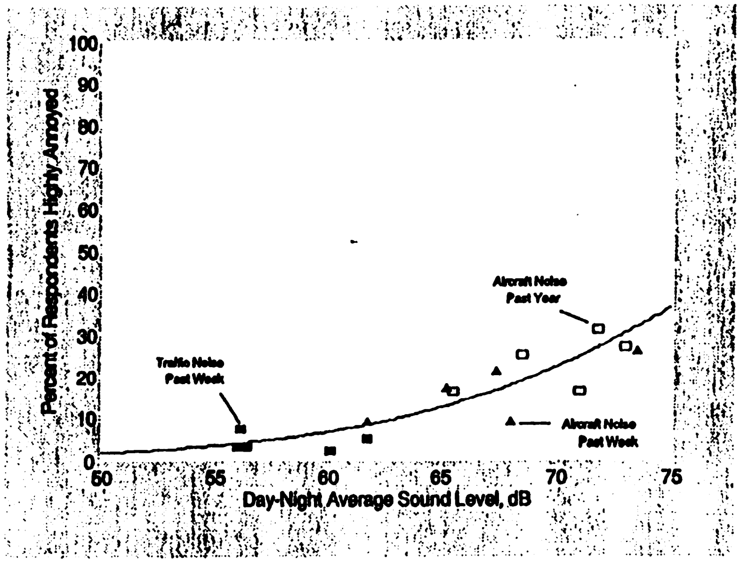


Figure 16 Relationship between the observed prevalence of high annoyance in the interviewing areas and a dosage-response relationship recommended by the Federal Interagency Committee on Noise (FICON, 1992).

source, as well as a variety of attitudes (*e.g.*, malfeasance, misfeasance, fear, necessity of noise exposure, locus of control, etc.) about noise source operation.

A theoretically-derived model developed by Green and Fidell (1991) characterizes the aggregate effect of all nonacoustic determinants of annoyance in terms of a single parameter, D^*. In the model of Green and Fidell, the slope of the dosage-response relationship between noise exposure and prevalence of annoyance is fixed by the effective loudness of the noise exposure, while the position of the dosage-response relationship along the abscissa is determined by the value of D^*. (A D^* value may be interpreted as an average value of DNL above which respondents describe themselves as highly annoyed by community noise exposure.)

Figure 17 shows a dosage-response relationship constructed by the method of Green and Fidell for the annoyance of aircraft noise during the year prior to interviewing in the present study. The value of D^* in the present data set was 75.7 dB, while the average value observed by Green and Fidell (1991) for aircraft noise annoyance in many other communities was 70.2 dB. In other words, respondents in this survey tolerated nearly 6 dB more aircraft noise exposure than residents of other communities before describing themselves as highly annoyed. The degree of tolerance for aircraft noise exposure observed in the current study has implications which may be stated in several ways:

(1) Nonacoustic factors played a smaller role in determining the prevalence of aircraft noise-induced annoyance among respondents in the present survey than in other communities;

(2) Since the expressed annoyance of aircraft noise in neighborhoods near Seattle-Tacoma International Airport is not strongly influenced by nonacoustic factors, observable reductions in annoyance should closely track noticeable reductions in noise exposure;

(3) The uncommonly tolerant concerns of residents of neighborhoods near Seattle-Tacoma International Airport with aircraft noise exposure thus deserve serious consideration in policy analyses.

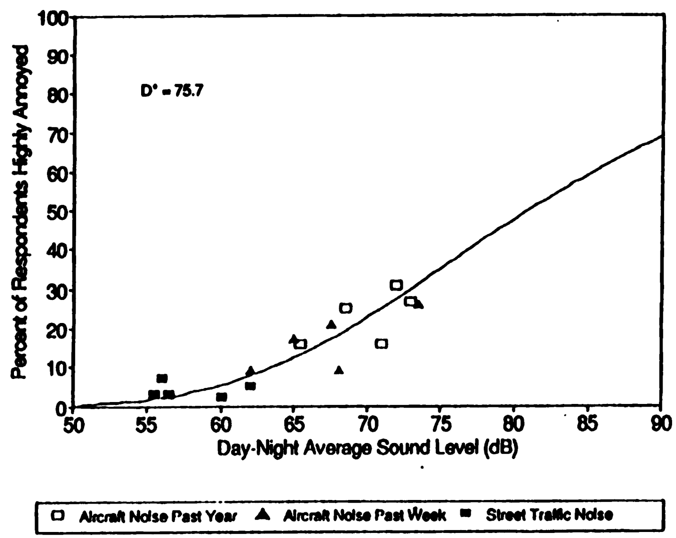


Figure 17 Prevalence of high annoyance in current study in relation to theoretical dosage-response relationship for residential noise exposure.

5.6 Comparison of Acoustic Measurements with those Reported by Port of Seattle

Remote monitoring stations 9, 3, and 1 of the permanent monitoring system operated by Seattle-Tacoma International Airport are in close proximity to interviewing areas 1, 2, and 4, respectively. Table 6 compares the annual DNL values reported by these monitoring stations for the last six years (abstracted from documents submitted by the Port to the Expert Arbitration Panel dated 24 February 1995) with estimated values of DNL in nearby interviewing areas due to aircraft noise exposure estimated from measurements made during the week prior to interviewing. Given the standard deviations of the annual measurements reported by the Port at the remote monitoring stations (on the order of 2 to 3 dB), as well as the disparity in time periods for which the sets of measurements were made, none of the observed differences is noteworthy.

Table 6 Comparison of DNL values measured in week prior to interviewing with annual figures reported to Expert Arbitration Panel (24 February 1995) by Seattle-Tacoma International Airport.

Interviewing Site	Airport RMS Number	Aircraft DNL Week Prior to Interviews	1994 DNL (dB)	1993 DNL (dB)	1992 DNL (dB)	1991 DNL (dB)	1990 DNL (dB)
1: Burien/Tukwila	9	67.4	69.0	69.5	71.0	71.1	70.8
2: North Des Moines	3	73.5	71.6	72.1	73.0	74.2	74.8
4: South Des Moines	1	68.0	69.7	69.7	70.4	72.0	73.6

5.7 Precision of Measurement

Although Figure 16 represents the results of this study as points, in reality they (like all other findings of empirical studies) are more properly represented as ellipses of uncertainty, due to unavoidable errors of sampling and measurement. As noted in Section 4.2, the uncertainty in estimated DNL values is on the order of ± 1.5 dB. Thus, if the present observations were plotted as ellipses of uncertainty rather than as points, the horizontal extent of each ellipse would be about 3 dB.

The percentages of respondents reported in the various tables of this report are exact counts, rounded to integer values. If the opinions of respondents in this survey are viewed as samples of populations of all residents of interviewing areas (including those not interviewed), however, then they must be interpreted with respect to confidence intervals calculated for each.

Table 7 shows confidence intervals based on dichotomizing responses into respondents highly annoyed by noise exposure and respondents not highly annoyed. The table shows the bounds of 90% confidence intervals for estimates of a consequential degree of annoyance. The widths of these confidence intervals (corresponding to the vertical extent of each ellipse) vary by questionnaire item and interviewing area, but are in all cases smaller than ± 3%.

Table 7 90% confidence intervals for percentages of respondents highly annoyed by noise.

Site	Number of Completed Interviews	Width of 90% Confidence Interval	Lower Bound on Estimate of Prevalence of Annoyance	Upper Bound of Estimate of Prevalence of Annoyance
Traffic Noise (Prior Week)				
Burien/Tukwila	526	1.6%	3.4%	6.6%
North Des Moines	171	1.8	.2	3.8
North Hill	161	2.2	.8	5.2
South Des Moines	114	3.9	3.1	10.9
Federal Way	264	1.7	1.3	4.7
Aircraft Noise (Prior Week)				
Burien/Tukwila	526	2.9	18.1	23.9
North Des Moines	171	5.5	20.5	31.5
North Hill	161	4.9	12.1	21.9
South Des Moines	114	4.4	4.6	13.4
Federal Way	264	2.9	6.1	11.9
Aircraft Noise (Prior Year)				
Burien/Tukwila	526	3.3	27.7	34.3
North Des Moines	171	5.6	21.4	32.6
North Hill	161	5.6	19.4	30.6
South Des Moines	114	5.7	10.3	21.7
Federal Way	264	3.7	12.3	19.7

6.0 CONCLUSIONS

The following inferences may be drawn from the results of the social survey described in this report:

Large majorities of respondents in all interviewing areas reported noticing either no change at all or increases in aircraft noise in their neighborhoods in the recent past.

Most of the respondents who reported noticing increases in aircraft noise described these increases as substantial (moderate or considerable).

Only small minorities among respondents noticed any reduction in neighborhood aircraft noise in the recent past.

The prevalence of noise-induced annoyance among respondents in the six interviewing areas is in reasonable agreement with that expected on the basis of the dosage-response relationship recommended by FICON.

About half (or more) of the respondents reported no change in their annoyance with aircraft noise in the prior two years. Of those who reported changes in their annoyance, large majorities reported increases in their annoyance attributable to aircraft noise.

7.0 REFERENCES

Federal Interagency Committee on Noise (FICON). (1992) Final Report: Airport Noise Assessment Methodologies and Metrics, Washington, D.C.

Fidell, S. (1978) Nationwide urban noise survey. Journal of the Acoustical Society of America, 64(1), pp. 198-206.

Fidell, S. (1992) "Interpreting findings about community response to environmental noise exposure: what do the data say?" EuroNoise '92, London.

Fidell, S., Schultz, T.J., and Green, D.M. (1988) A theoretical interpretation of the prevalence rate of noise-induced annoyance in residential populations. Journal of the Acoustical Society of America, 84(6), pp. 2109-2113.

Fields, J., (1991) An Updated Catalog of 318 Social Surveys of Residents' Reactions to Environmental Noise (1943-1989), NASA Contractor Report 187553.

Green, D. and Fidell, S. (1991) Variability in the criterion for reporting annoyance in community noise surveys. Journal of the Acoustical Society of America, 89(1), pp. 234-243.

Port of Seattle (1993) Noise Exposure Map Update for 1991 for Seattle-Tacoma International Airport (see especially page 5, Appendix A)

Schultz, T. J. (1978) Synthesis of social surveys on noise annoyance. Journal of the Acoustical Society of America, 64(2), pp. 377-405.

APPENDIX A SURVEY INSTRUMENT

INTRODUCTION: "Hello, Mr./Ms. (Last name), this is (interviewer name) from (interviewing service). We're conducting a scientific study of public opinion in the Puget Sound Region and would greatly appreciate about 5 minutes of your time."

(1) About how long have you lived at [street address]?

(2) What do you like best about living conditions in your neighborhood?

(3) What do you like least about living conditions in your neighborhood?

(4) How annoyed are you by traffic congestion in your daily life? Would you say that you're not at all annoyed, slightly annoyed, moderately annoyed, very annoyed, or extremely annoyed by traffic congestion?

(5) Would you say that your neighborhood is quiet or noisy?

SKIP TO ITEM 6 if neighborhood was described as "quiet"

Follow up question if neighborhood was described as "noisy":

5a) Would you say that your neighborhood is slightly noisy, moderately noisy, very noisy, or extremely noisy?

ITEM 6 asked only if duration of residence (per item 1) is 1 or more years:

(6) Have you noticed any more or any less aircraft noise in your neighborhood over the past year, just since last February?

SKIP TO ITEM 7 if no change was noticed

Follow up question if more aircraft noise was noticed:

(6a) Have you noticed slightly, moderately, or considerably more aircraft noise just since this time last year?

SKIP TO ITEM 7

Follow up question if less aircraft noise was noticed:

(6b) Have you noticed slightly, moderately, or considerably less aircraft noise just since this time last year?

ITEM 7 asked only if duration of residence (per item 1) is 2 or more years:

(7) How about the past two years? Have you noticed any more or any less aircraft noise in your neighborhood over the past two years?

SKIP TO ITEM 8 if no change was noticed

Follow up question if more aircraft noise was noticed:

(7a) Have you noticed slightly, moderately, or considerably more aircraft noise over the past two year?

SKIP TO ITEM 8

Follow up question if less aircraft noise was noticed:

(7b) Have you noticed slightly, moderately, or considerably less aircraft noise over the past two years?

(8) While you've been at home during the past week, since last [day of week], have you been bothered or annoyed by street traffic noise in your neighborhood?

SKIP TO ITEM 9 if response was no

Follow up question if response was yes:

(8a) Would you say that you were slightly annoyed, moderately annoyed, very annoyed, or extremely annoyed by street traffic noise in your neighborhood last week?

(9) While you've been at home over the past week, just since last [day of week], have you been bothered or annoyed by aircraft noise in your neighborhood?

SKIP TO ITEM 10 if response was no

Follow up question if response was yes:

(9a) Have you been slightly annoyed, moderately annoyed, very annoyed, or extremely annoyed over the past week by aircraft noise in your neighborhood?

(10) While you've been at home this past year, since last February, have you been bothered or annoyed by aircraft noise in your neighborhood?

SKIP TO ITEM 11 if response was no

Follow up question if response was yes:

(10a) Would you say that you were slightly annoyed, moderately annoyed, very annoyed, or extremely annoyed by aircraft noise while you've been at home this past year?

ITEM 11 asked only if duration of residence (per item 1) is 2 or more years:

(11) Has your annoyance with aircraft noise changed during the last two years?

SKIP TO ITEM 12 if response was no

Follow up question if response was yes:

(11a) Have you been more annoyed with aircraft noise over the last two years or less annoyed with aircraft noise over the last two years?

(12) Generally speaking, are you more annoyed by noise from big jets, by noise from propeller planes, or by noise from other types of aircraft?

APPENDIX B TABULAR SUMMARIES OF QUESTIONNAIRE RESPONSES

Tables in this Appendix summarize responses to each questionnaire item by interviewing area. The percentages in these tables are based on responses from only those residents who were asked the questions. Some marginals in these tables do not sum to 100% due to reporting of figures to the nearest whole percentage. The number of interviews from which percentages in these tables are calculated is shown for each question, and varies with contingencies (skips) in questioning. (Note that some table entries are based on relatively small numbers of interviews for this reason.)

Certain percentages cited elsewhere in this report are based on different denominators; for example, the percent of respondents highly annoyed by noise exposure is calculated elsewhere with respect to the total number of completed interviews per site, rather than with respect to the number of respondents who described themselves as annoyed in any degree.

Table 8 Responses to Item 1: About how long have you lived at (street address)?

Area	n	less than 1 year	Between 1 and 2 years	2 to 5 years	more than 5 years
1: Burien/Tukwila	526	5%	6%	22%	67%
2: North Des Moines	171	3	9	25	63
3: North Hill	161	3	4	21	72
4: South Des Moines	114	3	6	28	63
5: Federal Way	264	8	14	41	37
6: Mercer Island	208	2	3	17	78

Table 9 Responses to Item 4: How annoyed are you by traffic congestion in your daily life? Would you say that you're not at all annoyed, slightly, moderately, very or extremely annoyed by traffic congestion?

Area	n	Not at all	Slightly	Moderately	Very	Extremely	Don't Know
1: Burien/Tukwila	526	34%	25%	22%	11%	7%	1%
2: North Des Moines	171	24	28	29	12	6	1
3: North Hill	161	29	25	25	14	6	1
4: South Des Moines	114	25	28	30	5	9	3
5: Federal Way	264	20	28	30	12	8	1
6: Mercer Island	208	36	27	26	6	5	0

Table 10 Responses to Item 5: Would you say that your neighborhood is quiet or noisy?

Area	n	Quiet	Noisy	Don't Know
1: Burien/Tukwila	526	60%	38%	2%
2: North Des Moines	171	68	31	1
3: North Hill	161	74	25	1
4: South Des Moines	114	83	14	3
5: Federal Way	264	77	19	4
6: Mercer Island	208	95	5	0

Table 11 Responses to Item 5A: Would you say that your neighborhood is slightly, moderately, very, or extremely noisy? (Percentages based on "noisy" response to item 5).

Area	n	Slightly	Moderately	Very	Extremely	Don't Know
1: Burien/Tukwila	198	10%	26%	32%	31%	1%
2: North Des Moines	54	2	33	39	26	0
3: North Hill	40	5	35	50	10	0
4: South Des Moines	16	25	25	37	13	0
5: Federal Way	50	12	50	24	14	0
6: Mercer Island	10	40	40	10	10	0

Table 12 Responses to Item 6: Have you noticed any more or any less aircraft noise in your neighborhood over the past year? (Percentages based on duration of residence 1 year or more).

Area	n	No	Yes, More Aircraft Noise	Yes, Less Aircraft Noise	Don't Know
1: Burien/Tukwila	500	44%	43%	9%	4%
2: North Des Moines	166	47	40	10	3
3: North Hill	157	41	48	5	6
4: South Des Moines	111	55	35	6	4
5: Federal Way	244	60	26	9	5
6: Mercer Island	204	70	27	2	1

Table 13 Responses to Item 6A: Have you noticed slightly, moderately, or considerably more aircraft noise just since this time last year? (Percentages based on "yes, more aircraft noise" response to item 6).

Area	n	Slightly	Moderately	Considerably	Don't Know
1: Burien/Tukwila	217	19%	36%	39%	5%
2: North Des Moines	66	23	36	38	3
3: North Hill	76	29	30	34	7
4: South Des Moines	39	26	44	31	0
5: Federal Way	64	25	41	30	4
6: Mercer Island	55	33	40	24	3

Table 14 Responses to Item 7: Have you noticed any more or less aircraft noise in your neighborhood over the past 2 years? (Percentages based on duration of residence 2 years or more and "yes, more" or "yes, less" response to item 6).

Area	n	No	Yes, More Aircraft Noise	Yes, Less Aircraft Noise	Don't Know
1: Burien/Tukwila	264	12%	70%	13%	5%
2: North Des Moines	82	7	79	12	1
3: North Hill	90	12	70	12	6
4: South Des Moines	47	4	72	19	4
5: Federal Way	86	13	53	20	14
6: Mercer Island	60	13	82	3	2

Table 15 Responses to Item 7A: Have you noticed slightly, moderately, or considerable more aircraft noise over the past 2 years? (Percentages based on "yes, more" response to item 7).

Area	n	Slightly	Moderately	Considerably	Don't Know
1: Burien/Tukwila	186	12%	32%	54%	2
2: North Des Moines	65	20	31	49	0
3: North Hill	63	24	30	44	2
4: South Des Moines	34	21	32	47	0
5: Federal Way	46	24	37	39	0
6: Mercer Island	49	20	45	35	0

Table 16 Responses to Item 8: While you've been at home during the past week have you been bothered or annoyed by street traffic noise in your neighborhood?

Area	n	Yes	No	Don't Know
1: Burien/Tukwila	526	14%	85%	1%
2: North Des Moines	171	9	91	1
3: North Hill	161	12	88	0
4: South Des Moines	114	13	87	0
5: Federal Way	264	10	89	1
6: Mercer Island	208	7	92	1

Table 17 Responses to Item 8A: Would you say that you were slightly, moderately, very, or extremely annoyed by street traffic noise in your neighborhood last week? (Percentages based on "yes" response to item 8).

Area	n	Slightly	Moderately	Very	Extremely	Refused
1: Burien/Tukwila	76	32%	33%	20%	13%	2%
2: North Des Moines	15	47	27	20	6	0
3: North Hill	19	26	47	21	5	0
4: South Des Moines	15	20	27	40	13	0
5: Federal Way	27	59	15	11	15	0
6: Mercer Island	15	40	47	13	0	0

Table 18 Responses to Item 9: While you've been at home in the past week have you been bothered or annoyed by aircraft noise in your neighborhood?

Area	n	Yes	No	Don't Know
1: Burien/Tukwila	526	53%	46%	1%
2: North Des Moines	171	60	39	1
3: North Hill	161	48	50	2
4: South Des Moines	114	41	59	0
5: Federal Way	264	38	60	2
6: Mercer Island	208	13	85	2

Table 19 Responses to Item 9A: Have you been slightly annoyed, moderately annoyed, very annoyed, or extremely annoyed over the past week by aircraft noise in your neighborhood? (Percentages based on "yes" response to item 9).

Area	n	Slightly	Moderately	Very	Extremely	Don't Know
1: Burien/Tukwila	280	23%	36%	25%	14%	2%
2: North Des Moines	103	17	40	23	19	1
3: North Hill	77	27	38	19	16	0
4: South Des Moines	47	21	58	6	15	0
5: Federal Way	99	34	39	14	9	3
6: Mercer Island	28	36	39	11	14	0

Table 20 Responses to Item 10: While you've been at home this past year have you been bothered or annoyed by aircraft noise in your neighborhood? (Percentages based on duration of residence 1 year or more).

Area	n	Yes	No	Don't Know
1: Burien/Tukwila	500	72%	28%	0%
2: North Des Moines	166	77	23	0
3: North Hill	157	71	29	0
4: South Des Moines	111	59	40	1
5: Federal Way	244	56	43	1
6: Mercer Island	204	35	63	2

Table 21 Responses to Item 10A: Would you say that you were slightly, moderately annoyed, very annoyed, or extremely annoyed by aircraft noise while you've been at home this past year? (Percentages based on "yes" response to item 10).

Area	n	Slightly	Moderately	Very	Extremely	Don't Know
1: Burien/Tukwila	358	19%	35%	23%	23%	0
2: North Des Moines	128	21	43	19	17	0
3: North Hill	111	23	41	25	11	0
4: South Des Moines	66	30	42	11	17	0
5: Federal Way	137	33	36	19	11	1
6: Mercer Island	72	40	38	11	11	0

Table 22 Responses to Item 11: Has your annoyance with aircraft noise changed during the last two years? (Percentages based on duration of residence 2 or more years).

Area	n	Yes	No	Don't Know
1: Burien/Tukwila	470	49%	48%	3%
2: North Des Moines	150	43	55	2
3: North Hill	150	43	55	2
4: South Des Moines	104	51	46	3
5: Federal Way	208	30	66	4
6: Mercer Island	198	22	75	3

Table 23 Responses to Item 11A: Have you been more annoyed with aircraft noise over the past 2 years or less annoyed with aircraft noise over the last 2 years? (Percentages based on "yes" response to item 11).

Area	n	More	Less	Don't Know
1: Burien/Tukwila	229	70%	25%	5%
2: North Des Moines	65	80	20	0
3: North Hill	65	86	11	3
4: South Des Moines	53	60	36	4
5: Federal Way	63	76	22	2
6: Mercer Island	44	84	9	7

Table 24 Responses to Item 12: Generally speaking, are you more annoyed by noise from big jets, by noise from propeller planes, or by noise from other types of aircraft?

Area	n	Big jets	Prop Planes	Other	Don't Know	Refused
1: Burien/Tukwila	526	76%	5%	5%	14%	0
2: North Des Moines	171	76	4	7	13	0
3: North Hill	161	69	4	8	19	0
4: South Des Moines	114	75	4	9	11	2
5: Federal Way	264	70	5	4	20	1
6: Mercer Island	208	39	12	13	31	5

214

COMMENTS ON THE
DRAFT ENVIRONMENTAL IMPACT STATEMENT
FOR PROPOSED MASTER PLAN UPDATE DEVELOPMENT ACTIONS
AT SEATTLE-TACOMA INTERNATIONAL AIRPORT

Submitted By

THE AIRPORT COMMUNITIES COALITION

CITY OF FEDERAL WAY, WASHINGTON

CITY OF MERCER ISLAND, WASHINGTON

August 3, 1995

214

LIST OF APPENDICES*

Volume 2

8. Glenn Weiss, Historic Properties Survey, City of Burien (1994)
9. City of Des Moines, Wash., Historic Properties Survey (1995)
10. Glenn Weiss, Historic Properties Survey, City of Normandy Park (1994)
11. Glenn Weiss, Historic Properties Survey, City of Tukwila (1994)
12. Renny Greenmun, Impact of Aircraft Noise Levels on CTBS Test Scores in Highline School District (1995)
13. Envirometrics, Inc., Review of the Air Quality Sections in the Draft Environmental Impact Statement for Sea-Tac Master Plan Update Development Actions (June 21, 1995)
14. Kato & Warren, Inc., Draft Environmental Impact Statement for Proposed Master Plan Update Development Actions at Seattle-Tacoma International Airport: Compendium of Comments Reviewing and Analyzing Construction, Surface Transportation, Water Quality and Wetlands/Wildlife Impacts (June 1995)

* These Comments contain a considerable number of citations to documents. All documents cited are incorporated herein by reference. The preponderance of the citations are to (a) documents to which the FAA and the Port of Seattle must take official notice (e.g., laws, regulations, ordinances and records of proceedings or official actions by governmental bodies such as the Puget Sound Regional Council and its authorized boards and panels); (b) documents which the Commenters have obtained from the Port or the FAA (through applicable open records statutes) and hence are already in the agencies' possession; (c) materials which the Commenters believe to be already in the record of this proceeding; and (d) materials to which the agencies have ready access and which the Commenters otherwise would have to obtain from the agencies or another government agency. In the interest of brevity, the Commenters have attached as appendices hereto only those cited materials which the Commenters believe are not within those four categories. In the event that any cited material is not available to the FAA or the Port, the Commenters will make such material available immediately to the agencies upon request.

1994
Historic Properties Survey

A Survey of Historic Properties within the Boundaries of the A.C.C. Cities

City of Burien

Prepared by Glenn Weiss
for the
Airport Communities Coalition
Robert Olander, Executive Director

Airport Communities Coalition

City of Burien
City of Des Moines
City of Normandy Park
City of Tukwila

Contents

Introduction

The 1994 Historic Properties Survey was developed for the Airport Communities Coalition and was conducted by Glenn Weiss, Planning Intern for the Coalition and supervised by Steve Bennett, Assistant City Planner, from the City of Normandy Park. The survey was intended to be as broad as possible and to identify all potentially valuable historic properties in the cities of Burien, Des Moines, Normandy Park and Tukwila. Significant properties in the City of SeaTac and nearby unincorporated King County were also surveyed to a lesser extent.

Except in unusual circumstances, a structure should be at least 50 years old to be eligible for listing in the National Register of Historic Places. In light of this criteria, all pre-1945 buildings were surveyed in August and September, 1994. Pre-1955 buildings of significance were also surveyed for a local landmarks designation program with a 40 year old eligibility requirement. Due to time constraints, Burien and Tukwila were comprehensively surveyed only between First Ave South and Fifty-first Ave South. Although, previously published historic sites were surveyed in the remainder of these two cities. To the extent possible, the survey also reflects whether potentially significant properties have been alter from their original form. Although some property have undergone substantial alterations, they may constitute a unique and important resource that is eligible for listing in the National Register or local landmark status.

The survey produced prioritized lists of properties for listing in the National Register of Historic Places and local landmark designation programs. The prioritized list was identified by the surveyor after consultation with Julie Koler, King County Landmarks Preservation Officer, on the application of national and local standards during a tour of Normandy Park and Des Moines. The list is summarized in the report contained in this document and is indicated geographically on the accompanying maps.

The results of the survey includes a report document on the historic resources for each city, one comprehensive report, the master database file (in Paradox for Windows) and hanging files with the surveyor's notes and photocopied research. The survey hanging files include 1994 King County Assessor Lists, for each city, of buildings constructed before 1945 and 1955. The pre-1945 list is arranged by street address and the pre-1955 list is arranged by year, and then address.

Survey Methodology

Between August 1 and September 30, 1994, Airport Communities Coalition Planning Intern, Glenn Weiss, researched and surveyed potential historic properties in the cities of Burien, Des Moines, Normandy Park and Tukwila. The research involved reading all available histories of those cities completed since 1972 (see Sources List in appendix) and recording a list of sites discussed in those texts. Other potential sites were identified through the King County Landmarks Commission's 1979 Survey of King County Historic Properties, through private discussions with local historians, and by contacting prominent architects regarding past work in the study area.

A windshield survey of these properties was conducted. For this study, "windshield survey" means a visual inspection of the front elevation from the street or driveway. Each building was judged to fall in one of five categories based on the front elevation only and without checking any photographic records. (see Database Codes in appendix) Therefore, buildings were judged to be altered or unaltered based on the surveyor's judgment of appropriateness of materials and design related to the researched construction date of the property. For example, if horizontal windows were present in a dated 1910 structure, then the surveyor presumed the windows were a later change to the building, since vertical windows were typical for 1910.

The surveyor is aware of some inconsistencies in the survey especially related to siding materials and addresses, such that structures may be judged "unaltered" when newer siding materials existed and some addresses may have caused the wrong building to be judged. Finally, due to lack of time, the surveyor always presumed the correctness of the researched date of construction and therefore declared buildings demolished or remodeled if the structures appeared totally constructed at a later date. The surveyor estimates errors related to siding to be less than 3%, and errors related to address and date of construction to be less than 1%.

After surveying all buildings referenced in historic writings, the surveyor acquired lists of all properties developed before 1945 and 1955. The lists were generated by the King County Assessor by searching tax records for the date of construction. The surveyor conducted a "windshield survey" of all pre-1945 buildings in Normandy Park and Des Moines, all pre-1945 buildings east of First Avenue South in Burien and all pre-1945 buildings west of 51st Avenue South in Tukwila. Additionally, Subdivision 44', Chelsea Park and several other pre-1955 subdivisions were surveyed in Burien. The subdivisions were found by analysis of the King County Assessor lists to locate series of buildings constructed in the same year on the same street.

With a survey of over 3000 structures completed, a database of over 700 records was created of all historically referenced buildings that were presumed extant in 1994 and any unaltered buildings surveyed from the assessor's records. The database is accurate for use in identifying and locating historically valuable properties and as a list of properties to re-survey buildings to determine scarcity of buildings and comparative quality. Since no verification techniques were used, the list is not recommended as a sole source for establishing landmark designation status.

Historic Properties in the City of Burien
Prioritized Sites Report Date: January 25, 1995

The Windshield Survey
East of First Avenue South

Based on a "windshield survey" of all buildings constructed before 1945, I can report the following summary of existing buildings in original condition. Each of the buildings in the columns below is based upon a preliminary assessment that requires further research to verify the history and integrity of each building. The first column contains sites with the potential to join the National Register of Historic Places. The second column includes special architectural examples that might (or do) qualify for designation in a future local landmarks designation program. The third column includes all existing buildings with no readily apparent alterations. Three other groups exist in the survey, but are not displayed in the chart: existing buildings with minor changes; existing buildings with significant alterations; and completely remodeled or demolished buildings.

Potential Landmark Buildings from Each Major Historic Period
East of First Avenue South

Period of Construction	National Register	Local Landmark	Existing as Original
Pre-1910	0	1	1
1910-19	0	0	0
1920-29	2	3	14
1930-39	0	1	40
1940-44*	1	1	50
1945-54	Survey Incomplete	3	18 (Survey Incomplete)
Total	3	9	123

Note: All figures are cumulative; figures for the local and existing columns include previous columns.
*One site in the national & local landmark columns include 19 houses in unaltered condition in Subdivision '44, 7th Ave South.

A Few Conclusions Based in the Survey
East of First Avenue South

- Early Burien/Sunnydale Few buildings remain from the early beginnings of Sunnydale and none are in excellent or unaltered condition.
- Farming The only remaining farm, Dodd Homestead, exists with a Victorian style house in fair condition. The Homestead is a King County Landmark.
- Auto Suburbs First Ave South was extended as a paved road in the late 1920's, opening the area for suburban development. Several original condition buildings in the "steep roof" or "modest home" design remain from the 1930s.
- Community Facilities: 1920-39 From the 1920s-30s, significant community facilities may be eligible for the National Register. Examples include the Highline High School and Sunnydale School, (both King County Landmarks).
- WWII Defense Industry Housing During WWII, three developments were constructed to house defense industry workers in the Duwamish Boeing factories. *Chelsea Park* in Burien is the largest, followed by *Subdivision '44, Casade View* in Tukwila and then *Subdivision '44, 7th Ave South* in Burien which is in the best original condition.
- Community Facilities: 1945-64 Church and school structures from the 1950s and 60s reflect the history of post-WWII Burien and its dramatic growth as a residential community. In the area east of First Avenue South, Cedarhurst Elementary School remains in original condition.

Historic Properties in the City of Burien
Prioritized Sites Report Date: January 25, 1995

Legal Designation

Potential historic properties are divided into several categories below. These categories are determined by the criteria established for the National Register of Historic Places and the King County Landmark Commission program. The properties in each category are based on limited research and will most likely be reduced in number with further research that discovers physical changes to the structures. All pre-1945 buildings east of First Avenue South were examined to establish the list.

National Historic Places Nomination
East of First Avenue South

The following buildings and sites appear in excellent physical condition with an intact architectural integrity from the date of construction. Each building or site responds to a significant national, regional or community historic movement.

Highline High School, 1925, (A King County Landmark), 251 152nd Street SW
Architectural Integrity and Community Significance
Sunnydale School, 1928, (A King County Landmark), 15631 8 Ave South
Architectural Integrity and Community Significance

National Historic Places Nomination: Verification Required
East of First Avenue South

The following site appears in excellent physical condition but requires further research to verify architectural integrity from the date of construction. Additional research should be conducted into the human history of the site.

Subdivision '44, 7th Avenue South, 128th Street to 132nd Street S - 1944
WWII Homes for Defense Industry Workers

Local Landmark
East of First Avenue South

A future Burien landmarks program might recognize landmark status for the following structures pending further research into the precise scarcity and integrity of the buildings. Sites qualifying as local landmarks should be important to the history of Burien and retain their architectural integrity. In reference to common buildings, complete architectural integrity is usually essential. Buildings increase in historic importance with the scarcity of that building type during a given historic period. Any nomination for designation would include a list of other similar buildings remaining from the same period. (All buildings and sites in the National categories above should be considered for local landmark status.)

Cedarhurst Elementary, 1954, 611 132nd Street South
Exceptional modern style school in original condition
Brick Commercial Structure(temp), 1977, 658 152 Ave SW
Unique brick commercial structure with gable roof
Derlon Hose, 1950, 505 150th Street South
Earliest and awarded winning Burien example of modern butterfly roof house.
Dodd Homestead, 1888, 606 140th Street South
Last remaining homestead. A King County Landmark
Pacific Telephone Building, 1948, 14605 8th Ave South
Unique commercial building with modern decorative lintel
Pollock House(temp), 1938, 624 152nd Street South
Steep Roof Brick House with exceptional decorative brick work
YMCA House(temp), 1928, 17874 Des Moines Way South
Three Story Brick House Unique to Burien

Historic Properties in the City of Burien
Prioritized Sites Report Date: January 25, 1995

Significant Buildings that may have Compromised Integrity
East of First Avenue South

The following structures have had a significant role in Burien history, but their architectural integrity may have been compromised due to renovations and additions.

Crosby House, 1900, 14628 8th Ave South
Home of early Burien developer Homer Crosby.

Historic Properties in the City of Burien
Prioritized Sites Report Date: January 25, 1995

The Windshield Survey
West of First Avenue South

Most of the historic sites visited in the "windshield survey" west of First Avenue South were identified through historic references, not through a complete survey of all existing pre-1945 buildings. Most likely, many additional local landmarks would be identified with complete research. 1945-54 subdivision developments were identified through the King County Assessor records. An equal number of 1945-54 subdivisions were omitted from the list because of poor physical conditions.

Potential Landmark Buildings from Each Major Historic Period
West of First Avenue South

Period of Construction	*National Register*	*Local Landmark*	*Existing as Original*
Pre-1910	0	4	Survey Incomplete
1910-19	0	5	Survey Incomplete
1920-29	0	3	Survey Incomplete
1930-39	0	2	Survey Incomplete
1940-44*	1	1	Survey Incomplete
1945-54**	Survey Incomplete	11	Survey Incomplete
Total	1	26	NA

Note: All figures are cumulative; figures for the local and existing columns include previous columns.
*The one site listed includes 75 houses in unaltered condition in Subdivision '43, Chelsea Park
** 5 of the 11 sites are subdivisions that include 70 unaltered houses.

A Few Conclusions Based in the Survey
West of First Avenue South

- **Native American Sites** Three Tree Point is a significant Native American myth site with at least three stories from local traditions.
- **Early Burien/Sunnydale** The early beginnings of Burien do not remain west of First Avenue South.
- Farming The Hazelton farmhouse is the only remaining farm structure west of First Avenue, but without its original farmland.
- Summer Retreats: 1900-29 Examples of Three Tree Point's history as a summer retreat for the upper classes of Seattle and Tacoma is still represented by a few marvelous examples, but development has caused the reduction of the acreage. Good intentioned restoration and repair is the biggest threat to historic integrity.
- Lake Burien Trolley Communities With the opening of the Lake Burien Trolley in 1912, Lake Burien area and Seahurst were platted for home sites. The homes of developers Charles Schoening and F.W. Dashley still exists on Lake Burien. The Seahurst Development road layout is intact.
- Burien Business District Promoter, businessman F.W. Dashley and his brother helped establish the district after 1918. Several buildings exist in original condition and might qualify as a historic district.
- Community Facilities: 1920-39 From the 1920s-30s, significant community facilities still exist including Southgate Masonic Hall and the Highline Men's Progressive Club.
- WWII Defense Industry Housing During WWII, three developments were constructed to house defense industry workers in the Duwamish Boeing factories. *Chelsea Park* in Burien is the largest, followed by *Subdivision '44, Casade View* in Tukwila and then *Subdivision '44, 7th Ave South* in Burien which is in the best original condition.
- Community Facilities: 1945-54 Church and school structures from the 1950s and 60s reflect the history of post-WWII Burien and its dramatic growth as a residential community. The Hazel Valley/ Chelsea Park area with houses, schools, stores and churches is an excellent example of Post WWII suburban planning ideals. Five residential subdivisions exist from the 1950s in nearly perfect condition.

Historic Properties in the City of Burien
Prioritized Sites Report Date: January 25, 1995

Legal Designation
Potential historic properties are divided into several categories below. These categories are determined by the criteria established for the National Register of Historic Places and the King County Landmark Commission program. The properties in each category are based on limited research and will most likely be reduced in number with further research that may discover physical changes to the structures.

National Historic Places Nomination: Verification Required
West of First Avenue South

The following site appears in excellent physical condition but requires further research to verify architectural integrity from the date of construction. Additional research should be conducted into the human history of the site.

Subdivision '43, Chelsea Park - 1943, 2nd Ave to Ambaum, 136th to 139th SW
Over 300 WWII Homes for Defense Industry Workers

Local Landmark
West of First Avenue South

A future Burien landmarks program might recognize landmark status for the following structures pending further research into the precise scarcity and integrity of the buildings. Sites qualifying as local landmarks should be important to the history of Burien and retain their architectural integrity. In reference to common buildings, complete architectural integrity is usually essential. Buildings increase in historic importance with the scarcity of that building type during a given historic period. Any nomination for designation would include a list of other similar buildings remaining from the same period. (All buildings and sites in the National category above should be considered for local landmark status.)

aya'hos, Three Tree Point
Native American myth about Three Tree Point
Belnap House, 1923, 3750 Three Tree Point SW
Large summer residence
Burien Business District, 1918-39, 152 Street between Ambaum & 10th Ave SW
Burien's early business center through 1945
Carpenter House, 1914, 14508 25th Ave SW
Early Seahurst development home
Community Family Clinic (temp), 1950, 12634 First Ave South
Earliest remaining American modernistic commercial structure in Burien
Chelsea Park Elementary, 1954, 417 142nd Street SW
Well-designed Post-WWII suburban school
Dashley House, 1912, 1235 152 Street SW
Home of F.W. Dashley, early Burien leader
Dearborn House, 1951, 16765 Maplewild Drive SW
Show house of Northwest architecture in 1950s
Duffy Estate, 1934, 2727 156th Ave SW
Renown house and gardens
Glendale Lutheran Church, 1949, 13405 2nd Ave SW
First post-WWII suburban church
Gregory House, 1910, 3730 171 Street SW
Large summer residence at Three Tree Point
Haselton House, 1907, 12829 9th Ave SW
Early Burien farmhouse
Hazel Valley Elementary, 1947, 402 132 Street SW
First post-WWII suburban school

Historic Properties in the City of Burien
Prioritized Sites Report Date: January 25, 1995

Local Landmark (continued)
West of First Avenue South

Highline Men's Progressive Club, 1935, 15403 Ambaum Blvd SW
Romantic log club house for Burien men's association.
Osterman House #1, 1929, 17204 Hillcrest Terrace SW
Best of Hugh Osterman designed houses on Hillcrest Terrace
St. Elizabeth Episcopal Church, 1955, 1005 152 Street SW
Well designed modern church
Seahurst Development, 1910s, 16th Ave to the Sound between 144 and 152 SW
First major planned subdivision in Burien
Southgate Masonic Temple, 1920, 1004 152 Street SW
Unique neo-classical Masonic Hall
Subdivision '51, 1951, 18th Ave SW between 157 and 160 SW
One of five intact ranch subdivision
Subdivision'52, 1952, Two blocks at the intersection of 22nd SW and 169 SW
One of five intact ranch subdivision
Subdivision '52, 1952, 7th Ave SW between 146 and 148 SW
One of five intact ranch subdivision
Subdivision '54, 1954, Two block at intersection of 13th SW and 167th SW
One of five intact ranch subdivision. Unique building design.
Subdivision '54, 1954, 133rd Street SW between 6th and 8th Ave SW
One of five intact ranch subdivision
Three Tree Point Development, Early 1900's, Maplewild, 172 SW and the Point
First Seattle/Tacoma summer home development
Treisch House, 1908, 3506 172 Street SW
Earliest remaining Three Tree Point row house

Significant Buildings that may have Compromised Integrity
West of First Avenue South

The following structures have had a significant role in Burien history, but their architectural integrity may have been compromised due to renovations and additions.

Albee Estate, 1916, 1033 152 Ave SW
Ruth Dykeman Center
Des Moines Memorial Way, 1922, 96th South to 231 South
Road and Trees as World War I Memorial
Gunther Building, 1900, 16660 Marine View Drive SW
Real Estate Office for Gunther Reality, but moved from Seahurst
St. Francis Church, 1929, 15236 21 Ave SW
First Highline Area Catholic Church
Schoening House, 1909, 15407 11th Ave SW
Home of Charles Schoening, early Burien leader and developer
Three Tree Point Store, 1903, 16957 Maplewild SW
Original store promised in Three Tree Point development brochure

Index by Historic Name in Each City

Friday, October 14, 1994

Index by Historic Name in Each City

Friday, October 14, 1994

Index by Historic Name In Each City

Friday, October 14, 1994

M.	Historic Name	Common Name	File #	City	St. #	Site Street Name	Date	Pg.
•	Subdivision '44 - 7th Ave S	7th Ave South	B40-50	Burien	12804	7th Ave South	1944	655
•	Subdivision '61 - 18 Ave SW	Unknown	B50-04	Burien	15607	18th Ave SW	1951	654
•	Subdivision '52 - 22 Ave SW	Unknown	B50-05	Burien	16901	22nd Ave SW	1952	654
•	Subdivision '52 - 7th Ave S	Unknown	B50-06	Burien	14612	7th Ave SW	1952	654
•	Subdivision '54 - 13 Ave SW	Unknown	B50-09	Burien	16703	13th Ave SW	1954	654
•	Subdivision '54 - SW 133rd	Unknown	B50-10	Burien	614	133 Street SW	1954	654
	Sullivan House (temp)	Sullivan House	B30-44	Burien	13615	Des Moines Way South	1939	655
	Sunnydale Church	Burien Free Methodist Ch	B00-12	Burien	520	150 Ave South	1907	655
•	Sunnydale School	Sunnydale School	B20-15	Burien	15631	8 Ave South	1928	655
	Sweeney House (temp)	Unknown	B40-28	Burien	13017	3 Ave South	1942	655
	Teague House	Wick House	B10-04	Burien	419	140 Street South	1912	655
	Tedrow House (temp)	Tedrow House	B30-27	Burien	13233	10 Ave South	1937	655
	Thamert House (temp)	Thamert House	B40-45	Burien	504	150 Street South	1943	655
	Thomas House (temp)	Unknown	B40-29	Burien	13420	10 Ave South	1942	655
•	Three Tree Point Developm	Three Tree Point	B00-08	Burien		Maplewild, 172, & the Point	1900	654
•	Three Tree Point Store	Three Tree Point Store	B00-09	Burien	16957	Maple Wild SW	1903	654
	Tingley House (temp)	TingleyHouse	B20-10	Burien	13039	Occidental Ave South	1926	654
•	Treisch House	Eilers House	B00-14	Burien	3506	172 Street SW	1908	654
	Tumelson House (temp)	Tumelson House	B30-28	Burien	13115	12 Ave South	1937	655
	Unknown	Brunelle House	B00-05	Burien	1243	140 Street South	1890	655
	Vanderhoof House (temp)	Vanderhoof House	B30-29	Burien	13431	3 Ave South	1937	655
	Vittone House (temp)	Unknown	B40-13	Burien	1229	129 Street South	1941	655
	Voog House (temp)	Voog House	B40-05	Burien	16203	Des Moines Way South	1940	655
	Vorvell House (temp)	Vorvell House	B40-30	Burien	1235	128 Street South	1942	655
	Wagner House (temp)	Unknown	B30-30	Burien	17225	Ambaum Blvd South	1937	654
	Wallace House (temp)	Wallace House	B40-31	Burien	12839	First Ave South	1942	654
	Webster Home	Webster House	B10-08	Burien	16262	13 Ave SW	1918	654
	Weigel House (temp)	Weigel House	B40-06	Burien	12852	Occidental Ave South	1940	654
	Weston-Fox House (temp)	Weston-Fox House	B40-06	Burien	13227	12 Ave South	1940	655
	Wick House (temp)	Unknown	B30-08	Burien	518	140 Street South	1933	655
	Wines House (temp)	Wines House	B40-46	Burien	13426	8 Ave South	1943	655
	Wingstrand House (temp)	Wingstrand House	B20-20	Burien	836	146 Street South	1929	655
	Woods House	Del Villar House	B00-15	Burien	16806	Des Moines Way South	1908	655
	Wuesthoff House (temp)	Wuesthoff House	B40-32	Burien	1245	128 Street South	1942	655
•	YMCA House (temp)	YMCA - Highline	B20-16	Burien	17874	Des Moines Way South	1928	655
•	aya'hos	Three Tree Point	B00-02	Burien		NA		654
	kah-kah-AHL-ko	Crow's water	B00-03	Burien		Seacoma Blvd SW		654
	? Camp Dining Hall (temp)	Iversen House	D30-08	Des Moine	23204	14th Ave South	1935	685
	? Camp House (temp)	Opstad House	D40-21	Des Moine	23415	14th Ave South	1947	685
	? Camp Owner's House (te	Foster House	D30-19	Des Moine	23200	14th Ave South	1936	685
•	? Camp Shelter & Cabin (te	McGushin House	D30-09	Des Moine	23304	14th Ave South	1935	685
	AMCO House (temp)	Unknown	D10-10	Des Moine	1855	216 Street South	1918	685
	Archeological Sites	Shell Middens	D00-00	Des Moine		Not Publicly Accessible		684
	Assembly House (temp)	Unknown	D30-28	Des Moine	21816	24th Ave South	1939	685
	Assembly of God Church	Assembly of God Church	D60-01	Des Moine	21650	24 Ave South	1960	685
	Ault House (temp)	Ault House	D10-05	Des Moine	20932	First Ave South	1914	684
•	Baarley House (temp)	Baarley House	D20-21	Des Moine	22028	5 Place South	1927	684
	Barber House (temp)	Barber House	D30-05	Des Moine	24324	24th Ave South	1934	715
	Bartholomew House (temp)	Bartholomew House	D40-12	Des Moine	24121	21st Ave South	1943	715
•	Baum (Fisher) House	Cunningham House	D10-04	Des Moine	23207	Marine View Drive S	1913	685
•	Bauman House	Ramsey House	D10-11	Des Moine	23235	10th Ave South	1918	685
	Bay Cleaners & Tailor	Neptune Books	D40-20	Des Moine	22319	Marine View Drive South	1946	685
	Beal House (temp)	Unknown	D40-13	Des Moine	2812	226 Street South	1943	685
	Bergman House (temp)	Bergman House	D40-17	Des Moine	21030	7th Ave South	1944	685
	Bierma House (temp)	Bierma House	D30-20	Des Moine	21324	4th Ave South	1936	684
	Bisbee House (temp)	Maczko House	D00-13	Des Moine	1917	240 Ave South	1908	715
	Booth House (temp)	Booth House	D30-06	Des Moine	1118	222 Street South	1934	685
	Booth House (temp)	Booth House	D30-29	Des Moine	1005	242 Street South	1939	715
	Brown House (temp)	Brown House	D30-10	Des Moine	20927	3rd Ave South	1935	684
	Bundy House, Marc (temp)	Bundy House	D30-26	Des Moine	1716	223 Street South	1938	685
	Bundy House, Mike (temp)	Bundy House	D10-14	Des Moine	1609	223 Street South	1919	685
	Burke House (temp)	Unknown	D30-01	Des Moine	917	247 Street South	1930	715
	Butler House	Butler House	D40-05	Des Moine	2219	222 Street South	1942	685
•	Case House	Cunningham House	D00-11	Des Moine	22006	10 Ave South	1907	685

Index by Historic Name In Each City

Friday, October 14, 1994

M.	Historic Name	Common Name	File #	City	St. #	Site Street Name	Date	Pg.
	Chamber Office (temp)	Greater Des Moines Cha	D20-12	Des Moine	22237	Cliff Ave South	1926	685
	Chapel of the Bells	Discovery World Day Car	D50-08	Des Moine	22038	9 Ave South	1956	685
•	Chesney House	Gracy House	D00-02	Des Moine	1255	218 Street South	1890	685
	Coffy House (temp)	Coffy House	D20-06	Des Moine	22220	11th Place South	1923	685
	Coil House (temp)	Coil House	D30-21	Des Moine	1218	216th Street South	1936	685
•	Commercial Club Hall	Des Moines Odd Fellows	D10-03	Des Moine	22342	7 Ave South	1912	685
	Commons House	Scott House	D00-14	Des Moine	23627	Marine View Drive South	1908	715
•	Corby House (temp)	Corby House	D10-12	Des Moine	24224	7th Ave South	1918	715
•	Covenant Beach Bible Cam	Des Moines Beach Park	D30-07	Des Moine	22000	Cliff Ave South	1934	684
•	Danish Colony	Seashore Club	D20-13	Des Moine	23641	7 Ave South	1926	715
•	Del's Service	Butler's Auto Repair	D30-11	Des Moine	22341	Marine View Drive South	1935	685
•	Des Moines Field House	Des Moines Field House	D30-30	Des Moine	1000	220 Street South	1939	685
	Des Moines Library	Grace Day Care	D60-10	Des Moine	22815	24 Ave South	1964	685
•	Des Moines Masonic Lodge	Brate House	D30-02	Des Moine	22202	8 Ave South	1930	685
	Des Moines Masonic Templ	Des Moines Masonic Tem	D60-12	Des Moine	2208	223 Street South	1968	685
	Des Moines Methodist Chur	Des Moines Methodist Ch	D60-02	Des Moine	22225	9 Ave South	1960	685
•	Des Moines Public School	Des Moines Elementary	D20-11	Des Moine	22001	9 Ave South	1925	685
•	Des Moines Theater	AAA Liquidating & Auction	D40-22	Des Moine	22325	Marine View Drive South	1947	685
•	Dickensen House (temp)	Dickensen House	D30-22	Des Moine	24305	7th Ave South	1936	715
•	Dooley House (temp)	Dooley House	D10-09	Des Moine	24218	7th Ave South	1917	715
•	Draper Print Shop	Langston House	D00-05	Des Moine	600	220 Street South	1900	685
	Eemisse House (temp)	Unknown	D30-12	Des Moine	833	223 Street South	1935	685
	Eemissee House (temp)	Unknown	D40-06	Des Moine	22215	8th Ave South	1942	685
•	Ellington House	Sherman House	D20-01	Des Moine	22530	8th Ave South	1920	685
•	Elsey House	Laukaitis House	D10-01	Des Moine	921	223 Street South	1911	685
	Elsey House (temp)	Elsey House	D30-03	Des Moine	22006	11th Ave South	1932	685
	Elsner Greenhouses	Zenith Holland Nursery	D00-12	Des Moine	23269	Marine View Drive S	1907	685
	Elsner House	Unknown	D00-15	Des Moine	1217	240 Ave South	1908	715
•	Elsner House #2	Draper House	D20-16	Des Moine	23258	Marine View Drive South	1927	685
•	Engeset Home	Hartfield House	D00-08	Des Moine	21434	13 Ave South	1904	685
	Erickson House (temp)	Unknown	D30-14	Des Moine	22327	16th Ave South	1935	685
	Evanson House (temp)	Evanson House	D30-15	Des Moine	1615	Kent-Des Moines Road	1935	685
	Finnell / Dickerson House	**Demolished or Moved**	D00-10	Des Moine	22514	6 Ave South	1906	685
	Fire District #26 Station	Des Moines Fire Station	D50-12	Des Moine	2238	223 Street South	1958	685
	Fire District #26 Station	Quality Auto Electric	D50-01	Des Moine	22231	Marine View Drive South	1952	685
•	Fisher Compound	Fisher Compound	D20-07	Des Moine	23435	Marine View Drive South	1923	685
	Goedde House (temp)	Unknown	D40-07	Des Moine	615	225 Street South	1942	685
	Gokey House (temp)	Unknown	D40-18	Des Moine	22808	24th Place South	1944	685
	Goldsbery House (temp)	Goldsbery House	D40-14	Des Moine	23457	14th Ave South	1943	685
	Gould House (temp)	Gould House	D20-08	Des Moine	1242	Kent-Des Moines Road	1923	685
	Grace Lutheran Church	Grace Lutheran Church	D50-10	Des Moine	22975	24 Ave South	1957	685
•	Haines House (Temp)	Haines House	D20-05	Des Moine	601	240 Street South	1922	715
•	Halfway House	Foam Rubber City	D20-20	Des Moine	22613	Pacific Highway South	1928	685
	Hanson House (temp)	Hanson House	D10-15	Des Moine	22502	10th Ave South	1919	685
	Hartman House (temp)	Hartman House	D40-08	Des Moine	22604	16th Ave South	1942	685
	Hemenway House (temp)	Unknown	D40-01	Des Moine	21612	24th Ave South	1940	685
	Hickman House (temp)	Hickman House	D40-09	Des Moine	24433	Marine View Drive South	1942	715
	Highline Community College	Highline Community Colle	D60-11	Des Moine	2400	240 Street South	1964	715
•	Hill Farm (temp)	5H Ranch	D20-02	Des Moine	21815	24th Ave South	1920	685
	Janssen House (temp)	Janssen House	D40 03	Des Moine	22752	10th Ave South	1941	685
•	Jorgenson House	Simkus House	D10-01	Des Moine	24011	Marine View Drive South	1914	715
	Jory House (temp)	Unknown	D30-16	Des Moine	21904	Marine View Drive South	1935	715
	Judson Park Retirement Co	Judson Park Retirement	D60-07	Des Moine	23600	Marine View Drive South	1962	685
	Lamp House (temp)	Lamp House	D20-03	Des Moine	1251	230 Street South	1920	685
•	Latimer House	Old Gay House	D00-04	Des Moine	21816	7 Place South	1890	685
•	Lindahl House	McConnaughey House	D10-02	Des Moine	304	216 Street South	1911	684
•	Lute House (temp)	Lute House	D30-25	Des Moine	23235	Marine View Drive South	1937	685
	Lutheran Church of the Res	Highline Reformed Presby	D50-09	Des Moine	106	206 Street South	1956	684
	M.V.D. Unknown House	Unknown	D99-01	Des Moine	32220	Marine View Drive South		715
	Maher House (temp)	Unknown	D20-19	Des Moine	22017	28th Ave South	1928	685
	Marcus Whitman Presbyteri	Marcus Whitman Presbyt	D60-08	Des Moine	2130	248 Street South	1962	715
•	Masonic Home of Washingt	Masonic Home	D20-17	Des Moine	23660	Marine View Dr. South	1927	715
•	Midway Intermediate School	Midway Elementary Scho	D50-06	Des Moine	22447	24 Ave South	1955	685
	Motteler House (temp)	Motteler House	D20-04	Des Moine	22702	10th Ave South	1921	685

Index by Historic Name in Each City

Friday, October 14, 1994

M.	Historic Name	Common Name	File #	City	St. #	Site Street Name	Date	Pg.
	Mt. Rainier High School	Mt. Rainier High School	D50-13	Des Moine	22450	19 Ave South	1958	685
•	North Hill Community Club	North Hill Community Clu	D30-23	Des Moine	20827	3 Ave South	1936	684
•	Northhill Subdivision '53	Unknown	D50-02	Des Moine	20801	7th Place South	1953	685
	Nunner House (temp)	Unknown	D40-19	Des Moine	22436	30th Ave South	1944	685
•	Olympic Elementary School	Olympic Elementary Scho	D50-04	Des Moine	615	200 Street South	1954	685
•	Osterhoudt House	Osterhoudt House	D50-03	Des Moine	2037	222 Street South	1953	685
	Owen House (temp)	Owen House	D10-06	Des Moine	22335	6th Ave South	1914	685
	Owen House (temp)	Unknown	D30-31	Des Moine	21645	24th Ave South	1939	685
	Pacific Middle School	Pacific Middle School	D60-05	Des Moine	22705	24 Place South	1961	685
	Pacific Telephone & Telegra	US West	D40-04	Des Moine	802	223 Street South	1941	685
	Pacific Telephone Station	US West Switching Statio	D40-15	Des Moine	22600	28th Ave South	1943	685
	Parker House (temp)	Parker House	D30-17	Des Moine	21228	4th Ave South	1935	684
	Parkside Primary School	Parkside Primary School	D60-03	Des Moine	2104	247 Street South	1960	715
	Petersen House (temp)	Unknown	D20-09	Des Moine	1816	220 Street South	1923	685
•	Qah-wells	Glistening Rock	D00-01	Des Moine	421	227 Street South		684
•	Rayback House	Foote House	D10-07	Des Moine	22018	11 Ave South	1916	685
	Roehr House	Miller Estate	D60-04	Des Moine	1622	216 Street South	1960	685
	Schuch House (temp)	Schuch House	D30-32	Des Moine	1228	216 Street South	1939	685
	Sharp House (temp)	Sharp House	D30-04	Des Moine	917	249 Street South	1933	715
	Simmerer House (temp)	Unknown	D30-24	Des Moine	1223	230 Street South	1936	685
	Simms House (temp)	Unknown	D40-10	Des Moine	1136	220 Street South	1942	685
	Sleeman House (temp)	Unknown	D40-02	Des Moine	22843	30th Ave South	1940	685
•	Smith House	Pool House	D00-06	Des Moine	22204	9 Ave South	1900	685
	Somers Cottage (temp)	Somers House	D20-14	Des Moine	23525	7th Ave South	1926	685
	Somers House (temp)	Somers House	D20-15	Des Moine	23525	7th Ave South	1926	685
	Sonju Cottage (temp)	Unknown	D20-10	Des Moine	24800	16th Ave South	1924	685
	Sonju House (temp)	Sonju House	D40-11	Des Moine	24728	16th Ave South	1942	685
•	St. Philomena Catholic Chur	St. Philomena Catholic Ch	D50-07	Des Moine	1790	222 Street South	1955	685
	Strickler Hardware	Blais of Des Moines	D40-23	Des Moine	22607	Marine View Drive South	1947	685
•	Sturdy House (temp)	Sturdy House	D40-24	Des Moine	825	222 Street South	1947	685
	Ursino House (temp)	Ursino House	D40-16	Des Moine	2458	220 Street South	1943	685
•	Van Gasken House	Bray House	D00-02	Des Moine	402	222 Street South	1889	684
	Van Laak House (temp)	Van Leak House	D30-33	Des Moine	1915	222 Street South	1939	685
•	Vassar's Blacksmith Shop	Inglet House	D00-07	Des Moine	21216	Des Moines Memorial Dr. S.	1900	685
	Victory Baptist Church	Victory Baptist Church	D60-09	Des Moine	1807	223 Street South	1963	685
•	Walsworth House	Schaeffer House	D10-08	Des Moine	1104	223 Street South	1916	685
	Wamsley House (temp)	Unknown	D20-18	Des Moine	22525	6th Ave South	1927	685
	Weaver House (temp)	Weaver House	D30-27	Des Moine	21815	31st Ave South	1936	685
•	Wesley Homes - The Garde	Wesley Gardens	D50-05	Des Moine	815	216 Street South	1954	685
	Wesley Homes - The Terrac	Wesley Gardens	D60-06	Des Moine	816	216 Street South	1961	685
	Widell House (Temp)	Manz House	D00-09	Des Moine	1105	240 Ave South	1905	715
•	Wilson Hotel	Granberg House	D00-16	Des Moine	603	240 Street South	1908	715
	Wilson House (temp)	Unknown	D30-34	Des Moine	22238	Cliff Ave South	1939	685
	Witter House (temp)	Witter House	D30-18	Des Moine	24036	24th Ave South	1935	715
•	Zenith Grocery Store	Zenith Grocery Store	D10-13	Des Moine	23659	Marine View Dr South	1918	715
	Harvey's Skin Dive Suits	Harvey's Skin Dive Suits	W50-1	King Count	2505	252 Street South	1957	715
	North Hill Elementary	North Hill Elementary	H50-01	King Count	19835	8 Ave South		685
	Rose's Highway Inn	Rose's Highway Inn	W30-0	King Count	26915	Pacific Highway South	1939	715
•	Salt Water State Park	Salt Water State Park	W30-0	King Count	25201	Marine View Drive S	1934	715
	Southminister Presbyterian	Southminister Presbyteria	H50-02	King Count	19834	8 Ave South	1957	685
	Woodside School	Woodside School	H50-03	King Count	18367	8 Ave South	1958	685
•	Alverson House	Alverson House	N50-01	Normandy	17916	Brittany Dr SW	1950	654
	Anderson House (temp)	Anderson/Shea House	N20-01	Normandy	18317	2 Ave SW	1920	684
•	Andrews Log Cabin (temp)	Andrews Log Cabin	N10-02	Normandy	104	214 Street SW	1913	684
	Archeological Sites	Shell Middens	N00-00	Normandy		Not Publicly Accessible		684
•	Barricklow House	Hayes House	N30-01	Normandy	18135	Brittany Drive SW	1931	684
	Bauner House	P. Walters House	N50-17	Normandy	18175	Normandy Terrace SW	1959	684
•	Beko House (temp)	Beko House	N30-07	Normandy	230	164 Street SW	1935	654
	Benson House	Johnson House	N20-05	Normandy	20803	Marine View Drive SW	1927	684
	Bergman House	Alder House	N70-01	Normandy	17968	Normandy Terrace SW	1973	684
	Blesener House (temp)	Blesener House	N10-05	Normandy	21608	6 Ave South	1916	684
	Bramel House	Bramel House	N60-04	Normandy	19273	Edgecliff Dr. SW	1963	684
	Brown House	Unknown	N50-10	Normandy	19254	Edgecliff SW	1955	684
•	Bush Beach House (temp)	Bush Beach House	N10-06	Normandy	220	219 Street South	1916	684

Index by Historic Name in Each City

Friday, October 14, 1994

M.	Historic Name	Common Name	File #	City	St. #	Site Street Name	Date	Pg.
	Caddock House (temp)	Caddock House	N40-09	Normandy	18951	Marine View Drive SW	1941	684
•	Christie House (temp)	Christie House	N50-20	Normandy	17841	Brittany Drive SW	1951	684
•	Clark House	Andrews House	N20-09	Normandy	17915	Normandy Terrace SW	1929	654
•	Cole House	Cole House	N50-21	Normandy	18125	Brittany Drive SW	1951	684
	Colin House (temp)	Colin House	N40-18	Normandy	18911	Edgecliff Dr SW	1942	684
	Cook Beach House	Cook Beach House	N20-07	Normandy	21333	Marine View Drive SW	1928	684
•	Cook House	Unknown	N20-02	Normandy	21311	Marine View Drive South	1922	684
	Cooper House	Cooper House	N50-07	Normandy	18961	Edgecliff Drive SW	1954	684
•	Cordell House	Cordell House	N50-11	Normandy	645	174 Street SW	1955	654
	Cosgrove House	Unknown	N60-01	Normandy	18602	Brittany Dr. SW	1961	684
	Dalseg House (temp)	Unknown	N30-04	Normandy	16405	3 Ave SW	1932	654
	Davis House	Davis House	N40-10	Normandy	18135	Normandy Terrace SW	1941	684
•	Dawson House	Dawson House	N50-05	Normandy	18902	Marine View Drive SW	1952	684
	Delich House (Temp)	Delich House	N30-05	Normandy	18222	Terrace Court SW	1933	684
	Dibble House	Remel House	N30-20	Normandy	18915	Marine View Drive SW	1939	684
•	Dobszinsky (Anderson) Hou	Evans House	N30-14	Normandy	18107	Normandy Terrace SW	1937	684
•	Dodd House	Dodd House	N50-02	Normandy	19203	Edgecliff Drive SW	1950	684
•	Dunbar House	Christensen House	N00-01	Normandy	18617	4 Ave SW	1890	684
•	Dunbar House, Grant	Bruening House	N10-03	Normandy	18818	First Place SW	1913	684
	Ettel House (temp)	Ettel House	N40-19	Normandy	17942	Riviera Place SW	1942	654
	Fichtner House (temp)	Fichtner House	N30-12	Normandy	19205	First Ave South	1936	684
•	Fish House	Fish House	N40-20	Normandy	801	168 Street South	1942	654
	Fleener House (Temp)	Wendal & Phyllis Fleener	N40-11	Normandy	18177	Normandy Terrace SW	1941	684
	Fogelberg House (temp)	Unknown	N30-08	Normandy	18619	2 Ave SW	1935	684
	Fooks House (temp)	Fooks House	N20-04	Normandy	21636	6 Ave South	1924	684
	Forland House	Unknown	N60-05	Normandy	18939	Edgecliff Dr. SW	1963	684
•	Gustin House	Gustin House	N30-02	Normandy	17985	Normandy Terrace SW	1931	684
	Hanson House (temp)	Unknown	N40-34	Normandy	129	164 Street SW	1943	654
	Hardy House (temp)	Hardy House	N40-21	Normandy	226	171 Street SW	1942	654
	Helland House (temp)	Helland House	N40-22	Normandy	18901	Edgecliff Dr SW	1942	684
	Hilson House (temp)	Hilson House	N10-01	Normandy	18449	First Ave South	1910	684
	Hixson House (temp)	Hixson House	N30-13	Normandy	132	166 Street SW	1936	654
•	Hubbart House	Kludt House	N40-01	Normandy	17424	13 Ave SW	1940	654
•	Hughett House	Etchey House	N20-10	Normandy	17999	Normandy Terrace SW	1929	684
	Huhn House	Southgate Assembly of G	N20-03	Normandy	16625	First Ave South	1923	654
•	John Knox Presbyterian Ch	John Knox Presbyterian C	N50-08	Normandy	109	Normandy Road SW	1954	684
	Johnson House (temp)	Johnson House	N40-23	Normandy	18514	Marine View Drive SW	1942	684
	Kane House	Kane House	N60-03	Romandy	1923	170 Street SW	1962	654
	Keeble House (temp)	Unknown	N40-24	Normandy	420	218 Street South	1942	684
	Kimmel House (temp)	Kimmel House	N40-25	Normandy	1635	168 Street SW	1942	654
	Kobela House (temp)	Unknown	N30-09	Normandy	112	166 Street SW	1935	654
	Larsen House	Larsen House	N60-06	Normandy	20600	6 Ave SW	1964	684
•	Latimer House	Rosser House	N40-02	Normandy	1229	174 Street SW	1940	654
	LePenske House (temp)	LePenske House	N40-26	Normandy	18410	8 Ave SW	1942	684
	Leon House (temp)	Leon House	N30-10	Normandy	111	166 Street SW	1935	654
	Lingwood House (temp)	Lingwood House	N30-11	Normandy	17623	First Ave South	1935	654
	Martin House	LePenski House	N40-03	Normandy	16884	2nd Ave SW	1940	654
	Mavista Elementary School	Mavista Elementary Scho	N50-15	Normandy	19800	Marine View Dr SW	1957	684
•	Mayer House	Riddling House	N30-15	Normandy	18641	4 Ave SW	1937	684
	McInturff House	McInturff House	N50-16	Normandy	18958	Edgecliff Drive SW	1957	684
	Moore House	Moore House	N30-18	Normandy	18521	Brittany Drive SW	1938	684
	Mulvihill House (temp)	Unknown	N40-12	Normandy	20829	2 Place SW	1941	684
•	NIKE Missile Base	Civic Center Park	N40-04	Normandy	19900	4 Ave SW	1940	684
•	Normandy Park Club House	Ben Tipp House	N20-04	Normandy	1865	Miller Creek Dr SW	1926	654
	Normandy Park Community	The Cove	N50-18	Normandy	1500	Shorebrook Dr. SW	1959	654
•	Normandy Park Elementary	Normandy Park City Hall	N50-09	Normandy	801	174 Street SW	1954	654
•	Normandy Park Site Plan	Normandy Park	N20-11	Normandy		From Shorebrook to Normandy Pk. Dr.	1929	654
	Normandy Park Swim Club	Normandy Park Swim Clu	N50-12	Normandy	17655	12 Ave SW	1956	654
•	Northwest Archery Museum	Northwest Archery Museu	N50-03	Normandy	19807	First Ave South	1950	684
	Olympic View Swim Club	Olympic View Swim Club	N60-02	Normandy	19800	4th Ave SW	1961	684
	Parks House	Labenz House	N40-13	Normandy	18529	Normandy Terrace SW	1941	684
	Pearce House (temp)	Pearce House	N40-14	Normandy	1221	174 Street SW	1941	654
	Pedersen House	Pedersen House	N30-19	Normandy	609	207 Street SW	1938	684
	Pelger House (temp)	Pelger House	N40-27	Normandy	20938	Marine View Drive SW	1942	684

Index by Historic Name in Each City

Friday, October 14, 1994

M.	Historic Name	Common Name	File #	City	St. #	Site Street Name	Date	Pg.
*	Pevosky House	Bolles House	N40-35	Normandy	17622	12 Ave SW	1947	654
	Pirogoff House (temp)	Pirogoff House	N40-15	Normandy	18721	Edgecliff Dr SW	1941	684
	Pollard House	Pollard House	N10-04	Normandy	6167	187 or 189 Street SW	1913	684
*	Powell House (temp)	Powell House	N40-16	Normandy	17121	2 Ave SW	1941	654
	Provo House (temp)	Provo House	N40-28	Normandy	1607	168 Street SW	1942	654
*	Prudence Penny Home #1	Osborne House	N20-08	Normandy	17970	Brittany Drive SW	1928	684
	Prudence Penny Home #2	Thompson House	N30-03	Normandy	17954	Brittany Drive SW	1931	684
	Randall House (temp)	Randall House	N40-05	Normandy	1627	168 Street SW	1940	654
*	Raymond House #1	Holmes House?	N30-16	Normandy	204	Normandy Road SW	1937	684
*	Raymond House #2	Duff House	N50-06	Normandy	17925	Normandy Terrace SW	1952	654
*	Reitze House	Martin House	N40-06	Normandy	18541	Normandy Terrace SW	1940	684
	Riebe House (temp)	Riebe House	N40-29	Normandy	235	171 Street SW	1942	654
	Ringdahl House (Temp)	Ringdahl House	N20-04	Normandy	406	Normandy Road SW	1926	684
	Rova House (temp)	Unknown	N40-07	Normandy	18105	Brittany Dr SW	1940	684
	Sargent House	Sargent House	N40-30	Normandy	17941	Riviera Place SW	1942	654
*	Skoog House	David House	N50-04	Normandy	18191	Brittany Drive SW	1950	684
	Slaker House (temp)	Slaker House	N40-31	Normandy	18645	8 Ave SW	1942	684
*	Sprenger Beach House	Sprenger Beach House	N20-06	Normandy	232	218 Street South	1927	684
	Steele House (temp)	Steele House	N40-32	Normandy	131	171 Street SW	1942	654
*	Stone Beach House (temp)	Stone Beach House	N30-06	Normandy	222	219 Street South	1934	684
	Stoneman House (temp)	Unknown	N30-17	Normandy	635	207 Street SW	1937	684
	Storey House	Unknown	N50-13	Normandy	18705	Edgecliff SW	1956	684
	Tracy House	Tracy House	N50-14	Normandy	18971	Edgecliff Dr. SW	1956	684
	Trainer House (temp)	Tranier House	N40-33	Normandy	133	168 Street SW	1942	654
	Treaty Tree	Treaty Tree	N00-01	Normandy	17107	2 Ave SW		654
	Walker House	Carl Hansen House	N40-08	Normandy	17424	13 Ave SW	1940	654
	Westby House (temp)	Westby House	N40-17	Normandy	20647	6 Ave SW	1941	684
	Williams House (temp)	Williams House	N30-21	Normandy	17980	Brittany Dr SW	1939	684
	Angle Lake Elementary Sch	SeaTac City Hall	S50-01	SeaTac			1953	685
	Fire District #24 Station	SeaTac Fire Station	S50-04	SeaTac	2929	200 Ave South	1959	685
*	Hillgrove Cemetery	Hillgrove Cemetery	S00-03	SeaTac	1551	200 Street South	1900	685
	Marywood Elementary Scho	Port of Seattle Marywood	S50-03	SeaTac		200 Street South	1958	685
	Mayer House	Unknown	S30-01	SeaTac	15025	Military Road South	1935	655
*	Military Road	Military Road	S00-01	SeaTac		Military Road South	1860	655
	Pancake Chef Shopping Ce	Pancake Chef	S50-02	SeaTac	15201	Military Road South	1955	655
*	Paul House	Unknown	S00-02	SeaTac	839	157 Street South	1885	655
	Prince of Peace Lutheran C	Prince of Peace Lutheran	S50-05	SeaTac	19030	8 Ave South	1959	685
*	Vacca Farm	Vacca Farm, Pumpkin Pat	S20-01	SeaTac	15208	Des Moines Mem. Way South	1927	655
*	Allentown Acres Addition	Allentown Acres Addition	T00-17	Tukwila		42-50 Ave S Between 122 & 124	1906	625
*	Allentown Bridge	Allentown Bridge	T20-44	Tukwila	12600	42 Ave South	1927	655
	Anderson House (temp)	Anderson House	T30-16	Tukwila	4908	114 Street South	1932	625
	Anderson House (temp)	Anderson House	T40-69	Tukwila	13703	42 Ave South	1944	655
	Anderson House (temp)	Unknown	T40-44	Tukwila	12054	44 Place South	1943	625
	Anderson House (temp)	Unknown	T40-45	Tukwila	12533	51 Place South	1943	655
	Angle House (temp)	Angle House	T40-46	Tukwila	4831	146 Street South	1943	655
	Archeological Sites	Shell Middens, Burial Gro	T00-00	Tukwila		Not Publicly Accessible		655
	Atkins House (temp)	Atkins House	T30-43	Tukwila	4321	140 Street South	1936	655
	Auto Cabins	Alva Pease Property	T20-01	Tukwila	11540	East Marginal Way South	1920	625
	Axelson House (temp)	Unknown	T40-47	Tukwila	4602	164 Street South	1943	655
	Babcock House (temp)	Babcock House	T10-41	Tukwila	4027	128 Street South	1919	655
	Bailey House (temp)	Unknown	T40-48	Tukwila	12227	44 Ave South	1943	625
	Baker House (temp)	Baker House	T40-01	Tukwila	11662	42 Ave South	1940	625
	Baker's Kitchen	Unknown	T20-02	Tukwila	11650	East Marginal Way South	1920	625
	Bales House	Bales House	T20-03	Tukwila	14100	42 Ave South	1920	655
	Baney House (temp)	Baney House	T20-42	Tukwila	4511	136 Street South	1928	655
	Barber House (temp)	Barber House	T30-17	Tukwila	4231	148 Street South	1932	655
	Barene House (temp)	Barene House	T40-23	Tukwila	13423	48 Ave South	1942	655
	Barnes House (temp)	Unknown	T40-49	Tukwila	12222	47 Ave South	1943	625
	Barrett House (temp)	Unknown	T30-11	Tukwila	12250	48 Ave South	1931	625
	Baugart House (temp)	Baumgart House	T30-12	Tukwila	3241	135 Street South	1931	655
*	Ben Carol Motel Sign	Ben Carol Motel Sign	T40-24	Tukwila	14110	Pacific Highway South	1942	655

Index by Historic Name in Each City

Friday, October 14, 1994

M.	Historic Name	Common Name	File #	City	St. #	Site Street Name	Date	Pg.
	Benson House (temp)	Benson House	T40-12	Tukwila	3720	142 Street South	1941	655
*	Bergquist House	Marks House	T20-31	Tukwila	14455	58 Ave South	1924	655
	Berkman House (temp)	Unknown	T20-51	Tukwila	11914	Interurban South	1928	625
	Bigelow House	McCarton House	T00-09	Tukwila	11728	40 Ave South	1902	625
	Boardman House (temp)	Boardman House	T20-37	Tukwila	11926	Interurban South	1925	625
	Boardwalk House (temp)	Unknown	T10-23	Tukwila	13042	Pacific Highway South	1917	655
*	Boeing Company Building 1	The Red Barn	T00-27	Tukwila	9404	East Marginal Way South	1909	625
	Bohall House (temp)	Bohall House	T10-42	Tukwila	12840	35 Ave South	1919	655
	Bohleen House (temp)	Unknown	T40-50	Tukwila	12218	46 Ave South	1943	625
	Bosshart House (temp)	Bosshart House	T20-38	Tukwila	14220	Military Road South	1925	655
	Botham House (temp)	Unknown	T00-18	Tukwila	14702	51 Ave South	1906	655
	Bowen House (temp)	Unknown	T30-28	Tukwila	13311	37 Ave South	1934	655
	Brandeberry House (temp)	Unknown	T40-02	Tukwila	13908	45 Ave South	1940	655
	Braucher House (temp)	Braucher House	T30-13	Tukwila	12223	43 Ave South	1931	625
	Bretthauer House (temp)	Bretthauer House	T30-62	Tukwila	14065	33 Ave South	1939	655
	Brown House (temp)	Brown House	T10-26	Tukwila	3832	130 Street South	1918	655
	Burkey House (temp)	Burkey House	T40-51	Tukwila	3928	113 Street South	1943	625
	Buss House (temp)	Unknown	T40-03	Tukwila	11811	44 Ave South	1940	625
	Caldwell House (temp)	Caldwell House	T10-06	Tukwila	15650	42 Ave South	1912	655
	Calibuso House (temp)	Unknown	T30-64	Tukwila	15843	47 Ave South	1939	655
	Cantonwine House (temp)	Cantonwine House	T10-24	Tukwila	14454	51 Ave South	1917	655
	Capellaro House (temp)	Capellaro House	T10-27	Tukwila	4061	128 Street South	1918	655
	Capellaro House (temp)	Unknown	T20-32	Tukwila	4603	124 Street South	1924	655
	Carlson House (temp)	Unknown	T20-04	Tukwila	3818	116 Street South	1920	625
	Carlson House (temp)	Unknown	T40-25	Tukwila	12248	43 Ave South	1942	625
	Case House (temp)	Unknown	T40-52	Tukwila	12040	44 Ave South	1943	625
*	Cavanaugh House (temp)	Cavanaugh House	T00-07	Tukwila	4026	130 Street South	1901	655
	Chittenden House (temp)	Chittenden House	T40-04	Tukwila	13057	34 Ave South	1940	655
*	Christian Science Church	Primera Iglesia Bautista C	T30-22	Tukwila	13045	42 Ave South	1933	655
	Clark House	**Demolished 80s**	T00-10	Tukwila	13532	52 Ave South	1902	655
	Clark House (temp)	Clark House	T40-53	Tukwila	12217	46 Ave South	1943	625
	Cloutier House (temp)	Cloutier House	T20-39	Tukwila	4058	128 Street South	1925	655
	Codd House (temp)	Codd House	T30-23	Tukwila	4240	158 Street South	1933	655
*	Codiga Farm: Dairy Barn	Codiga Farm	T20-52	Tukwila	12523	50 Place South	1928	655
*	Codiga House	Codiga House	T10-43	Tukwila	12523	50 Place South	1919	655
	Codiga House #2 (temp)	Unknown	T20-33	Tukwila	12523	50 Place South	1924	655
	Cohen House (temp)	Unknown	T30-65	Tukwila	13738	45 Ave South	1939	655
	Coleman House (temp)	Coleman House	T40-13	Tukwila	12223	48 Ave South	1941	625
	Conner House (temp)	Conner House	T40-26	Tukwila	4616	146 Street South	1942	655
	Coon House (temp)	Coon House	T40-14	Tukwila	13018	41 Ave South	1941	655
	Dahl House (temp)	Dahl House	T10-28	Tukwila	11714	40 Ave South	1918	655
	Davidson House (temp)	Davidson House (temp)	T30-01	Tukwila	4020	128 Street South	1930	655
	Davidson House (temp)	Unknown	T40-54	Tukwila	4058	148 Street South	1943	655
	Davis House (temp)	Davis House	T40-55	Tukwila	4705	122 Street South	1943	625
	Dawe House (temp)	Dawe House	T40-56	Tukwila	2929	133 Street South	1943	655
*	Delta Masonic Lodge	Delta Masonic Lodge	T20-45	Tukwila	13034	41 Ave South	1927	655
	Dennis House (temp)	Unknown	T10-29	Tukwila	3906	113 Street South	1918	625
	Derosier House (temp)	Unknown	T40-27	Tukwila	12214	42 Ave South	1942	625
	Desjardin House (temp)	Desjardin House	T20-53	Tukwila	3826	116 Street South	1928	625
	Dietsch House (temp)	Unknown	T30-66	Tukwila	4635	144 Street South	1039	655
	Dillon House (temp)	Unknown	T20-05	Tukwila	4210	115 Street South	1920	625
	Dingle House (temp)	Dingle House	T30-02	Tukwila	4115	114 Street South	1930	625
	Doty House	Unknown	T00-15	Tukwila	14711	57 Ave South	1905	655
	Doubleday House	**Demolished or Moved**	T00-11	Tukwila	14951	57 Ave South	1903	655
	Driscoll House (temp)	Driscoll House	T30-14	Tukwila	3944	113 Street South	1931	625
	Dukich House (temp)	Dukich House	T10-07	Tukwila	5001	114 Street South	1912	625
	Duncan House (temp)	Unknown	T30-03	Tukwila	11664	44 Ave South	1930	625
	Dunne House (temp)	Unknown	T30-44	Tukwila	12812	37 Ave South	1936	655
*	Duwamish 99 Bridge	Duwamish 99 Bridge	T20-46	Tukwila	11600	Pacific Highway South	1927	625
*	Duwamish Church	Duwamish Community Pr	T00-03	Tukwila	11814	42 Ave South	1870	625
	Easter House (temp)	Easter House	T10-20	Tukwila	4820	150 Street South	1915	655
	Eberhardt House (temp)	Eberhardt House	T30-36	Tukwila	12816	34 Ave South	1935	655
	Elliott House (temp)		T99-01	Tukwila				655
	Eng House (temp)	Eng House	T30-52	Tukwila	4836	150 Street South	1937	655

Index by Historic Name in Each City

Friday, October 14, 1994

Index Page 9

M.	Historic Name	Common Name	File #	City	St. #	Site Street Name	Date	Pg.
	Fackrell House (temp)	Unknown	T00-28	Tukwila	13027	37 Ave South	1909	655
	Fencl House (temp)	Fencl House	T30-53	Tukwila	12840	33 Place South	1937	655
	Ferrell House (temp)	Ferrell House	T00-23	Tukwila	14025	44 Ave South	1908	655
•	Fetters House (temp)	Unknown	T10-30	Tukwila	14019	37 Ave South	1918	655
	Fokkema House (temp)	Fokkema House	T30-18	Tukwila	4440	160 Street South	1932	655
•	Foster Golf Course	Foster Golf Links	T20-40	Tukwila	13900	Interurban Ave South	1925	655
•	Foster High School Stadium	Werner Neudorf Memorial	T50-02	Tukwila	4242	144 Street South	1952	655
	Foster Library	Foster Library	T50-04	Tukwila	4205	142 Street South	1959	655
•	Foster Maple Tree	Large Maple Tree	T00-02	Tukwila	Northe	Foster Golf Links	1865	655
	Foster Senior High School	**Demolished**	T50-03	Tukwila	4242	144 Street South	1952	655
	Foster-Tukwila Presbyterian	Tukwila Presbyterian Chu	T00-29	Tukwila	14401	56 Ave South	1909	655
	Fowler House (temp)	Fowler House	T00-30	Tukwila	3517	130 Street South	1909	655
	Fox House (temp)	Fox House	T40-28	Tukwila	11863	44 Ave South	1942	625
	Fredericks Store	Unknown	T20-06	Tukwila	11602	42 Ave South	1920	625
	Frymier House (temp)	Fymier House	T30-29	Tukwila	13650	Military Road South	1934	655
	Fuller House	Painter House	T20-07	Tukwila	13526	53 Ave South	1920	655
	Gaviglio House (temp)	Gaviglio House	T40-29	Tukwila	4008	114 Street South	1942	625
	Geehan House (temp)	Unknown	T10-08	Tukwila	14261	Macadam Road South	1912	655
	Glenn House (temp)	Glenn House	T40-15	Tukwila	10333	51 Ave South	1941	625
	Glessner House (temp)	Glessner House	T30-67	Tukwila	12092	44 Place South	1939	625
	Gomez House (temp)	Unknown	T30-45	Tukwila	4518	124 Street South	1936	655
	Gonzalez Buildings (temp)	Unknown	T20-24	Tukwila	3827	130 Street South	1922	655
	Gonzalez House (temp)	Unknown	T20-08	Tukwila	13027	40 Ave South	1920	655
	Goodale House (temp)	Goodale House	T30-15	Tukwila	3726	128 Street South	1931	655
	Gradzuk House (temp)	Gradzuk House	T10-31	Tukwila	13041	38 Ave South	1918	655
	Greene House (temp)	Unknown	T40-30	Tukwila	11867	44 Ave South	1942	625
	Greeno House (temp)	Unknown	T40-16	Tukwila	13722	44 Ave South	1941	655
	Grotem House (temp)	Grotem House	T30-68	Tukwila	4802	150 Street South	1939	655
	Guess House (temp)	Unknown	T20-32	Tukwila	13319	42 Ave South	1918	655
	Gulla House (temp)	Gulla House	T30-04	Tukwila	11659	44 Ave South	1930	625
	Gustafson House #2 (temp)	Unknown	T40-05	Tukwila	3915	117 Street South	1940	625
	Gustafson House (temp)	Gustafson House	T40-17	Tukwila	14650	46 Ave South	1941	655
	Gustofson Buldings (temp)	Unknown	T20-47	Tukwila	11640	East Marginal Way South	1927	625
•	Haggard House (temp)	Haggard House	T00-12	Tukwila	11532	40 Ave South	1903	625
	Hale House	Most Likely "Demolished"	T20-09	Tukwila	12550	51 Place South?	1920	655
	Harty House (temp)	Harty House	T10-11	Tukwila	13119	42 Ave South	1913	655
	Hellstrom House (temp)	Unknown	T10-33	Tukwila	4208	115 Street South	1918	625
	Henderson House		T20-25	Tukwila	4815	124 Street South	1922	655
•	Henke House	Moore House	T10-34	Tukwila	14222	58 Ave South	1918	655
	Henry House (temp)	Unknown	T00-19	Tukwila	14424	51 Ave South	1906	655
	Hibbs House (temp)	Hibbs House	T30-54	Tukwila	12633	37 Ave South	1937	655
	Hildner House (temp)	Hildner House	T20-26	Tukwila	3901	117 Street South	1922	625
	Hilmes House (temp)	Unknown	T20-27	Tukwila	3709	126 Street South	1922	655
	Hingorani House (temp)	Unknown	T20-58	Tukwila	15608	47 Ave South	1929	655
	Holdaas House (temp)	Holdaas House	T40-06	Tukwila	4432	148 Street South	1940	655
	Houle House (temp)	Houle House	T10-12	Tukwila	12910	East Marginal Way South	1913	655
	Hughes House (temp)	Hughes House	T20-10	Tukwila	13739	41 Ave South	1920	655
	Hunter House (temp)	Hunter House	T40-57	Tukwila	13442	34 Ave South	1943	655
	Ingersoll House (temp)	Ingersoll House	T40-31	Tukwila	13455	48 Ave South	1942	655
	Interurban Bridge	**Demolished 88**	T10-21	Tukwila	11500	East Marginal Way South	1915	625
	Iverson House (temp)	Unknown	T40-58	Tukwila	16226	51 Ave South	1943	655
	Jacobson House (temp)	Jacobson House	T20-11	Tukwila	12202	42 Ave South	1920	625
	Jenson Dairy	Basich House	T00-20	Tukwila	11854	42 Ave South	1906	625
	Jenson House (temp)	Jenson House	T40-70	Tukwila	14647	42 Ave South	1944	655
	Johnson House (temp)	Johnson House	T40-18	Tukwila	13048	34 Ave South	1941	655
	Johnson House (temp)	Johnson House	T20-59	Tukwila	14406	42 Ave South	1929	655
	Johnson Residence	Johnson House	T10-01	Tukwila	13136	42 Ave South	1910	655
	Jones House (temp)	Jones House	T30-55	Tukwila	10415	47 Ave South	1937	625
	Jordon House (temp)	Jordon House	T30-60	Tukwila	10918	49 Ave South	1938	625
•	Jorgensen Forge	Jorgenson Forge	T40-59	Tukwila	8531	East Marginal Way South	1943	625
	Jorgensen House (temp)	Jorgensen House	T10-18	Tukwila	13025	41 Ave South	1914	655

214

Index by Historic Name in Each City

Friday, October 14, 1994

Index Page 10

M.	Historic Name	Common Name	File #	City	St. #	Site Street Name	Date	Pg.
	Josie House (temp)	Josie House	T20-60	Tukwila	10035	East Marginal Way South	1929	625
	Judd House (temp)	Judd House	T20-12	Tukwila	4044	128 Street South	1920	655
	Kaiser #1 House	Violin House	T10-13	Tukwila	4128	130 Street South	1913	655
	Kaiser #2 House	Dealry House	T10-14	Tukwila	4136	130 Street South	1913	655
•	Kassner House	Unknown	T00-14	Tukwila	14406	59 Ave South	1904	655
	King County House (temp)	Unknown	T30-61	Tukwila	4029	144 Street South	1938	655
	Kirkland Building (temp)	Used Trucks and Equipm	T20-54	Tukwila	13500	Pacific Highway South	1928	655
	Knaus House (temp)	Knaus House	T40-60	Tukwila	16445	51 Ave South	1943	655
	Kolsky House (temp)	Kolsky House	T00-24	Tukwila	13001	41 Ave South	1908	655
	Lacava House	**Wrong Address**	T20-13	Tukwila	13012	40 Ave South	1920	655
	Larson House (temp)	Larson House	T40-32	Tukwila	12524	51 Place South	1942	655
	Lawrence House (temp)	Lawrence House	T30-46	Tukwila	4481	144 Street South	1936	655
	Lee House (temp)	Unknown	T20-61	Tukwila	4240	148 Street South	1929	655
	Lehmbeck House (temp)	Lehmbeck House	T20-34	Tukwila	13011	33 Ave South	1924	655
	Lewis House (temp)	Lewis House	T10-22	Tukwila	3403	132 Street South	1916	655
	Light Residence	Unknown	T00-13	Tukwila	14688	53 Ave (Macadam Rd) South	1903	655
	Liljestrand House (temp)	Liljestrand House	T10-33	Tukwila	13111	42 Ave South	1918	655
•	Lincoln House	Lautenschlager House	T00-25	Tukwila	13243	40 Ave South	1908	655
	Little Church by the Side of t	Little Church...	T30-24	Tukwila	14800	Pacific Highway South	1933	655
	Looney House (temp)	Looney House	T30-19	Tukwila	12218	49 Ave South	1932	625
	Lovell House (temp)	Unknown	T30-25	Tukwila	3235	135 Street South	1933	655
	Lucero House (temp)	Lucero House	T10-35	Tukwila	13219	East Marginal Way South	1918	655
	Marleau Building (temp)	Unknown	T30-05	Tukwila	12601	East Marginal Way South	1930	655
	Martin House (temp)	Unknown	T30-30	Tukwila	11682	44 Ave South	1934	625
	Mason House (temp)	Mason House	T40-19	Tukwila	13021	33 Ave South	1941	655
	Mathias House (temp)	Mathias House	T40-61	Tukwila	12056	44 Ave South	1943	625
	Matson House (temp)	Matson House	T30-06	Tukwila	12204	43 Ave South	1930	625
	Mauzeralle House (temp)	Mauzeraulle House	T30-58	Tukwila	4808	146 Street South	1937	655
	McCall House (temp)	Unknown	T10-36	Tukwila	13734	42 Ave South	1918	655
	McHugh House (temp)	McHugh House	T30-31	Tukwila	15222	42 Ave South	1934	655
	McNicholas House (temp)	McNicholas House	T10-37	Tukwila	10342	Beacon Ave South	1918	625
	Mechling House (temp)	Mechling House	T20-14	Tukwila	14011	Macadam Road South	1920	655
	Merkle House (temp)	Merkel House	T40-62	Tukwila	4602	122 Street South	1943	625
•	Merkle, Grandma, House	Kolstad House	T00-26	Tukwila	12244	42 Ave South	1908	625
	Merriam House (temp)	Unknown	T10-04	Tukwila	4939	114 Street South	1911	625
•	Mess Pioneer Family Ceme	Mess Cementary	T00-06	Tukwila	19200	Frager Ave South	1900	685
	Methodist House #1 (temp)	Unknown	T40-33	Tukwila	13842	Military Road South	1942	655
	Methodist House #2 (temp)	Unknown	T40-34	Tukwila	13848	Military Road South	1942	655
	Miller House (temp)	Miller House	T20-21	Tukwila	4629	144 Street South	1921	655
•	Miyao Greenhouse	Miyao House	T30-07	Tukwila	11600	39 Ave South	1930	625
	Miyao House (temp)	Miyao House	T10-38	Tukwila	12054	42 Ave South	1918	625
	Mollane House(temp)	Unknown	T30-32	Tukwila	12205	44 Ave South	1934	625
•	Monroe House	Ritch House	T20-62	Tukwila	11616	42 Ave South	1929	625
	Morgan House (temp)	Unknown	T40-20	Tukwila	16446	51 Ave South	1941	655
	Moriwaki House (temp)	Moriwaki House	T10-05	Tukwila	4033	128 Street South	1911	655
	Morrison House (temp)	Morrison House	T40-07	Tukwila	12562	50 Place South	1940	655
	Mosier House (temp)	Mosier House	T40-35	Tukwila	4411	146 Street South	1942	655
	NW Realty House (temp)	Unknown	T40-36	Tukwila	3224	135 Street South	1942	655
	Nash House	Cripe House	T10-15	Tukwila	4106	130 Street South	1913	655
	Nealy House (temp)	Nealy House	T40-63	Tukwila	4408	122 Street South	1943	625
•	Nelsen House	Nelsen House	T00-16	Tukwila	15643	West Valley Road South	1905	655
•	Nelson, Fred, Farm	Nelson Dairy	T00-08	Tukwila	7107	Grady Road South	1901	655
	Ness House (temp)	Unknown	T10-16	Tukwila	12607	East Marginal Way South	1913	655
	Newporter Motel	Newporter Apartments	T40-37	Tukwila	14848	Pacific Highway South	1942	655
	Nienaber House (temp)	Unknown	T30-37	Tukwila	16228	42 Ave South	1935	655
	Nistor House (temp)	Nistor House	T40-64	Tukwila	12253	44 Ave South	1943	625
	Norris House (temp)	Unknown	T20-22	Tukwila	11609	39 Ave South	1921	655
•	Northwest House (temp)	Unknown	T20-63	Tukwila	3730	142 Street South	1929	655
	O'Brien House (temp)	Unknown	T40-38	Tukwila	3429	144 Street South	1942	655
	O'Brien House (temp)	Unknown	T40-21	Tukwila	3468	148 Street South	1941	655

214

Index by Historic Name In Each City

Friday, October 14, 1994

M.	Historic Name	Common Name	File #	City	St. #	Site Street Name	Date	Pg.
	Om House (Temp)	Om House	T20-41	Tukwila	13415	48 Ave South	1925	655
	Patapoff House (temp)	Patapoff House	T20-23	Tukwila	3703	126 Street South	1921	655
	Patterson House (temp)	Patterson House	T30-69	Tukwila	3910	113 Street South	1939	625
	Pearce House (temp)	Unknown	T40-65	Tukwila	4627	125 Street South	1943	655
	Pearson House (temp)	Pearson House	T30-38	Tukwila	4221	148 Street South	1935	655
	Poirier House (temp)	Unknown	T10-09	Tukwila	13745	44 Ave South	1912	655
	Pollinger House (temp)	Unknown	T40-71	Tukwila	14910	51 Ave South	1944	655
	Presbyterian House (temp)	Unknown	T30-26	Tukwila	15820	Military Road South	1933	655
	Primacio House (temp)	Unknown	T40-72	Tukwila	12048	44 Place South	1944	625
	Radley House (temp)	Radley House	T20-48	Tukwila	13347	34 Ave South	1927	655
•	Rainier View Community Cl	Rainier View Community	T20-55	Tukwila	10915	51 Ave South	1928	625
	Ramsey House (temp)	Ramsey House	T40-08	Tukwila	14040	33 Ave South	1940	655
•	Ray House	Carrosino House	T00-04	Tukwila	11269	East Marginal Way South	1882	625
	Reed House (temp)	Reed House	T40-66	Tukwila	12202	44 Ave South	1943	625
	Regal House	Unknown	T99-02	Tukwila		56 Ave South?		655
	Reidl House (temp)	Unknown	T20-29	Tukwila	4653	150 Street South	1923	655
	Ristau House (temp)	Ristau House	T20-15	Tukwila	13642	Military Road South	1920	655
	Riverton Heights Post Office	Unknown	T99-04	Tukwila	35007	150 Street South		655
•	Riverton Heights Presbyteri	Riverton Heights Presbyte	T30-08	Tukwila	3728	160 Street South	1930	655
•	Riverton Hospital	Huls Apartments	T10-44	Tukwila	13041	East Marginal Way South	1919	655
	Riverton House #1 (temp)	Unknown	T20-16	Tukwila	13449	43 Ave South	1920	655
	Riverton House #2 (temp)	Unknown	T30-39	Tukwila	13517	43 Ave South	1935	655
•	Riverton Park United Metho	Beth Ha Shofar	T10-02	Tukwila	13001	37 Ave South	1910	655
	Roberson House (temp)	Roberson House	T20-17	Tukwila	14845	51 Ave South	1920	655
	Rochon House (temp)	Rochon House	T20-43	Tukwila	5136	151 Street South	1926	655
	Roland House (temp)	Roland House	T20-35	Tukwila	4633	160 Street South	1924	655
	Ruffino House (temp)	Unknown	T30-27	Tukwila	14862	Pacific Highway South	1933	655
	Ruggles House (temp)	Ruggles House	T40-39	Tukwila	12404	50 Place South	1942	655
	Ruja House (temp)	Ruja House	T30-47	Tukwila	3115	135 Street South	1936	655
	Runge House (temp)	Unknown	T40-22	Tukwila	3742	141 Street South	1941	655
	Rupp House (temp)	Rupp House	T30-57	Tukwila	4611	140 Street South	1937	655
	Rupp-Santora House (temp)	Unknown	T10-17	Tukwila	4647	140 Street South	1913	655
	Sampson House	Alva Pease Property	T30-58	Tukwila	11540	East Marginal Way South	1937	625
	Santora House (temp)	Santora House	T30-59	Tukwila	4617	140 Street South	1937	655
	Sarantos House (temp)	Unknown	T40-40	Tukwila	3725	126 Street South	1942	655
	Serifica House (temp)	Serifica House	T40-67	Tukwila	12542	50 Place South	1943	655
	Sherman House (temp)	Sherman House	T40-09	Tukwila	13715	42 Ave South	1940	655
•	Shoemaker House	Malone House	T00-21	Tukwila	14243	58 Ave South	1906	655
•	Showalter School	Showalter Intermediate S	T30-70	Tukwila	4628	144 Street South	1939	655
	Simkus House (temp)	Simkus House	T30-48	Tukwila	4320	150 Street South	1936	655
	Simpson House (temp)	Simpson House	T30-40	Tukwila	4615	148 Street South	1935	655
	Sims House (temp)	Unknown	T30-71	Tukwila	14118	37 Ave South	1939	655
	Smith House (temp)	Smith House	T00-22	Tukwila	4226	139 Street South	1906	655
•	Southcity Motel Sign	Southcity Motel	T30-33	Tukwila	14242	Pacific Highway South	1934	655
•	Southgate Elementary Scho	Tukwila Community Cente	T50-01	Tukwila	4101	131 Street South	1950	655
	St. Thomas Catholic Church	St. Thomas Church	T60-01	Tukwila	4415	140 Street South	1963	655
	Stanley House (temp)	Stanley House	T30-20	Tukwila	13029	41 Ave South	1932	655
	Steadman House (temp)	Steadman House	T40-41	Tukwila	3811	116 Street South	1942	625
	Steen House (temp)	Steen House	T20-49	Tukwila	14062	33 Ave South	1927	655
	Steffan House (temp)	Steffan House	T10-10	Tukwila	15207	40 Ave South	1912	655
	Strand House (temp)	Strand House	T30-72	Tukwila	13235	East Marginal Way South	1939	655
	Strayer House (temp)	Strayer House	T10-25	Tukwila	11830	42 Ave South	1917	625
•	Subdivision '44, Casade Vie	Casade View Homes	T40-73	Tukwila	13503	37 Ave South	1944	655
	Sundby 119th House	Schulhamer House	T20-50	Tukwila	4037	119 Street South	1927	625
	Sundby 40th House	"Wrong Address"	T20-56	Tukwila	11605	40 Ave South	1928	625
	Sundby Interurban House	Unknown	T30-34	Tukwila	11918	Interurban South	1934	625
	Swanberg House (temp)	Swanberg House	T30-49	Tukwila	14809	51 Ave South	1936	655
	Teays House (temp)	Teays House	T30-41	Tukwila	4633	150 Street South	1935	655
	Thompson House (temp)	Unknown	T20-18	Tukwila	4503	136 Street South	1920	655
•	Thompson Store/ Riverton C	Jakes Antiques	T20-57	Tukwila	4010	130 Street South	1928	655
•	Thompson, O.C., House	Bitzig House	T10-19	Tukwila	4049	128 Street South	1914	655

214

Index by Historic Name In Each City

Friday, October 14, 1994

M.	Historic Name	Common Name	File #	City	St. #	Site Street Name	Date	Pg.
	Thorndyke School	Thorndyke Community Cl	T10-45	Tukwila	15000	42 Ave South	1919	655
	Tinsley House (temp)	Unknown	T30-21	Tukwila	12219	49 Ave South	1932	625
	Tolland House (temp)	Tolland House	T30-50	Tukwila	13636	Military Road South	1936	655
	Tom House (temp)	Unknown	T30-73	Tukwila	13228	37 Ave South	1939	655
	Tomaso House (temp)	Unknown	T10-39	Tukwila	13751	41 Ave South	1918	655
	Tompkins House (temp)	Tompkins House	T20-28	Tukwila	4439	160 Street South	1922	655
•	Torre House	Unknown	T00-05	Tukwila	3914	115 Street South	1890	625
	Tractor House (temp)	Unknown	T40-42	Tukwila	4438	160 Street South	1942	655
	Tremana House (temp)	Unknown	T10-40	Tukwila	14211	37 Ave South	1918	655
	Trone House (temp)	Trone House	T30-09	Tukwila	14020	43 Ave South	1930	655
•	Trudy's Tavern Sign		T30-74	Tukwila	15001	Pacific Highway South	1939	655
•	Tukwila Community Club Ha	Tukwila Community Club	T20-30	Tukwila	14257	Interurban Ave South	1923	655
•	Tukwila Grade School	Tukwila City Hall	T20-19	Tukwila	14475	59 Ave South	1920	655
•	Tukwila Park	Tukwila Park	T30-42	Tukwila	15300	65 Ave South	1935	655
	Vanness House (temp)	Vanness House	T30-51	Tukwila	15210	42 Ave South	1936	655
	Vasilieff House (temp)	Vasillieff House	T40-68	Tukwila	13504	Military Road South	1943	655
	Verhoff Service Station	Vi's Tavern	T20-20	Tukwila	12539	East Marginal Way South	1920	655
	Walker House (temp)	Walker House	T20-36	Tukwila	4208	124 Street South	1924	625
	Walkley House (temp)	Walkley House	T30-35	Tukwila	13035	40 Ave South	1934	655
	Walkup House	Mayor Walkup House	T99-03	Tukwila	15001	65 Ave South		655
	Whitworth House (temp)	Unknown	T10-03	Tukwila	13749	45 Ave South	1910	655
	Wickstrom House (temp)	Wickstrom House	T40-43	Tukwila	12022	44 Ave South	1942	625
	Wood House (temp)	Unknown	T30-75	Tukwila	4926	107 Street South	1939	625
	Yellam House (temp)	Unknown	T40-10	Tukwila	12501	50 Place South	1940	655
	Zuvela House (temp)	Zuvela House	T30-10	Tukwila	15205	51 Ave South	1930	655
•	ku-LAH-hahd	Northwind Fishweir	T00-01	Tukwila	2800	112 Street South		625

Historic Properties Survey: City of Burien

Report Date: 10/14/94

Created in August, September & October, 1994
Glenn Weiss, Surveyor & Planning Intern

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
B00-00 Not Publicly Accessible 654 WA Arch. U U U	**Archeological Sites** WA Arch Not Publicly Accessible	Shell Middens NA Not Publicly Accessible Burien 98166	See Washington State Office of Archeology for information on Native American Sites.
B00-01 Three Tree Point 654 KC E6 Dev [illegible] C A	**S-he-lahb** NA KC Native Site Map, Buerge 90, Kennedy 90 Beach altered with water break	Three Tree Point Several Owners NA Burien 98166	Ko-KWOI-lt-sah story of the Native people. The canoe of the girl's parents becomes stone at the point.
B00-02 Three Tree Point 654 KC E7 Dev [illegible] B A	***aya'hos** NA KC Native Sites Map, Buerge 90 Bluff has been covered by houses and stabilized.	Three Tree Point Several Owners NA Burien 98166	Huge serpent inhabited the place whose movements caused sand and gravel to slide down the bluff.
B00-03 Three Tree Point 654 KC E0 None [illegible] F A	**kah-kah-AHL-ko** KC Native Sites Map 93, Buerge 90 Spring never found.	Crow's water Unknown Seacome Blvd SW Burien 98166	Crow's water carried in ke-KWOI-lt-sah story of the Native peoples. The native people thought the spring (never found) to be poisonous and killed ten people.
B00-04 Sunnydale 656 KCLM nra3 [illegible] B A	***Dodd Homestead** 1888 KC Landmark, KC Survey 78, Burien Sites 90 House in fair condition.	Sutton Farm Doris Sutton 606 140 Street South Burien 98168	Only remaining homestead farms in the Highline area. Original Victorian Italianate style house and chestnut trees on South 140th.
B00-05 Sunnydale 656 KC 0280 Dev [illegible] C C	**Unknown** 1890 Unknown KC Survey 78, Batzadal 72 Concrete block basement added in 1930. New composite siding. Chimney Removed. Form is intact. 1994 potential demolition approved by Burien. 17 House Development.	Brunelle House Brunelle 1243 140 Street South Burien 98168	Early pioneer cabin built in 1890. Nothing was discovered about the builders in the KC Survey 78.

Key to Categories Above (If field is empty, the other fields move up in each column)

*Original Site Name

Historic Properties Survey: City of Burien

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
B00-06 Sunnydale 656 KC 0268 nra3 [illegible] F A	***Crosby House** 1900 Unknown KC Survey 78, Batzadal 72, Eyler 72, Young 76 South Addition and Remodel of Porch & Windows such that building resembles 1950s ranch.	Brown Home Duane Brown 14628 8 Ave. South Burien 98148	Residence of Homer Crosby between 1907 & 1952?. Crosby promoted the Burien Railroad, built 148th Street between Ambaum & First South, and built the water system. Architectural character has been changed.
B00-07 Gregory Heights 654 KC 0332 None D A	***Gunther Building** 1900 KC Survey 78, Batzadal 72 Moved from SW 152 & 21st Ave SW in Seahurst to Gregory Heights in 1967. Brick Chimney replaced stone one.	Unknown Unknown 16660 Marine View Dr. SW Burien 98166	Original office for Gunther Realty who marketed the south Lake Burien subdivision in 1912, among other properties.
B00-08 Three Tree Point 654 None None [illegible] U A	***Three Tree Point Development** 1900 Batzadal 72 Unknown. Original brochure has no date or road layout.	Three Tree Point Many Maplewild, 172, & the Point Burien 98166	Developed in early 1900s as summer community with general store, picnic areas and parks. Travel by boat from Seattle & Tacoma. Clark Belnap's lawsuit against subdivision went to the Supreme Court. J.D. Lohman was president of the Three Tree Point Company.
B00-09 Three Tree Point 654 KC 0336 None [illegible] C A	***Three Tree Point Store** 1903 KC Survey 78, Eyler 72, Burien Sites 90 Front porch and shape original. Instrusive large sign covers box truss on porch. Back of building remodeled in 1947 including large brick fire place.	Three Tree Point Store B. McCaffrey-Sawyer 16957 Maple Wild SW Burien 98166	The original store promised in the Three Tree Point Development that also included a picnic area and pavilion.
B00-10 Three Tree Point 654 KC 0337 Owner [illegible] D A	**Ghiglione House** 1907 KC Survey 78, Eyler 72 Originally a cheap beach shack. Now a concrete foundation, new southeast gable, and detached garage. All new replacement windows in 90s.	Wintermute House David & Julie Wintermute 3541 171 Street SW Burien 98166	First house at Three Tree Point
B00-11 Hazel Valley 654 KC 0263 None [illegible] B A	***Haselton Home** 1907 E. & O. Haselton, Builder KC Survey 78, Young 76 Unaltered and Original Site	Haseltown-Zwiefelhofer Home Frank Zwiefelhofer 12829 9 Ave. SW Burien 98146	Early house built by the Haseltons on 30 acres purchased from the Soloman family in 1902.

Key to Categories Above (If field is empty, the other fields move up in each column)

*Original Site Name

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
B00-12 Sunnydale 655 None nra3 [illegible] D A	**Sunnydale Church** 1907 Weiss 94 1907 Church demolished. 1953 Sanctuary with addition of 1971 offices and sanctuary.	Burien Free Methodist Church Same 520 150 Ave South Burien 98166	Site of original Sunnydale Church built in 1907. Demolished in 1950s but original bell at existing front entrance. New sanctuary built in 1953. Newest sanctuary built in 1971 and designed by Beckwith & Spangler, AIA in Bellevue. See photos in Highline Times of Jan. 22, 1990.
B00-13 Sunnydale 655 KC 0329 NRA [illegible] D B	**Bryan House** 1906 KC Survey 78, Balzarini 72 Remodeled in 1990s with new basement windows and window replacement thoughout. Building extended and moved 100' in 1950.	Leetch House Michael Leetch 1029 146 Street South Burien 98198	House from original Putnam homestead. Good example of pioneer style architecture.
B00-14 Three Tree Point 654 KC 0338 None [illegible] B B	*Treisch House 1908 KC Survey 78, Eyler 72, Burien Sites 90 In original condition in 78. Between 78 & 94, the exterior was further "tudorized" with decorative 1x4s and stucco.	Ellers House Robert Ellers 3508 172 Street SW Burien 98166	Second oldest house in Three Tree Point built by retired Seattle minister Treisch.
B00-15 Sunnydale 655 KC 0261 nra3 [illegible] D A	**Woods House** 1906 Wood Family, Builder KC Survey 78 All Windows replaces with metal sliders and recled in plywood. Central chimney removed.	Del Villar House Del Villar 16806 Des Moines Way South Burien 98148	Woods family were one of the earliest settlers. The first house on the site was built in the 1880s. Architectural character has been changed.
B00-16 Burien 654 KC 0279 None [illegible] D A	*Schoening House 1909 KC Survey 78, Slyer 72, Balzarini 72 Originally a log-built hunting lodge and then sided by Schoening. 1941 all remaining logs covered and other additions since the 40s.	Perry Residence Robert Perry 15407 11 Ave. SW Burien 98166	Charles Schoening was very important to early Burien. He promoted the Burien Railroad, created the south Lake Burien subdivision in 1912(?) and was instrumental in the building the road from Duwamish to Burien (Ambaum Way).
B10-01 Three Tree Point 654 KC 0336 None [illegible] A A	*Gregory House 1910 KC Survey 78, Eyler 72, Burien Sites 90 Excellent with minor changes to convert the house to a year round residence in 1926. In 1980s two buildings built between house and water.	Bailey House William & L. Bailey 3730 171 Street SW Burien 98166	One of the earliest summer residences built. L.I.Gregory was on the Board of Directors of the Three Tree Point Development. One tree and one tree stump from the original "Three Trees" were on the property in 1978.

Key to Categories Above (if field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives: WA State, King County Path to Site, Name, NRA, nra3, Development & Owner Date of Windshield Survey; Codes: Architecture & History (see left side)	*Original Site Name Date of Construction Architect or Builder, if known References 1994 Condition of Site * Asterisk designates Map Number	1994 Site Name, if known 1994 Owner, if Recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A: Important, B: Rare Building, C: Common, U: Unknown Architecture Codes: A: Special Style, B: Common, C: Minor Alteration of "A" or "B", D: Larger Alteration, F: Remodel or Demolition

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
B10-02 Five Corners 654 KC 0276 nra3 8/26/94 C B	**Kormasoff House** 1910 Unknown KC Survey 78 Addition added to south in 1970s. Good Condition.	Unknown Merrill & Yvonne Kuehn 122 166 Street South Burien 98166	One of the oldest remaining homes in the area.
B10-03 Burien 654 KC 0278 None 8/26/94 A A	*Dashley Home 1912 KC Survey 78, Balzarini 72, Eyler 72, Salonen 92 Good Condition in 94 from street.	Coury House James Coury & Lynn Majors 1235 152 Street SW Burien 98166	F.W. Dashley and his brother were very important to early Burien. They promoted the Burien Railroad, were instrumental in the building the road from Duwamish to Burien (Ambaum Way) and built many of the buildings in the business district.
B10-04 Sunnydale 655 KC 0260 nra3 8/26/94 C C	**Teague House** 1912 Teague, Builder KC Survey 78 Original North entrance and porch removed. 1980s deck and covered porch on new east entrance. Building form intact.	Wick House Frank Wick 419 140 Street South Burien 98166	Built by one of the earliest pioneer families to Highline area. Good example of poineer style architecture.
B10-05 Seahurst 654 None None 8/26/94 A C	*Carpenter House 1914 Frederick Carpenter, BLD. Lautman, 92 Excellent condition. Under going restoration in 1994.	Unknown Smith Family Trust 14508 25 Ave SW Burien 98166	One of the early Seahurst development houses.
B10-06 Burien 654 KC 0331 None 8/26/94 C A	*Albee Estate 1916 Schack & Young, Arch. KC Survey 78, Balzarini 72, Dorpat 92, Burien Sites 90 Front facade in good Condition with metal replacement windows and railings on porch roofs. Addition to back plus other buildings on estate. Barn and pump tower original.	Ruth Dykeman Children's Center Ruth Dykeman Children's Center 1033 152 Street SW Burien 98166	Building: Designed by the prestigous Seattle firm of Schack & Young (TRA in 1994). Institution: Founded in 1919 and moved to Albee Estate in 1933. Only residential institution of its kind in the state providing care to disturbed girls (later boys too.)
B10-07 Burien 654 KC 0328 None 8/26/94 C A	*Burien Business District 1918 Various KC Survey 78, Balzarini 72, Eyler 72, Burien Sites 90 15 Original with 3 Dramatically altered. One historic building burned in 86. Replaced with intrusive structure.	Burien Historic Business Districe Several 152 Street SW, Ambaum-10th Burien 98166	As the land was cleared for lumber and the Burien railroad was constructed in 1912, working people moved to Burien. The historic business district served the community between 1918 and 1940. The district includes 18 buildings built between 1918 & 1939.
B10-08 Burien 654 KC 0253 None 8/18/94 F A	**Webster Home** 1918 Homer Webster KC Survey 78 Completely remodeled in 1938 into shingle style building.	Webster House B.J. Webster 16262 13 Ave SW Burien 98166	Originally a "tar paper shack" typical of poverty housing after WW1. One of the first houses built on the hill south of Lake Burien. Homer Webster worked for Charles Schoening.

Key to Categories Above (if field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives: WA State, King County Path to Site, Name, NRA, nra3, Development & Owner Date of Windshield Survey; Codes: Architecture & History (see left side)	*Original Site Name Date of Construction Architect or Builder, if known References 1994 Condition of Site * Asterisk designates Map Number	1994 Site Name, if known 1994 Owner, if Recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A: Important, B: Rare Building, C: Common, U: Unknown Architecture Codes: A: Special Style, B: Common, C: Minor Alteration of "A" or "B", D: Larger Alteration, F: Remodel or Demolition

Historic Properties Survey: City of Burien

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
B10-09 Three Tree Point 654 None None	**Higgins House** 1919 Burien Sites 90 Non surveyed.	Unknown Russell Austin 16220 Maple Wild SW Burien 98166	Elliot Higgins was a pioneer Seattle car dealer. All the windows were cut from model T windshields. In 1934, Hotel owner Harry Gowman added extensive gardens.
B10-10 Seahurst 654 None None A U	**Jenks House** 1911 Weiss 94 Date is an estimate.	Cedar Crest For Sale in Oct. 94 14403 24 Ave SW Burien 98166	Built as summer residence for Jenks family. Log house built for trees on the property. The orginal summer residence cabin has been converted to a guest house. Information from Lois Collins-Mullarky, Real Estate Agent for John L. Scott. Grandson Ted Jenks alive in 1994.
B20-01 Burien 654 None None [illegible] A A	*Southgate Masonic Temple** 1920 Weiss 94 Excellent Condition. Could be 1939 date	Southgate Masonic Temple Southgate Mason Temple 1004 152 Street SW Burien 98166	Two Story, Neo Classical wood structure.
B20-02 Sunnydale 655 KC Files nra3 [illegible] D A	*Des Moines Memorial Way** 1922 Seattle Garden Club, Bld. KC Survey 78, Kennedy 89, Betzadrl 72, Eyler 72 The plantings have been reduced due to disease and destruction.	Des Moines Memorial Way Des Moines Way South Memorial Way, 96 to 231 S. Burien	War memorial of planted elm trees for WW1 Americans. Intended to go between Seattle & Tacoma. Historic Marker at Sunnydale School. Only memorial highway in USA.
B20-03 Three Tree Point 654 KC 0334 None [illegible] A B	*Belknap House** 1923 KC Survey 78, Eyler 72, Burien Sites 90 Excellent condition. Only minor alternations but with reduced grounds.	Klopfenstein House K.H. Klopfenstein 3750 Three Tree Point SW Burien 98166	One of the earliest permanent and most elegant homes built in the Three Tree Point Development, a summer resident development started in the early 1900s. Clark Belknap's lawsuit against his neighbors' subdivision went to the US Supreme Court.
B20-04 Five Corners 654 None Owner [illegible] B U	**Sofie House (temp)** 1923 Assessor 94 Unaltered, but abandoned.	Unknown Louis Sofie 16615 Ambaum Blvd South Burien 98168	House
B20-05 Cederhurst 655 None NRA [illegible] B U	**Benson Houses (temp)** 1924 Assessor 94 Two unaltered houses. Date is approximate.	Unknown Robert Benson 1239 136 Street South Burien 98168	Two craftsman style houses. KC Assessor record show 1944 date, but either the date is incorrect or the houses were moved.

Key to Categories Above

*Original Site Name

Historic Properties Survey: City of Burien

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
B20-06 Five Corners 655 None nra3 [illegible] B U	**Buckles House (temp)** 1926 Assessor 94 Unaltered	Unknown Arlene Buckles 826 176 Street South Burien 98168	Simple craftsman style, one and one-half story, side gable with porch.
B20-07 Sunnydale 655 KCLM nra3 [illegible] A A	*Highline High School** 1925 KC Survey Facade in excellent condition. Additions to rear and east.	Highline High School Highline School District 251 152 Street South Burien 98148	First major high school in Highline Area. Brick construction. Facade is a King County Landmark.
B20-08 Cederhurst 655 None NRA [illegible] B U	**Hubbard House (temp)** 1926 Assessor 94 Unaltered	Hubbard House Rose Hubbard 13811 Des Moines Way South Burien 98168	Very small "shack" house.
B20-09 Sunnydale 655 None NRA [illegible] B U	**McCann House (temp)** 1926 Assessor 94 Unaltered	McCann House Vera McCann 1219 140 Street South Burien 98168	One story, hipped roof, stucco house.
B20-10 Cederhurst 654 None None [illegible] B U	**Tingley House (temp)** 1926 Assessor 94 Unaltered, but check historic photos.	TingleyHouse Vera Tingley 13039 Occidental Ave South Burien 98168	Simple wooden folk house from the 1920s.
B20-11 Three Tree Point 654 None None [illegible] D U	**Hungerford House (Temp)** 1928 None Remodeling in 1980's with second story addition in original house style. Convincing job.	Anderson House The Andersons 17306 21 Ave SW Burien 98166	Normandy style house.
B20-12 Sunnydale 655 None nra3 [illegible] B U	**McInerny House (temp)** 1928 Assessor 94 Unaltered	Unknown Hugh McInerny 148 152 Street South Burien 98168	House

Key to Categories Above

*Original Site Name

Historic Properties Survey: City of Burien

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
B20-13 Cedarhurst 655 None NRA [illegible] B U	**Moe House (temp)** 1928 Assessor 94 Unaltered	Unknown Elsa Moe-Vittone 1228 129 Street South Burien 98168	One story, side gable, wooden house.
B20-14 Gregory Heights 654 None None [illegible] D C	**Osterman House #2** 1928 Hugo Osterman, Arch. Kholt 94 Good condition with later room addition to northside.	McShane House Lawrence & Shirley McShane 17210 Hillcrest Terrace Burien 98166	Designed by architect Hugo Osterman as one of the Osterman family houses on the bluff. Original home of Hugo and Mildred Osterman.
B20-15 Sunnydale 655 KCLM nra3 [illegible] B A	***Sunnydale School** 1928 KC Landmark, KC Survey 78, Balzarini 72, Eyler 72, Burien Sites 80 Excellent	Sunnydale School Highline School District 15631 8 Ave South Burien 98148	Original site, with newer 1928 school, of 1902-4 Sunnydale School that served all children from White Center to Des Moines. Original bronze school bell monument and marble monument to Des Moines Memorial Drive.
B20-16 Five Corners 655 None nra3 [illegible] A U	***YMCA House (temp)** 1928 Weiss 94 Excellent condition. Used by YMCA.	YMCA - Highline YMCA 17874 Des Moines Way South Burien 98148	Unusual, three story brick house from 1928. Could be unique Burien example.
B20-17 Sunnydale 655 None nra3 [illegible] B U	**Genzale House (temp)** 1929 Assessor 94 Unaltered, but check historic photos.	Genzale House Natalina Genzale 651 150 Street South Burien 98168	Very Nice craftsman style wooden house with some brick.
B20-18 Gregory Heights 654 None None [illegible] A C	***Osterman House #1** 1929 Henry Osterman, Arch. Kholt 94 Unaltered.	Aasness House Eric and Susan Aasness 17204 Hillcrest Terrace SW Burien 98166	Designed by architect Henry Osterman as one of the Osterman family houses on the bluff. Longtime owners were Hugo Osterman and Melba Davis. Well designed steep roofed wooden house.
B20-19 Seahurst 654 None None [illegible] C A	***St. Francis Church** 1929 Burien Sites 80 Good condition. Enclosed entrance and probably new stairs. Metal replacement windows, but OK.	St. Francis Church St. Francis Church 15236 21 Ave SW Burien 98166	First Catholic Church in Burien

Key to Categories Above (if field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives. WA State, King County Built to Site: None, NRA, nra(#) Date of Windshield Survey Development & Owner Codes, Architecture & History (see below)	***Original Site Name** Date of Construction Architect or Builder, if known References 1994 Condition of Site * Asterisk designates Map Number	1994 Site Name, if known 1994 Owner, if Recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A Important, B Rare Building, C Common, U Unknown Architecture Codes: A Special Style, B Common, C Minor Alteration of "A" or "B", D Larger Alteration, F: Remodel or Demolition

Historic Properties Survey: City of Burien

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
B20-20 Sunnydale 655 None nra3 [illegible] B U	**Wingstrand House (temp)** 1929 Assessor 94 Unaltered	Wingstrand House Brent & Luanne Winstrand 836 146 Street South Burien 98168	Brick and Wood House.
B30-01 Cedarhurst 655 None NRA [illegible] B B	**Goodau House (temp)** 1930 Assessor 94 Unaltered, but check historic photos.	Goodau House Clifford & Mary Goodau 1261 132 Street South Burien 98168	Steep roofed, "colonial" wooden house.
B30-02 Sunnydale 655 None nra3 [illegible] B U	**Lehman House (temp)** 1930 Assessor 94 Unaltered	Lehman House Violet Lehman 1019 146 Street South Burien 98168	Brick and wood, tudor style house.
B30-04 Sunnydale 656 None nra3 [illegible] B U	**Marlan House (temp)** 1930 Assessor 94 Unaltered but requires historic photo check.	Unknown Floyd Marlan 14636 4 Place South Burien 98168	House.
B30-05 Cedarhurst 655 None nra3 [illegible] B U	**Rosler House (temp)** 1930 Assessor 94 Unaltered	Rosler House Mark Rosler 13426 6 Ave South Burien 98168	One story, side gable, wooden house.
B30-06 Sunnydale 655 None nra3 [illegible] B U	**Dean House (temp)** 1931 Assessor 94 Unaltered.	Dean House Ira & Shelly Dean 14835 8 Ave South Burien 98166	One story, front gable, wooden house.
B30-07 Cedarhurst 655 None NRA [illegible] B U	**Olson House (temp)** 1933 Assessor 94 Unaltered	Olson House Rogneda Olson 13433 12 Ave South Burien 98166	One story, side gable, wooden house.
B30-08 Sunnydale 655 None nra3 [illegible] B U	**Wick House (temp)** 1933 Assessor 94 Unaltered	Unknown Jerry & Dorothy Wick 518 140 Street South Burien 98166	House

Key to Categories Above (if field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives. WA State, King County Built to Site: None, NRA, nra(#) Date of Windshield Survey Development & Owner Codes, Architecture & History (see below)	***Original Site Name** Date of Construction Architect or Builder, if known References 1994 Condition of Site * Asterisk designates Map Number	1994 Site Name, if known 1994 Owner, if Recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A Important, B Rare Building, C Common, U Unknown Architecture Codes: A Special Style, B Common, C Minor Alteration of "A" or "B", D Larger Alteration, F: Remodel or Demolition

214

Historic Properties Survey: City of Burien

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
B30-09 Seahurst 654 None None A U	*Duffy Estate 1934 Burien Sites 90 Not Surveyed	Duffy Estate Gilbert Duffy 2727 156 Street SW Burien 98166	Gilbert Duffy home was a showplace garden that opened to public tours in 1933.
B30-10 Sunnydale 655 None nra3 [illegible] D U	Edmonds House (temp) 1935 Weiss 94 Added and remodeled a few times	Edmonds/Walker House D. Edmonds & B Walker 639 160 Ave South Burien 98148	Very large house out of character with neighborhood. Must have interesting history.
B30-11 Burien 654 KC 0275 None [illegible] B B	*Highline Men's Progressive Club 1935 Volunteers from the Club KC Survey 79, Bolsard 72, Eyler 73 Good with asphalt singles on the roof and a new chimney.	The Log Hall Jenice Knutzen 15403 Ambaum Blvd SW Burien 98166	Volunteers built Club House for the Highline Men's Progressive Club. Built of peeled logs. The facility has been used by various organizations such as the volunteer fire department.
B30-12 Cedarhurst 655 None nra3 [illegible] B U	Carr House (temp) 1936 Assessor 94 Unaltered	Unknown Dorothy Carr 13218 8 Ave South Burien 98168	House
B30-14 Sunnydale 655 None NRA [illegible] B U	Eakins House (temp) 1936 Assessor 94 Unaltered, but check historic photos.	Eakins House Brian Eakins 14061 Des Moines Way South Burien 98168	One story, side gable, wooden house greater than 50 years old.
B30-15 Cedarhurst 655 None NRA [illegible] B U	Ferguson House (temp) 1936 Assessor 94 Unaltered	Ferguson House David Ferguson 13127 12 Ave South Burien 98168	Two story, gambrell roof, wooden house.
B30-16 Cedarhurst 655 None NRA [illegible] B U	Kretzschmar House (temp) 1936 Assessor 94 Unaltered	Kretzschmar House John & Barbara Kretzschmar 1243 136 Street South Burien 98168	Steep roofed, 1930s House.

Key to Categories Above (if field is empty, the other fields move up in each column)

Historic Property Survey Number / Neighborhood / Thomas Map Page Number / Other Historic Archives: WA State, King County / Sch. in Site, None, HRA, nra3 / Date of Windshield Survey / Codes: Architecture & History	*Original Site Name / Date of Construction / Architect or Builder, if known / References / 1994 Condition of Site / *Asterisk designates Map Number	1994 Site Name, if known / 1994 Owner, if Recorded / Street Address / City and Zip Code	Short Statement of Significance / History Codes: A Important, B Rare Building, C Common, U Unknown / Architecture Codes: A Special Style, B Common, C Minor Alteration of "A" or "B", D Larger Alteration, F Remodel or Demolition

214

Historic Properties Survey: City of Burien

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
B30-17 Sunnydale 655 None nra3 [illegible] B U	Lee House (temp) 1936 Assessor 94 Unaltered	Lee House Suk Joo & Hyonmi Lee 422 156 Street South Burien 98168	1936 House
B30-18 Sunnyside 655 None NRA [illegible] B U	Miller House (temp) 1936 Assessor 94 Unaltered	Miller House Gerald Miller 1220 136 Street South Burien 98168	Very nice house with special central gable entrance.
B30-19 Cedarhurst 654 None None [illegible] C B	Regan House (temp) 1936 Assessor 94 New windows.	Unknown Pamela Regan 13030 Occidental Ave South Burien 98168	Unusual wooden house form in a series of overlapping cubic volumes. Most likely folk house and shop, but resembles 1930s modernistic houses.
B30-20 Sunnydale 655 None nra3 [illegible] B U	Shaw House (temp) 1936 Assessor 94 Unaltered	Unknown Gordon & Linda Shaw 643 150 Street South Burien 98168	House
B30-21 Sunnydale 655 None nra3 [illegible] B U	Stackhouse House (temp) 1936 Assessor 94 Unaltered, but check photos for 1940's windows.	Unknown Rodney Stackhouse 623 160 Street South Burien 98168	House
B30-22 Cedarhurst 655 None NRA [illegible] B U	Burch House (temp) 1937 Assessor 94 Unaltered	Burch House Frieda House 1236 134 Street South Burien 98168	One story, side gable, wooden house with porch.
B30-23 Cedarhurst 654 None None [illegible] B U	Flygare House (temp) 1937 Assessor 94 Unaltered.	Flygare House Curtis & Robin Flygare 13004 First Ave South Burien 98168	Wooden house.
B30-24 Sunnydale 655 None nra3 [illegible] B U	Naud House (temp) 1937 Assessor 94 Unaltered	Unknown William & Mary Naud 1050 140 Street South Burien 98168	House

Key to Categories Above (if field is empty, the other fields move up in each column)

Historic Property Survey Number / Neighborhood / Thomas Map Page Number / Other Historic Archives: WA State, King County / Sch. in Site, None, HRA, nra3 / Date of Windshield Survey / Codes: Architecture & History (see below)	*Original Site Name / Date of Construction / Architect or Builder, if known / References / 1994 Condition of Site / *Asterisk designates Map Number	1994 Site Name, if known / 1994 Owner, if Recorded / Street Address / City and Zip Code	Short Statement of Significance / History Codes: A Important, B Rare Building, C Common, U Unknown / Architecture Codes: A Special Style, B Common, C Minor Alteration of "A" or "B", D Larger Alteration, F Remodel or Demolition

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
B30-25 Gregory Heights 654 None None [illegible] B C	**Osterman House #3** 1937 Hugo Osterman, Arch. [illegible] 94 Excellent Condition.	Crawford House Robert & Ella Crawford 17225 Hillcrest Terrace SW Burien 98166	Designed by architect Hugo Osterman as one of the Osterman family houses on the bluff. Original owner was Mildred Osterman's father.
B30-26 Cedarhurst 655 None None [illegible] B U	**Ingraham House (temp)** 1939 Assessor 94 Unaltered	Ingraham House Stephen Ingraham 13002 2 Ave South Burien 98166	One Story, hipped roofed wooden house.
B30-26 Cedarhurst 655 None None [illegible] B U	**Palmer House (temp)** 1937 Assessor 94 Unaltered	Palmer House Ralph Palmer 13413 2 Ave South Burien 98166	One story, side gable, wooden house.
B30-27 Cedarhurst 655 None nra3 [illegible] B U	**Tedrow House (temp)** 1937 Assessor 94 Unaltered with shutters.	Tedrow House Martha Tedrow 13233 10 Ave South Burien 98166	One story, side gable, wooden house.
B30-28 Cedarhurst 655 None NRA [illegible] B U	**Tumelson House (temp)** 1937 Assessor 94 Unaltered	Tumelson House Kelly Tumelson 13115 12 Ave South Burien 98166	One story, side gable, wooden house.
B30-29 Cedarhurst 655 None nra3 [illegible] B U	**Vanderhoof House (temp)** 1937 Assessor 94 Unaltered in poor condition.	Vanderhoof House Kay Vanderhoof 13431 3 Ave South Burien 98166	One story, side gable, wooden house.
B30-30 Five Corners 654 None None [illegible] B U	**Wagner House (temp)** 1937 Assessor 94 Unaltered	Unknown Gary Wagner 17226 Ambaum Blvd South Burien 98166	One and one-half story, 1930s steep roof style house.
B30-31 Cedarhurst 655 None nra3 [illegible] B U	**Bakken House (temp)** 1938 Assessor 94 Unaltered	Bakken House Thomas & Marjorie Bakken 826 136 Street South Burien 98166	House

Key to Categories Above (if field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives: WA State, King County Built to Site: Nara, NRA, nra3, Development & Owner Date of Windshield Survey — Codes: Architecture & History (see leftside)	*Original Site Name Date of Construction Architect or Builder, if known References 1994 Condition of Site * Asterisk designates Map Number	1994 Site Name, if known 1994 Owner, if Recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A: Important, B: Rare Building, C: Common, U: Unknown Architecture Codes: A: Special Style, B: Common, C: Minor Alteration of "A" or "B", D: Larger Alteration, F: Remodel or Demolition

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
B30-32 Cedarhurst 655 None nra3 [illegible] B U	**Droz House (temp)** 1938 Assessor 94 Unaltered	Droz House Gail Droz 13248 10 Ave South Burien 98168	One story, front gable, wooden house.
B30-33 Five Corners 654 None None [illegible] B U	**Merz House (temp)** 1938 Assessor 94 Unaltered	Merz House John Merz 17002 Ambaum Blvd South Burien 98166	House
B30-34 Sunnydale 656 None nra3 [illegible] A U	***Pollock House (temp)** 1938 Weiss 94 Excellent condition with asphalt parking lot for front yard.	Pollock Building Robert Pollock 654 152 Street South Burien 98148	Excellent and unique 1930's, double gabled house with decorative brick patterns. Used as commercial building in 1994.
B30-35 Sunnydale 656 None NRA [illegible] B U	**Anderson House (temp)** 1939 Assessor 94 Unaltered	Unknown Douglas Anderson 14811 Des Moines Way South Burien 98166	House greater than 50 years old:
B30-37 Five Corners 654 None None [illegible] B U	**Johannesen House (temp)** 1939 Assessor 94 Unaltered	Johannesen House Jacob Johannesen 16468 Ambaum Blvd South Burien 98166	House
B30-38 Cedarhurst 655 None NRA [illegible] B U	**Judkins House (temp)** 1939 Assessor 94 Unaltered	Unknown Leroy Judkins 1426 134 Street South Burien 98168	One story, side gable, wooden house.
B30-39 Cedarhurst 655 None nra3 [illegible] B U	**Lawler House (temp)** 1939 Assessor 94 Unaltered	Unknown Jack Lawler 812 136 Street South Burien 98168	House

Key to Categories Above (if field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives: WA State, King County Built to Site: Nara, NRA, nra3, Development & Owner Date of Windshield Survey — Codes: Architecture & History (see leftside)	*Original Site Name Date of Construction Architect or Builder, if known References 1994 Condition of Site * Asterisk designates Map Number	1994 Site Name, if known 1994 Owner, if Recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A: Important, B: Rare Building, C: Common, U: Unknown Architecture Codes: A: Special Style, B: Common, C: Minor Alteration of "A" or "B", D: Larger Alteration, F: Remodel or Demolition

Historic Properties Survey: City of Burien

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
B30-40 Cedarhurst 654 None None 9/15/94 B U	**Linder House (temp)** 1939 Assessor 94 Unaltered	Linder House Kenneth Linder 12855 Occidental Ave South Burien 98168	One story, "modest home", wooden, 1930-40s' builder's pattern house.
B30-41 Five Corners 654 None None 9/15/94 B U	**MacKenzie House (temp)** 1939 Assessor 94 Unaltered	MacKenzie House R. & E. MacKenzie 16920 Ambaum Blvd South Burien 98168	Brick, neo-colonial style.
B30-42 Sunnydale 655 None nra3 9/15/94 B U	**McCamish House (temp)** 1939 Assessor 94 Unaltered	McCamish House Kevin & Teresa McCamish 853 148 Street South Burien 98168	House
B30-43 Cedarhurst 654 None None 9/15/94 B U	**Rein House (temp)** 1939 Assessor 94 Unaltered	Unknown Robert & Barbara Rein 13026 First Ave South Burien 98168	Wooden House
B30-44 Cedarhurst 655 None NRA 9/15/94 B U	**Sullivan House (temp)** 1939 Assessor 94 Unaltered	Sullivan House Joe Sullivan 13615 Des Moines Way South Burien 98168	House
B40-01 Sunnydale 655 None nra3 9/15/94 B U	**Betz House (temp)** 1940 Assessor 94 Unaltered.	Betz House Terri Betz 13806 8 Ave South Burien 98168	House
B40-02 Cedarhurst 655 None nra3 9/15/94 B U	**Brunette House (temp)** 1940 Assessor 94 Unaltered	Brunette House Ruth Brunette 13456 4 Ave South Burien 98168	One story, side gable, wooden house.

Key to Categories Above (If field is empty, the other fields move up in each column)

Historic Property Survey Number
Neighborhood
Thomas Map Page Number
Other Historic Archives: WA State, King County
Elig. to Nat'l Register, NRA, nra
Date of Windshield Survey | Development & Owner Codes: Architecture & History (see infolds)

*Original Site Name
Date of Construction
Architect or Builder, if known
References
1994 Condition of Site
* Asterisk designates Map Number

1994 Site Name, if known
1994 Owner, if Recorded
Street Address
City and Zip Code

Short Statement of Significance
History Codes: A. Important, B. Rare Building, C. Common, U. Unknown
Architecture Codes: A. Special Style, B. Common, C. Minor Alteration of "A" or "B", D. Larger Alteration, F. Remodel or Demolition

Historic Properties Survey: City of Burien

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
B40-03 Cedarhurst 655 None nra3 9/15/94 B U	**Hagstrom House (temp)** 1940 Assessor 94 Unaltered	Hagstrom House Robert Hagstrom 13035 8 Ave South Burien 98168	House
B40-04 Cedarhurst 655 None NRA 9/15/94 B U	**More House (temp)** 1940 Assessor 94 Unaltered	More House Erma More 1415 129 Street South Burien 98168	One story, side gable, wooden house.
B40-05 Five Corners 655 None nra3 9/15/94 B U	**Voog House (temp)** 1940 Assessor 94 Unaltered	Voog House Ruth Lee Voog 16203 Des Moines Way South Burien 98168	House greater than 50 years old.
B40-06 Cedarhurst 654 None None 9/15/94 B U	**Weigel House (temp)** 1940 Assessor 94 Unaltered	Weigel House Phillip & Anne Weigel 12862 Occidental Ave South Burien 98168	One story, hipped roof, wooden, 1940's builder's pattern house.
B40-06 Cedarhurst 655 None NRA 9/15/94 B U	**Weston-Fox House (temp)** 1940 Assessor 94 Unaltered	Weston-Fox House Lola Weston-Fox 13227 12 Ave South Burien 98168	One story, front gable, concrete block house.
B40-08 Cedarhurst 655 None nra3 9/15/94 B U	**Coates House (temp)** 1941 Assessor 94 Unaltered	Unknown Richard & Mary Coates 13421 4 Ave South Burien 98168	One story, double gable, wooden house
B40-09 Cedarhurst 655 None NRA 9/15/94 B U	**Hubbard House #2 (temp)** 1941 Assessor 94 Unaltered	Unknown Robert Hubbert 13625 Des Moines Way South Burien 98168	House greater than 50 years old.

Key to Categories Above (If field is empty, the other fields move up in each column)

Historic Property Survey Number
Neighborhood
Thomas Map Page Number
Other Historic Archives: WA State, King County
Elig. to Nat'l Register, NRA, nra
Date of Windshield Survey | Development & Owner Codes: Architecture & History

*Original Site Name
Date of Construction
Architect or Builder, if known
References
1994 Condition of Site

1994 Site Name, if known
1994 Owner, if Recorded
Street Address
City and Zip Code

Short Statement of Significance
History Codes: A. Important, B. Rare Building, C. Common, U. Unknown
Architecture Codes: A. Special Style, B. Common, C. Minor Alteration of "A" or "B".

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
B40-10 Cedarhurst 654 None None [illegible] B U	**McEvoy House (temp)** 1941 Assessor 94 Unaltered.	McEvoy House Alice McEvoy 12833 First Ave South Burien 98168	Wooden, 1940s house.
B40-11 Five Corners 655 None nra3 [illegible] B U	**Monroe House (temp)** 1941 Assessor 94 Unaltered	Unknown Sylvia Monroe 18830 Des Moines Way South Burien 98168	House greater than 50 years old.
B40-12 Cedarhurst 654 None None [illegible] B U	**Radenbaugh House (temp)** 1941 Assessor 94 Unaltered	Radenbaugh House Amy Radenbaugh 13231 Occidental Ave South Burien 98168	One story, side gable, wooden, 1940's builder's pattern house.
B40-13 Cedarhurst 655 None NRA [illegible] B U	**Vittone House (temp)** 1941 Assessor 94 Unaltered	Unknown Else Moe-Vittone 1229 129 Street South Burien 98168	One story, side gable, wooden house.
B40-14 Cedarhurst 655 None nra3 [illegible] B U	**Colson House(temp)** 1942 Assessor 94 Unaltered in fair condition.	Unknown Kenneth Colson 12907 10 Ave South Burien 98168	One story house.
B40-15 Cedarhurst 655 None NRA [illegible] B U	**Davis House (temp)** 1942 Assessor 94 Unaltered.	Davis House Matthew & Carol Davis 13025 12 Ave South Burien 98168	One story, side gable, wooden house.
B40-16 Cedarhurst 655 None NRA [illegible] B U	**Dempsey House (temp)** 1942 Assessor 94 Unaltered	Dempsey House Brian Dempsey 13416 12 Ave South Burien 98168	One story, hipped roof, wooden house.

Key to Categories Above (if field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives: WA State, King County Built in Site: Here, NRA, nra3 Date of Windshield Survey / Codes: Architecture & History; Development & Owner	*Original Site Name Date of Construction Architect or Builder, if known References 1994 Condition of Site * Asterisk designates Map Number	1994 Site Name, if known 1994 Owner, if Recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A. Important, B. Rare Building, C. Common, U. Unknown Architecture Codes: A. Special Style, B. Common, C. Minor Alteration of "A" or "B", D. Larger Alteration, F. Remodel or Demolition

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
B40-17 Cedarhurst 655 None nra3 [illegible] B U	**Elkins House (temp)** 1942 Assessor 94 Unaltered	Unknown Lyal Elkins 12806 8 Ave South Burien 98168	One story, side gable, wooden house.
B40-18 Cedarhurst 655 None nra3 [illegible] B U	**Ernst House (temp)** 1942 Assessor 94 Unaltered	Ernst Home Carol Ernst & L. Sweany 13419 10 Ave South Burien 98168	Ranch like house.
B40-19 Cedarhurst 654 None None [illegible] B U	**Keenan House (temp)** 1942 Assessor 94 Unaltered	Keenan House Thomas & Doris Keenan 13007 Occidental Ave South Burien 98168	One story, side gable, wooden, 1940's builder's pattern house.
B40-20 Cedarhurst 655 None nra3 [illegible] B U	**Laurencio House (temp)** 1942 Assessor 94 Unaltered	Laurencio House Lee Laurencio & T. Web 13442 8 Ave South Burien 98168	One and one-half story, front gable, wooden house.
B40-21 Cedarhurst 655 None nra3 [illegible] B U	**Lombard House (temp)** 1942 Assessor 94 Unaltered	Lombard House Merl Lombard 13012 3 Ave South Burien 98168	One story, hipped roof, wooden house.
B40-22 Cedarhurst 655 None None [illegible] B U	**Lopez House (temp)** 1942 Assessor 94 Unaltered.	Lopez House Genevieve Lopez 13045 2 Ave South Burien 98168	One story, side gable, wooden house.
B40-23 Sunnydale 655 None nra3 [illegible] B U	**Magnuson House (temp)** 1942 Assessor 94 Excellent Condition	Magnuson House Paul Magnuson 13424 2nd Ave South Burien 98168	Unusual brick, hip roofed house with corner windows.
B40-24 Cedarhurst 654 None None [illegible] B U	**Moore Family House (temp)** 1942 Assessor 94 Unaltered	Unknown Moore Family Trust 12833 Occidental Ave South Burien 98168	One story, side gable, wooden 1940's builder's pattern house.

Key to Categories Above (if field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives: WA State, King County Built in Site: Here, NRA, nra3 Date of Windshield Survey / Codes: Architecture & History; Development & Owner	*Original Site Name Date of Construction Architect or Builder, if known References 1994 Condition of Site * Asterisk designates Map Number	1994 Site Name, if known 1994 Owner, if Recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A. Important, B. Rare Building, C. Common, U. Unknown Architecture Codes: A. Special Style, B. Common, C. Minor Alteration of "A" or "B", D. Larger Alteration, F. Remodel or Demolition

214

Historic Properties Survey: City of Burien

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
[illegible] Cedarhurst 655 None NRA [illegible] B U	**Ross House (temp)** 1942 Assessor 94 Unaltered	Ross House D L Ross 13015 Des Moines Way South Burien 98198	"Modest Home"
B40-28 Hazel Valley 654 None None [illegible] C C	**Subdivision '42, First Ave S** 1942 Assessor 94 Of the six houses, two are unaltered, three with minor alteration and one remodeled.	First Ave South Six Private Owners 13217 First Ave Sout Burien 98168	Subdivision of the westside of First Ave south with house numbers between 13217-49 between 132 & 133. Small wooden houses.
B40-27 Hazel Valley 654 None None [illegible] C A	**Subdivision '42, First & 2nd SW** 1942 Assessor 94 Of the 56 houses, 8 are unaltered, 34 with minor alterations, 13 with major alterations, two completely remodeled & 1 missed in the survey.	Chelsea Park Northeast Many Owners 13204 First Ave SW Burien 98168	56 Houses in the first wave of Chelsea Park type construction in 1942. These houses were built to house Boeing factory workers during the WWII and, with the Chelsea Park subdivision, may be the Seattle's "Levittown". Included are all houses on First SW with numbers between 13204-13455 and houses on the eastside of Second SW with even numbers between 13204-13454.
B40-26 Cedarhurst 655 None nra3 [illegible] B U	**Sweeney House (temp)** 1942 Assessor 94 Unaltered	Unknown Dena Sweeney 13017 3 Ave South Burien 98168	"Modest Home" wooden house.
B40-29 Cedarhurst 655 None nra3 [illegible] B U	**Thomas House (temp)** 1942 Assessor 94 Unaltered	Unknown Frank Thomas 13420 10 Ave South Burien 98168	One story, side gable, wooden house.

Key to Categories Above (If field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives WA State, King County Ask to Site, None, NRA, nra3; Development & Owner Date of Windshield Survey; Codes: Architecture & History	**Original Site Name** Date of Construction Architect or Builder, if known References 1994 Condition of Site	1994 Site Name, if known 1994 Owner, if Recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A Important, B Rare Building, C Common, U Unknown Architecture Codes: A Special Style, B Common, C Minor Alteration of "A" or "B"

214

Historic Properties Survey: City of Burien

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
B40-30 Cedarhurst 655 None NRA [illegible] B U	**Vorvell House (temp)** 1942 Assessor 94 Unaltered	Vorvell House Patricia Vorvell 1235 128 Street South Burien 98168	One story, hipped roof, wooden house.
B40-31 Cedarhurst 654 None None [illegible] B U	**Wallace House (temp)** 1942 Assessor 94 Unaltered.	Wallace House Ian Wallace & M. Mannery 12839 First Ave South Burien 98168	Wooden, 1940's House.
B40-32 Cedarhurst 655 None NRA [illegible] B U	**Wuesthoff House (temp)** 1942 Assessor 94 Unaltered	Wuesthoff House Mark& Julene Wuesthoff 1245 128 Street South Burien 98168	One story, side gable, wooden house.
B40-33 Cedarhurst 654 None nra3 [illegible] B U	**Anderson House (temp)** 1943 Assessor 94 Unaltered, but new door.	Anderson House T, P & P Anderson 12812 8 Ave South Burien 98168	House
B40-34 Cedarhurst 655 None NRA [illegible] B U	**Baxter House (temp)** 1943 Assessor 94 Unaltered	Baxter House 138 Street South 1047 138 Street South Burien 98168	House
B40-35 Cedarhurst 655 None nra3 [illegible] B U	**Campbell House (temp)** 1943 Assessor 94 Unaltered but check historic photos.	Campbell House Steven & Angela Campbell 13443 7 Ave South Burien 98168	House.
B40-36 Cedarhurst 656 None NRA [illegible] B U	**Gilmore House (temp)** 1943 Assessor 94 Unaltered	Unknown Michael Gilmore 12922 16 Ave South Burien 98168	One story, front gable, small wooden house.
B40-38 Cedarhurst 655 None nra3 [illegible] B U	**Kennedy House (temp)** 1943 Assessor 94 Unaltered	Kennedy House Thomas Kennedy 812 132 Street South Burien 98168	One story, front gable, wooden house.

Key to Categories Above (If field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives WA State, King County Ask to Site, None, NRA, nra3; Development & Owner Date of Windshield Survey; Codes: Architecture & History	**Original Site Name** Date of Construction Architect or Builder, if known References 1994 Condition of Site Assessor, Alterations Minor to major	1994 Site Name, if known 1994 Owner, if Recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A Important, B Rare Building, C Common, U Unknown Architecture Codes: A Special Style, B Common, C Minor Alteration of "A" or "B"

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
B40-39 Cedarhurst 655 None nra3 [8/18/94] B U	**Kuehl House (temp)** 1943 Assessor 94 Unaltered	Kuehl House Mary Kuehl 835 136 Street South Burien 98168	House
B40-40 Cedarhurst 655 None nra3 [8/18/94] B U	**Lohman House (temp)** 1943 Assessor 94 Unaltered	Unknown Fernando & Elvira Lohman 13207 6 Ave South Burien 98168	House
B40-41 Cedarhurst 655 None nra3 [8/18/94] B U	**Soper House (temp)** 1943 Assessor 94 Unaltered	Soper House Donald Soper 13431 7 Ave South Burien 98168	One story, front gable, wooden house.
B40-42 Cedarhurst 654 None None [8/18/94] B U	**Stokes House (temp)** 1943 Assessor 94 Unaltered	Stokes House Bette Stokes 12823 Occidental Ave South Burien 98168	Original, one story, side gable, wooden house in 1940s builder's pattern style.
B40-43 Chelsea Park 654 None None [8/18/94] B A	*****Subdivision '43 - Chelsea Park** 1943 Weiss 94, Assessor 94 Road layout and park intact. Of 332 homes, 75 are unaltered, 207 have replacement windows or new siding, 40 have minor additions and 11 are completely remodeled.	Chelsea Park 332 Homeowners 2 Ave to Ambaum south of 136 Burien 98146	Suburban development built during WW2 for house migration of workers for Boeing factories. The area is bounded by the south side of 136, the east side of Ambaum Way, both sides of 139 and bothsides of 1st SW. Other area to included in district count is north of 136 of 1st & 2nd SW. Area includes small park, elementary schools to north and south & business area at 136 & Ambaum.

Key to Categories Above (if field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives: WA State, King County Aid to Site: Nora, NRA, nra Development & Owner Date of Windshield Survey / Codes: Architecture & History	*Original Site Name Date of Construction Architect or Builder, if known References 1994 Condition of Site * Asterisk designates Map Number	1994 Site Name, if known 1994 Owner, if Recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A. Important, B. Rare Building, C. Common, U. Unknown Architecture Codes: A. Special Style, B. Common, C. Minor Alteration of "A" or "B", D. Larger Alteration, F. Remodel or Demolition

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
B40-44 Hazel Valley 654 None NRA [8/18/94] B U	**Subdivision '43, 128th South** 1943 Assessor 94 Of the six buildings, four are unaltered and two have replacement windows.	128 Street South Six Owners 1423 128 Street South Burien 98168	Six one story wooden houses on the south side of 128th Street South with odd house numbers between 1423-1449.
B40-45 Sunnydale 655 None nra3 [8/18/94] B U	**Thamert House (temp)** 1943 Assessor 94 Unaltered	Thamert House Skyler & Karen Thamert 604 150 Street South Burien 98168	One and one-half story, side gable, wooden house.
B40-46 Cedarhurst 655 None nra3 [8/18/94] B U	**Wines House (temp)** 1943 Assessor 94 Unaltered	Wines House Brett Wines 13426 8 Ave South Burien 98168	Nice House
B40-47 Sunnydale 655 None nra3 [8/18/94] B U	**Fleming House (temp)** 1944 Assessor 94 Unaltered	Unknown Margaret Fleming 14404 5 Ave South Burien 98168	House
B40-48 Sunnydale 655 None nra3 [8/18/94] B U	**Hart House (temp)** 1944 Assessor 94 Unaltered, but very poor condition	Hart House L. Hart & J. Johnson 839 140 Street South Burien 98168	House
B40-49 Sunnydale 655 None nra3 [8/18/94] B U	**Quesnell House (temp)** 1944 Assessor 94 Unaltered.	Quesnell House Edlee Quesnell 13700 8 Ave South Burien 98168	House
B40-50 Cedarhurst 655 None nra3 [8/18/94] A A	*****Subdivision '44 - 7th Ave S** 1944 Assessor 94 Of the 45 houses, 19 are original, 20 with window replacement and/or new siding, 4 have small additions and 2 have been completely remodeled. Excellent feeling.	7th Ave South 45 Owners 12804 7th Ave South Burien 98168	Intact street of 1944 homes built for WWII workers in Boeing factories. 45 wooden houses in hip roof or side gable plan. Street ends at south with 1954 elementary school in the pattern recommended in the 1952 Highline Community Development Plan.

Key to Categories Above (if field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives: WA State, King County Aid to Site: Nora, NRA, nra Development & Owner Date of Windshield Survey / Codes: Architecture & History	*Original Site Name Date of Construction Architect or Builder, if known References 1994 Condition of Site * Asterisk designates Map Number	1994 Site Name, if known 1994 Owner, if Recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A. Important, B. Rare Building, C. Common, U. Unknown Architecture Codes: A. Special Style, B. Common, C. Minor Alteration of "A" or "B", D. Larger Alteration, F. Remodel or Demolition

Historic Properties Survey: City of Burien

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
B40-51 Hazel Valley 654 None Owner [illegible] A A	*Hazel Valley Elementary 1947 Assessor 94 Good condition. May have additions. Planned demolition in 1994 if school bond passes.	Hazel Valley Elementary School Highline School District 402 132 Street SW Burien 98146	The first post WWII suburban elementary school in Burien. Built under national post WWII suburban planning ideas developed by Clarence Perry. The neighborhood unit has an elementary school in the middle of detached family homes [illegible] at the perimeter. R-7-9
B40-52 Sunnydale 655 None nra3 [illegible] A U	*Pacific Telephone Building 1948 Assessor 94 Excellent exterior condition.	US West Building US West 14605 8th Ave South Burien 98168	Excellent architectural example of 1940's commercial structure. Four story, brick construction with decorative ceramic lintels. Unique example in Burien.
B40-53 Sunnydale 655 None None U A	Fire District #2 Station 1949 Kennedy 89 Not Surveyed	Burien Fire Station 15100 8 Ave South Burien	First fire district in SW King County and oldest existing station.
B40-54 Chelsea Park 654 None None [illegible] B B	*Glendale Lutheran Church 1949 Assessor 94 Sanctuary in original condition with major additions to north.	Glendale Evangelical Lutheran Church Same 13405 2nd Ave SW Burien 98146	One of the original post-WWII churches in Burien. Later new sanctuary addition designed by architect Robert Theriault. (Stenhart, Theriault, Andersen Architects)
B40-55 Chelsea Park 654 None None [illegible] C B	Burien Gardens (temp) 1948 Weiss 94 Unknown. Still wooden structure from period.	Burien Gardens Janice Wahlbrink 13601 Ambaum Blvd. SW Burien 98166	Only remaining "shopping center" built for post-WWII suburban development in Burien. Combined with other gas stations and other retail at 136 and Ambaum, the intersection provided neighborhood services to Chelsea Park and Seahurst Village matching post-WWII planning ideas of service on the arterials.
B40-56 Chelsea Park 654 None None [illegible] C U	Seahurst Village 1948 Weiss 94 New vinal siding and shutters throughout, with sporadic window replacement	Seahurst Village Apartments Mararisk, Inc. 13606 12 Ave SW Burien 98166	Large scale apartment complex development built after WWII. Very usual for time period of massive construction of single-family houses.

Key to Categories Above (If field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives: WA State, King County Risk to Site: None, HRA, nra3, Development & Owner Date of Windshield Survey | Codes: Architecture & History	*Original Site Name Date of Construction Architect or Builder, if known References 1994 Condition of Site * Asterisk designates Map Number	1994 Site Name, if Known 1994 Owner, if Recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A: Important, B: Rare Building, C: Common, U: Unknown Architecture Codes: A: Special Style, B: Common, C: Minor Alteration of "A" or "B", D: Larger Alteration, F: Remodel or Demolition

Historic Properties Survey: City of Burien

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
B50-01 Chelsea Park 654 None None 9/15/94 B B	*Community Family (temp) 1950 Assessor 94 Unaltered.	Community Family Practice Community Family Practice 13624 First Ave South Burien 98168	Rare remaining, unaltered commercial building from the early 1950s. One story, flat roofed, metal structure with glass and brick infill.
B50-02 Sunnydale 655 None nra3 9/15/94 A U	*Deroin House 1950 Weiss 94 Excellent condition with one roll down exterior security metal grate.	Deroin House Hurley Deroin 505 150 Street South Burien 98168	Unique to Burien, International style house in original condition. Long, flat roofed house in stucco. According to owners, the house was published in Sunset Magazine in the early 1950s.
B50-03 Three Tree Point 654 None None 8/30/94 A U	*Dearborn House 1951 Robert Massar, Arch. Steinbrueck 53 Original condition except new building between house and water. Under repair in August 94	Unknown Unknown 16765 Maplewild Drive SW Burien 98166	Designed by architect, Robert Massar. House was included in top 100 Seattle area buildings tour for 1953 National American Institute of Architects' convention.
B50-04 Gregory Heights 654 None None 9/15/94 B U	*Subdivision '51 - 18 Ave SW 1951 Assessor 94 Of the 16 buildings of the west side, 15 are original and one has been remodeled.	Unknown Unknown 15607 18th Ave SW Burien 98166	Intact 1951 wooden ranch home development of west side of street. East side is a mixed developement from the 1950s is excellent condition.
B50-05 Gregory Heights 654 None None 9/15/94 B U	*Subdivision '52 - 22 Ave SW 1952 Assessor 94 All 12 houses on 22nd are original. Of the 9 houses on 169th, five are original, two with new windows, one with an addition and one completely remodeled but hidden from view.	Unknown Unknown 16901 22nd Ave SW Burien 98166	1952 ranch house developement on both sides of 22nd Ave SW and 169th Street SW. Excellent feeling.
B50-06 Burien 654 None None 9/15/94 B U	*Subdivision '52 - 7th Ave SW 1952 Assessor 94 All 16 buildings in original condition.	Unknown Unknown 14612 7th Ave SW Burien 98166	Excellent condition 1952 ranch houses located one block from Burien Library, Art Gallery and City Hall. Addresses are 14612 -14655 7th Ave SW on both side of street.
B50-07 Cedarhurst 655 None nra3 9/15/94 A B	*Cedarhurst Elementary 1954 Weiss 94 Excellent condition.	Cedarhurst Elementary School Highline School District 611 132 Street South Burien 98168	Excellent architectural design for early 1950's school. Part of suburban ideals with elementary school in the center of a residential area. 1944 Subdivision on 7th Ave South completes historic understanding.
B50-08 Chelsea Park 654 None None 9/15/94 A B	*Chelsea Park Elementary 1954 Assessor 94 Good condition. No longer an elementary school.	Unknown King County 417 142 Street SW Burien 98146	Part of post-WWII elementary school plan for Highline School District of school in the center of neighborhood. Very interesting architectural design if orginal.

Key to Categories Above (If field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives: WA State, King County Risk to Site: None, HRA, nra3, Development & Owner Date of Windshield Survey | Codes: Architecture & History	*Original Site Name Date of Construction Architect or Builder, if known References 1994 Condition of Site * Asterisk designates Map Number	1994 Site Name, if Known 1994 Owner, if Recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A: Important, B: Rare Building, C: Common, U: Unknown Architecture Codes: A: Special Style, B: Common, C: Minor Alteration of "A" or "B", D: Larger Alteration, F: Remodel or Demolition

214

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
B50-09 Gregory Heights 654 None None [illegible] B U	*Subdivision '54 - 13 Ave SW 1954 Assessor 94 Of the 11 houses, 9 are original and two in hidden locations have minor modifications.	Unknown Unknown 16703 13th Ave SW Burien 98168	Contemporary ranch house design with clearstory in the gable between the large roof beams. Excellent, but crowded houses.
B50-10 Hazel Valley 654 None None [illegible] B U	*Subdivision '54 - SW 133rd 1954 Assessor 94 Of the 16 houses, 13 are original, 2 with enclosed garage or carport, and one at end of street was remodeled in 1980s. Excellent landscape feeling.	Unknown Unknown 614 133 Street SW Burien 98146	Excellent condition 1954 ranch house development on both sides of street. House numbers from 614 to 656 on SW 133 Street.
B60-11 Burien 654 None None [illegible] B A	*St. Elizabeth Episcopal Church 1965 Weiss 94 Excellent with new asphalt shinglesc on Sanbuary. Date is approximate.	St. Elizabeth St. Elizabeth 1005 152 Street SW Burien 98168	
B60-12 Gregory Heights 654 None Owner [illegible] A U	Cumminge House (temp) 1959 Ira E. Cummings, Arch Weiss 94 Excellent condition.	Unknown Unknown 16769 Marine View Drive SW Burien 98168	Unique modern house with round living area and curving brick/stone walls.
B60-01 Gregory Heights 654 None None [illegible] A U	Bartholomew House 1960 A.O. Bumgardner, Arch. SAM Tour 63, Highline Times in 94. Excellent Condition. No Changes.	Bartholomew House Chester Bartholomew 16256 25 Ave. SW Burien 98168	Designed by A.O. Bumgardner. Seattle Art Museum Tour of 1963. Built by Chester Bartholomew. Seattle Times house of the month in 1960 and House of the Decade in 1994.
B60-02 Sunnydale 655 None NRA [illegible] B U	Burien Seventh Day Adventist 1960 Assessor 94 Unaltered. Date is estimate.	7th Day Adventist Church Unknown 14237 Des Moines Way South Burien 98168	Good modern designed church from 1960s.
B60-03 Chelsea Park 654 None None [illegible] A A	Church of Latter-day Saints 1960 Weiss 94 Excellent condition. Date is estimate.	Morman Church Latter-day Saints 14200 Ambaum Way SW Burien 98146	Interesting late, Frank Lloyd Wright studio design style.

Key to Categories Above (if field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives WA State, King County Built to Std: None, NRA, nra3 Development & Owner Date of Windshield Survey Codes: Architecture & History (see inside)	*Original Site Name Date of Construction Architect or Builder, if known References 1994 Condition of Site * Asterisk designates Map Number	1994 Site Name, if Known 1994 Owner, if Recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A. Important, B. Rare Building, C. Common, U. Unknown Architecture Codes: A. Special Style, B. Common, C. Minor Alteration of "A" or "B", D. Larger Alteration, F. Remodel or Demolition

214

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
B60-04 Gregory Heights 654 None None [illegible] A U	Graham House 1962 A.O. Bumgardner, Arch. SAM Tour 63 Excellent Condition. Basement finished by recent owners.	Unknown Unknown 16222 25 Ave SW Burien 98166	Designed by A.O. Bumgardner for Thomas Graham. Seattle Art Museum Tour of 1963.
B60-08 Gregory Heights 654 None None [illegible] A U	Clark House 1962 Elizabeth Ayer, Arch. SAM Tour 63 Excellent Conditoin	Unknown Unknown 2205 170 Street SW Burien 98166	Designed by Elizabeth Ayer. Seattle Art Museum Tour of 1963. Orginal owner was Harry Clark.
B99-01 Sunnydale 655 None nra3 [illegible] A U	*Brick Commercial (temp) Assessor 94 Excellent condition.	Unknown Unknown 658 152 Street South Burien 98168	Unique front gable, brick masonry building currently under commercial use. Date unknown, but could have been built in 1920-1960.
B99-02 Seahurst 654 None None [illegible] C A	*Seahurst Park Development Gardner & Gardner, Eng. Balzarini 72. All roads intact, two small connecting roads unbuilt. Wide variety of houses, but at consistent size and lot coverage to original plan.	Seahurst City of Burien 152 SW to 144 SW east of 16 Ave SW Burien 98	Road layout by the Same engineers Gardner and Gardner that engineered Normandy Park. Design matches Bebb and Gould ideas of grid that "naturalizes" near the water.

Key to Categories Above (if field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives WA State, King County Built to Std: None, NRA, nra3 Development & Owner Date of Windshield Survey Codes: Architecture & History (see inside)	*Original Site Name Date of Construction Architect or Builder, if known References 1994 Condition of Site * Asterisk designates Map Number	1994 Site Name, if Known 1994 Owner, if Recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A. Important, B. Rare Building, C. Common, U. Unknown Architecture Codes: A. Special Style, B. Common, C. Minor Alteration of "A" or "B", D. Larger Alteration, F. Remodel or Demolition

CITY OF DES MOINES

HISTORIC PROPERTIES SURVEY

Sails With Pride

July, 1995

Attachment to City of Des Moines Ordinance No. 1124
Prepared by Glenn Weiss for
the City of Des Moines

Introduction

The 1995 Des Moines Historic Properties Survey was developed to be as broad as possible and to identify all potentially valuable historic properties I the City of Des Moines.

Except in unusual circumstances, a structure should be at least 50 years old to be eligible for listing in the National register of Historic Places. In light of this criteria, all pre-1945 buildings were surveyed in August and September, 1994. Pre-1955 buildings of significance were also surveyed. To the extent possible, the survey also reflects whether potentially significant properties have been altered from their original form. Although some properties have undergone substantial alterations, they may constitute a unique and important resource.

Survey Methodology

The first survey step was the reading of all available histories of the city of Des Moines, and recording a list of sites in those texts. Other sites were identified through the King County Landmarks Commission's 1979 Survey of King County Historic Properties, through private discussions with local historians, and by contacting prominent architects regarding past work in the study area.

A windshield survey of these properties was conducted. Each building was judged to fall in one of five categories based on the front elevation only and without checking historic photographic records.

TABLE OF CONTENTS

HISTORICAL AND ARCHEOLOGICAL PROPERTIES OF LOCAL SIGNIFICANCE

Updated July 24, 1995

City of Des Moines
Historic and Archeological Properties of Local Significance

File Number: D00-04

Historic Name: Latimer House — **Common Name:** Old Gay House — **Current Owner Name:** Jacque Mason

Site Address: 21616 | 7 Place South — **Neighborhood:** Des Moines — ***Historic Significance:** Important

Year Constructed: 1890 — **Architect/Engineer/Builder:** — ***Architecture Significance:** Special Style

Other Historic Archives: KC 0458 — **Recommended By:** KC Survey 78, Kennedy 89, Draper 75

Current Status: Minor alterations & in fai — ***Risk to Status:** nra3 — **Map Designation:** *

Notes: Late 19th century Victorian structure that may have been built by Capt. Robert Flynn, one of the original homestead claims in Des Moines. The Latimers and Gays were active citizens.

Thomas Map Page No#: 685

Field Inspection Date: 8/30/94

File Number: D00-05

Historic Name: Draper Print Shop — **Common Name:** Langston House — **Current Owner Name:** Jim Langston

Site Address: 600 | 220 Street South — **Neighborhood:** Des Moines — ***Historic Significance:** Important

Year Constructed: 1900 — **Architect/Engineer/Builder:** — ***Architecture Significance:** Special Style

Other Historic Archives: None — **Recommended By:** Draper 94, Kennedy 89

Current Status: Good condition with a se — ***Risk to Status:** nra3 — **Map Designation:** *

Notes: Print shop for literature, posters and information about the Children's Industrial Home and other writings. The adjacent Home building has been demolished.

Thomas Map Page No#: 685

Field Inspection Date: 8/30/94

214

*Historic Codes: A=Important, B=Rare Building, C=Common, U=Unknown
Architecture Codes: A=Special Style, B=Common, C=Minor Alteration of "A" or "B", D=Larger Alteration, R=Remodel or Demolition
Risk Codes: None, NRA, nra3, Development -Owner

1621

City of Des Moines
Historic and Archeological Properties of Local Significance

File Number: D00-00

Historic Name: Archeological Sites — **Common Name:** Shell Middens — **Current Owner Name:** NA

Site Address: | Not Publicly Accessible — **Neighborhood:** Not Publicly Accessible — ***Historic Significance:** Important

Year Constructed: — **Architect/Engineer/Builder:** — ***Architecture Significance:** Special Style

Other Historic Archives: WA Arch. — **Recommended By:** WA Arch

Current Status: Not Publicly Accessible — ***Risk to Status:** U — **Map Designation:**

Notes: See Washington State Office of Archeology for information on Native American Sites.

Thomas Map Page No#: 684

Field Inspection Date:

File Number: D00-02

Historic Name: Cheney House — **Common Name:** Gracy House — **Current Owner Name:** William Gracy

Site Address: 1255 | 216 Street South — **Neighborhood:** Des Moines — ***Historic Significance:** Important

Year Constructed: 1890 — **Architect/Engineer/Builder:** Cheney, Bld. — ***Architecture Significance:** Special Style

Other Historic Archives: KC 0466 — **Recommended By:** KC Survey 78, Kennedy 89, Draper 75

Current Status: Extensively remodeled. — ***Risk to Status:** NRA — **Map Designation:** *

Notes: One of the earliest remaining houses built by one of earliest pioneer families to Des Moines. The Cheneys organized the Des Moines Methodist Church & Ladies Aid Society in 1891.

Thomas Map Page No#: 685

Field Inspection Date: 8/30/94

214

*Historic Codes: A=Important, B=Rare Building, C=Common, U=Unknown
Architecture Codes: A=Special Style, B=Common, C=Minor Alteration of "A" or "B", D=Larger Alteration, R=Remodel or Demolition
Risk Codes: None, NRA, nra3, Development -Owner

City of Des Moines
Historic and Archeological Properties of Local Significance

File Number: D00-10
Historic Name: Fennell / Dickerson House
Common Name: **Demolished or Moved**
Current Owner Name: Unknown
Site Address: 22514 6 Ave South
Neighborhood: Des Moines
***Historic Significance:** Important
Year Constructed: 1906
Architect/Engineer/Builder:
***Architecture Significance:** Special Style
Other Historic Archives: KC 0459
Recommended By: KC Survey 78, Kennedy 89, Draper 75
Current Status: No longer at Site. Build
***Risk to Status:** nra3
Map Designation:
Notes: Fennells were very early settlers in 1880's. House built next to first Des Moines post office where Nettie Fennell Dickinson became to first Postmistress in 1906.
Thomas Map Page No#: 685
Field Inspection Date: 8/19/94

File Number: D00-11
Historic Name: Case House
Common Name: Cunningham House
Current Owner Name: Marion Cunningham
Site Address: 22006 10 Ave South
Neighborhood: Des Moines
***Historic Significance:** Important
Year Constructed: 1907
Architect/Engineer/Builder: Rollin Case, Bld.
***Architecture Significance:** Special Style
Other Historic Archives: KC 0461
Recommended By: KC Survey 78, Kennedy 89, Draper 75
Current Status: Unaltered except for plat
***Risk to Status:** NRA
Map Designation: *
Notes: Rollin Case moved to Des Moines in 1896 and formed the Case Land Company. He became a famous promoter of Real Estate in Des Moines. He built the house after returning from the Alaska Gold Rush. Marion Cunningham is Case's Daughter.
Thomas Map Page No#: 685
Field Inspection Date: 8/30/94

214

July 24, 1995

*Historic Codes: A=Important, B=Rare Building, C=Common, U=Unknown
Architecture Codes: A=Special Style, B=Common, C=Minor Alteration of "A" or "B", D=Larger Alteration, R=Remodel or Demolition
Risk Codes: None, NRA, nra3, Development -Owner

1622

City of Des Moines
Historic and Archeological Properties of Local Significance

File Number: D00-07
Historic Name: Vesser's Blacksmith Shop
Common Name: Ingles House
Current Owner Name: Kenneth Ingles
Site Address: 21216 Des Moines Memorial Dr.
Neighborhood: Northhill
***Historic Significance:** Important
Year Constructed: 1900
Architect/Engineer/Builder:
***Architecture Significance:** Special Style
Other Historic Archives: None
Recommended By: Kennedy 89, Draper 94
Current Status: Moved in 1942 and reno
***Risk to Status:** NRA
Map Designation: *
Notes: Original blacksmith and carriage repair business in Des Moines. Two story, side gable with simple porches on east and west.
Thomas Map Page No#: 685
Field Inspection Date: 8/30/94

File Number: D00-08
Historic Name: Engquist Home
Common Name: Hatfield House
Current Owner Name: Karen Hatfield
Site Address: 21434 13 Ave South
Neighborhood: Des Moines
***Historic Significance:** Important
Year Constructed: 1904
Architect/Engineer/Builder:
***Architecture Significance:** Special Style
Other Historic Archives: None
Recommended By: Kennedy 89
Current Status: Remodeled in 1940s wit
***Risk to Status:** NRA
Map Designation: *
Notes: Built mill on Des Moines Creek. 120 acre farm with dairy and vegetables. Large two story, side gable, wooden house.
Thomas Map Page No#: 685
Field Inspection Date: 8/30/94

214

July 24, 1995

*Historic Codes: A=Important, B=Rare Building, C=Common, U=Unknown
Architecture Codes: A=Special Style, B=Common, C=Minor Alteration of "A" or "B", D=Larger Alteration, R=Remodel or Demolition
Risk Codes: None, NRA, nra3, Development -Owner

City of Des Moines
Historic and Archeological Properties of Local Significance

File Number: D00-14

Historic Name: Commons Home | **Common Name:** Scott Home | **Current Owner Name:** Preston Scott

Site Address: 23427 Marine View Drive South | **Neighborhood:** Zenith | ***Historic Significance:** Important

Year Constructed: 1908 | **Architect/Engineer/Builder:** | ***Architecture Significance:** Special Style

Other Historic Archives: None | **Recommended By:** Draper 94

Current Status: Wings added south and | ***Risk to Status:** nra3 | **Map Designation:**

Notes: Commons was a civil war veteran. Folk, pyramid house.

Thomas Map Page No#: 715

Field Inspection Date: 8/30/94

File Number: D00-15

Historic Name: Elsner House | **Common Name:** Unknown | **Current Owner Name:** Richard Nelson

Site Address: 1217 240 Ave South | **Neighborhood:** Zenith | ***Historic Significance:** Important

Year Constructed: 1908 | **Architect/Engineer/Builder:** | ***Architecture Significance:** Special Style

Other Historic Archives: None | **Recommended By:** Draper 94, Kennedy 89

Current Status: Exterior Original. Moved | ***Risk to Status:** NRA | **Map Designation:**

Notes: Original Max Elsner home that was moved from site of Masonic Home in 1925. Max Elsner grew vegetables and flowers in greenhouse for market in Seattle.

Thomas Map Page No#: 715

Field Inspection Date: 8/30/94

214

*Historic Codes: A=Important, B=Rare Building, C=Common, U=Unknown
Architecture Codes: A=Special Style, B=Common, C=Minor Alteration of "A" or "B", D=Larger Alteration, R=Remodel or Demolition
Risk Codes: None, NRA, nra3, Development -Owner

1623

City of Des Moines
Historic and Archeological Properties of Local Significance

File Number: D00-12

Historic Name: Elsner Greenhouses | **Common Name:** Zenith Holland Nursery | **Current Owner Name:** Lyn Fraser

Site Address: 23269 Marine View Drive S | **Neighborhood:** Zenith | ***Historic Significance:** Important

Year Constructed: 1907 | **Architect/Engineer/Builder:** | ***Architecture Significance:** Special Style

Other Historic Archives: None | **Recommended By:** Kennedy 89

Current Status: Same location after mov | ***Risk to Status:** nra3 | **Map Designation:**

Notes: Longest continuous business in Des Moines. Founded in 1907 by Max Elsner with greenhouses on the current Masonic Home property. The business was moved to current site in the 1920's.

Thomas Map Page No#: 685

Field Inspection Date: 8/30/94

File Number: D00-13

Historic Name: Bisbee House (temp) | **Common Name:** Meche House | **Current Owner Name:** Mitchell Meche

Site Address: 1917 240 Ave South | **Neighborhood:** Zenith | ***Historic Significance:** Important

Year Constructed: 1900 | **Architect/Engineer/Builder:** | ***Architecture Significance:** Special Style

Other Historic Archives: None | **Recommended By:** Draper 94

Current Status: Good Condition. New ro | ***Risk to Status:** NRA | **Map Designation:**

Notes: Older house in area. Folk, pyramid roof style.

Thomas Map Page No#: 715

Field Inspection Date: 8/30/94

214

*Historic Codes: A=Important, B=Rare Building, C=Common, U=Unknown
Architecture Codes: A=Special Style, B=Common, C=Minor Alteration of "A" or "B", D=Larger Alteration, R=Remodel or Demolition
Risk Codes: None, NRA, nra3, Development -Owner

City of Des Moines
Historic and Archeological Properties of Local Significance

Field	Value	Field	Value	Field	Value
File Number:	D10-03				
Historic Name:	Commercial Club Hall	Common Name:	Des Moines Odd Fellows H	Current Owner Name:	Des Moines IOOF Lodge
Site Address:	22342 7 Ave South	Neighborhood:	Des Moines	*Historic Significance:	Important
Year Constructed:	1912	Architect/Engineer/Builder:	Momben, Bld.	*Architecture Significance:	Special Style
Other Historic Archives:	KC 0456	Recommended By:	KC Survey 78, Kennedy 89, Draper 75		
Current Status:	Original shape and wind	*Risk to Status:	nra3	Map Designation:	*
Notes:	Originally constructed as Community Club Hall as outgrowth of the Booster's Club, founded in1907. The Odd Fellows Lodge #305 used the hall since 1912 and purchased it in 1919. The building has also served as an elementary school in1925 and the fire house between 1947-71	Thomas Map Page No#:	685	Field Inspection Date:	8/30/94

Field	Value	Field	Value	Field	Value
File Number:	D10-04				
Historic Name:	Baum (Fisher) House	Common Name:	Cunningham House	Current Owner Name:	Margaret and John Cunnin
Site Address:	23207 Marine View Drive S	Neighborhood:	Zenith	*Historic Significance:	Important
Year Constructed:	1913	Architect/Engineer/Builder:		*Architecture Significance:	Special Style
Other Historic Archives:	None	Recommended By:	Kennedy 89		
Current Status:	Good condition. Unimo	*Risk to Status:	nra3	Map Designation:	*
Notes:	According to M. Draper, built by the Baum family and then sold to Oliver David Fisher in 1929. One of the post WW1 summer homes. Fishers (KC0460) had several houses in area.	Thomas Map Page No#:	685	Field Inspection Date:	8/30/94

214

July 24, 1995

*Historic Codes: A=Important, B=Rare Building, C=Common, U=Unknown
Architecture Codes: A=Special Style, B=Common, C=Minor Alteration of "A" or "B",
D=Larger Alteration, R=Remodel or Demolition
Risk Codes: None, NRA, nra3, Development -Owner

1624

City of Des Moines
Historic and Archeological Properties of Local Significance

Field	Value	Field	Value	Field	Value
File Number:	D00-16				
Historic Name:	Wilson Hotel	Common Name:	Granberg House	Current Owner Name:	Alan Granberg
Site Address:	603 240 Street South	Neighborhood:	Zenith	*Historic Significance:	Important
Year Constructed:	1908	Architect/Engineer/Builder:		*Architecture Significance:	Special Style
Other Historic Archives:	None	Recommended By:	Kennedy 89, Draper 94		
Current Status:	Excellent condition insic	*Risk to Status:	nra3	Map Designation:	*
Notes:	Site of the original resort hotels on the waterfront. House most likely a later construction in similar style.	Thomas Map Page No#:	715	Field Inspection Date:	8/30/94

Field	Value	Field	Value	Field	Value
File Number:	D10-00				
Historic Name:	Elsey House	Common Name:	Loutzkin House	Current Owner Name:	Michael Loutzkin
Site Address:	921 223 Street South	Neighborhood:	Des Moines	*Historic Significance:	Important
Year Constructed:	1911	Architect/Engineer/Builder:	William Elsey, Bld.	*Architecture Significance:	Special Style
Other Historic Archives:	KC 0460	Recommended By:	KC Survey 78, Kennedy 89, Draper 75		
Current Status:	Original shape. Window	*Risk to Status:	nra3	Map Designation:	*
Notes:	William Elsey was a member of the Elsey family that was one of the first homesteaders in Duwamish. His brother, John, purchased a sawmill in Des Moines and the remaining town plat in 1896.	Thomas Map Page No#:	685	Field Inspection Date:	8/30/94

214

July 24, 1995

*Historic Codes: A=Important, B=Rare Building, C=Common, U=Unknown
Architecture Codes: A=Special Style, B=Common, C=Minor Alteration of "A" or "B",
D=Larger Alteration, R=Remodel or Demolition
Risk Codes: None, NRA, nra3, Development -Owner

City of Des Moines
Historic and Archeological Properties of Local Significance

File Number: D10-08

Historic Name: Walworth House | Common Name: Schaeffer House | Current Owner Name: Bonnie Schaeffer

Site Address: 1104 | 22D Street South | Neighborhood: Des Moines | *Historic Significance: Important

Year Constructed: 1916 | Architect/Engineer/Builder: | *Architecture Significance: Special Style

Other Historic Archives: KC 0463 | Recommended By: KC Survey 78, Dasper 94

Current Status: Excellent Condition. Un | *Risk to Status: NRA | Map Designation: *

Notes: Large, craftsman style, two story farmhouse.

Thomas Map Page No#: 685

Field Inspection Date: 8/30/94

File Number: D10-11

Historic Name: Bauman House | Common Name: Ramsey House | Current Owner Name: Hank Ramsey

Site Address: 23235 | 10th Ave South | Neighborhood: Zenith | *Historic Significance: Important

Year Constructed: 1918 | Architect/Engineer/Builder: | *Architecture Significance: Special Style

Other Historic Archives: None | Recommended By: Kennedy 89

Current Status: Good Condition. House | *Risk to Status: NRA | Map Designation: *

Notes: House for Lewis Bauman, owner of Centennial Mills. Craftsman style, two story front gable house.

Thomas Map Page No#: 685

Field Inspection Date: 9/6/94

1625

City of Des Moines
Historic and Archeological Properties of Local Significance

File Number: D10-05

Historic Name: Ault House (camp) | Common Name: Ault House | Current Owner Name: Ault and Steier

Site Address: 20932 | First Ave South | Neighborhood: Northhill | *Historic Significance: Important

Year Constructed: 1914 | Architect/Engineer/Builder: | *Architecture Significance: Special Style

Other Historic Archives: None | Recommended By: Assessor 94

Current Status: Poor condition. Uninhabit | *Risk to Status: nra3 | Map Designation:

Notes: One story, wooden, front gable house

Thomas Map Page No#: 684

Field Inspection Date: 9/6/94

File Number: D10-07

Historic Name: Raybeck House | Common Name: Foste House | Current Owner Name: Roger Foste

Site Address: 22018 | 11 Ave South | Neighborhood: Des Moines | *Historic Significance: Important

Year Constructed: 1916 | Architect/Engineer/Builder: Freedom Lane, Bld. | *Architecture Significance: Special Style

Other Historic Archives: KC 0462 | Recommended By: KC Survey 78, Kennedy 89, Dasper 75

Current Status: The house has been alt | *Risk to Status: NRA | Map Designation: *

Notes: Mabel Raybeck was a very active citizen. She was Postmistress between 1953-71. She was an active member of the Methodist Church, Historical Society and Improvement Club.

Thomas Map Page No#: 685

Field Inspection Date: 8/30/94

City of Des Moines

Historic and Archeological Properties of Local Significance

File Number: D10-14

Historic Name: Bundy House, Mike (temp) **Common Name:** Bundy House **Current Owner Name:** Michael Bundy

Site Address: 1600 223 Street South **Neighborhood:** Des Moines ***Historic Significance:** Important

Year Constructed: 1919 **Architect/Engineer/Builder:** ***Architecture Significance:** Special Style

Other Historic Archives: None **Recommended By:** Assessor 94

Current Status: Good Original Condition ***Risk to Status:** NRA **Map Designation:**

Notes: Craftsman Bungalow. Front gable with porch. **Thomas Map Page No#:** 685

Field Inspection Date: 9/6/94

File Number: D10-15

Historic Name: Hanson House (temp) **Common Name:** Hanson House **Current Owner Name:** Peggy Hanson

Site Address: 22502 10th Ave South **Neighborhood:** Des Moines ***Historic Significance.** Important

Year Constructed: 1919 **Architect/Engineer/Builder:** ***Architecture Significance:** Special Style

Other Historic Archives: None **Recommended By:** Assessor 94

Current Status: Unaltered except for one ***Risk to Status:** NRA **Map Designation:**

Notes: Nice craftsman house. **Thomas Map Page No#:** 685

Field Inspection Date: 9/6/94

214

*Historic Codes: A=Important, B=Rare Building, C=Common, U=Unknown
Architecture Codes: A=Special Style, B=Common, C=Minor Alteration of "A" or "B", D=Larger Alteration, R=Remodel or Demolition
Risk Codes: None, NRA, nra3, Development -Owner

1626

City of Des Moines

Historic and Archeological Properties of Local Significance

File Number: D10-12

Historic Name: Corby House (temp) **Common Name:** Corby House **Current Owner Name:** GW & Anita Corby

Site Address: 24224 7th Ave South **Neighborhood:** Zenith ***Historic Significance:** Important

Year Constructed: 1918 **Architect/Engineer/Builder:** ***Architecture Significance:** Special Style

Other Historic Archives: None **Recommended By:** Assessor 94

Current Status: Excellent, unaltered one ***Risk to Status:** nra3 **Map Designation:** *

Notes: Very beautiful, western craftsman style summer house. National landmark potential. **Thomas Map Page No#:** 715

Field Inspection Date: 9/6/94

File Number: D10-13

Historic Name: Zenith Grocery Store **Common Name:** Zenith Grocery Store **Current Owner Name:** Terry McKean

Site Address: 23659 Marine View Dr South **Neighborhood:** Zenith ***Historic Significance:** Important

Year Constructed: 1918 **Architect/Engineer/Builder:** ***Architecture Significance:** Special Style

Other Historic Archives: None **Recommended By:** Kennedy 89

Current Status: Moved. Fair Condition. ***Risk to Status:** nra3 **Map Designation:** *

Notes: In 1917, Charles Gilbert was chosen postmaster of Zenith Post Office. Store/Post Office were on the Gilbert Home property. The store is the second longest running business in Zenith. One story, woodframe structure in front of front gable house. **Thomas Map Page No#:** 715

Field Inspection Date: 8/30/94

214

*Historic Codes: A=Important, B=Rare Building, C=Common, U=Unknown
Architecture Codes: A=Special Style, B=Common, C=Minor Alteration of "A" or "B", D=Larger Alteration, R=Remodel or Demolition
Risk Codes: None, NRA, nra3, Development -Owner

City of Des Moines
Historic and Archeological Properties of Local Significance

File Number: D20-04

Historic Name: Metzler House (temp)
Common Name: Metzler House
Current Owner Name: Del and Patricia Metzler

Site Address: 22302 | 10th Ave South
Neighborhood: Des Moines
***Historic Significance:** Important

Year Constructed: 1921
Architect/Engineer/Builder:
***Architecture Significance:** Special Style

Other Historic Archives: None
Recommended By: Assessor 94

Current Status: Good Condition with an
***Risk to Status:** NRA
Map Designation:

Notes: Story story, craftsman style house.

Thomas Map Page No#: 685

Field Inspection Date: 9/6/94

File Number: D20-06

Historic Name: Coffy House (temp)
Common Name: Coffy House
Current Owner Name: Patrick Coffy

Site Address: 22220 | 11th Place South
Neighborhood: Des Moines
***Historic Significance:** Important

Year Constructed: 1923
Architect/Engineer/Builder:
***Architecture Significance:** Special Style

Other Historic Archives: None
Recommended By: Assessor 94

Current Status: Good condition under re
***Risk to Status:** NRA
Map Designation:

Notes: May be the barn to Walworth house. Wooden barn like structure that has been converted to house.

Thomas Map Page No#: 685

Field Inspection Date: 9/6/94

1627

City of Des Moines
Historic and Archeological Properties of Local Significance

File Number: D20-01

Historic Name: Ellington House
Common Name: Sherman House
Current Owner Name: Daniel Sherman

Site Address: 22530 | 8th Ave South
Neighborhood: Des Moines
***Historic Significance:** Important

Year Constructed: 1920
Architect/Engineer/Builder:
***Architecture Significance:** Special Style

Other Historic Archives: None
Recommended By: Assessor 94

Current Status: Good Condition but rem
***Risk to Status:** nra3
Map Designation: *

Notes: Original House of Vera May Ellington of the Robert Ellington family. Robert Ellington was an early farmer in Des Moines. House lived in by John Sommers in 1950s and 1960s after he established the successful Johnny's Food Center. (See Sommer's Residence(temp) as another residence). In 1994, owned by Des Moines city council member Daniel

Thomas Map Page No#: 685

Field Inspection Date: 9/6/94

File Number: D20-03

Historic Name: Lamp House (temp)
Common Name: Lamp House
Current Owner Name: Karen Lamp

Site Address: 1251 | 230 Street South
Neighborhood: Des Moines
***Historic Significance:** Important

Year Constructed: 1920
Architect/Engineer/Builder:
***Architecture Significance:** Special Style

Other Historic Archives: None
Recommended By: Assessor 94

Current Status: Unclear about original c
***Risk to Status:** NRA
Map Designation:

Notes: Big craftsman style house, but unclear about changes. The house is clearly visible from Kent-Des Moines Way on northside near 12th Ave.

Thomas Map Page No#: 685

Field Inspection Date: 9/6/94

City of Des Moines

Historic and Archeological Properties of Local Significance

File Number: D20-11

Historic Name: Des Moines Public School
Common Name: Des Moines Elementary
Current Owner Notes: Highline School District

Site Address: 22001 | 9 Ave South
Neighborhood: Des Moines
*Historic Significance. Important

Year Constructed: 1925
Architect/Engineer/Builder:
*Architecture Significance. Special Style

Other Historic Archives: None
Recommended By: Kennedy 89

Current Status: Good Condition. Origin
*Risk to Status: nra3
Map Designation: *

Notes: Site of first Des Moines School. Existing building constructed in 1925.

Thomas Map Page No#: 685

Field Inspection Date: 9/6/94

File Number: D20-12

Historic Notes: Chamber Office (temp)
Common Name: Greater Des Moines Cham
Current Owner Name: City of Des Moines

Site Address: 22237 | Cliff Ave South
Neighborhood: Des Moines
*Historic Significance: Important

Year Constructed: 1926
Architect/Engineer/Builder:
*Architecture Significance: Special Style

Other Historic Archives: None
Recommended By: Assessor 94

Current Status: Front addition with large
*Risk to Status: nra3
Map Designation:

Notes: Beach cottage. Since 1987, the office of the Greater Des Moines Chamber of Commerce founded in 1947. The chamber sponsors started and manages the Waterland Festival.

Thomas Map Page No#: 685

Field Inspection Date: 9/6/94

214

*Historic Codes: A = Important, B = Rare Building, C = Common, U = Unknown
Architecture Codes: A = Special Style, B = Common, C = Minor Alteration of "A" or "B",
D = Larger Alteration, R = Remodel or Demolition
Risk Codes: None, NRA, nra3, Development -Owner

1628

City of Des Moines

Historic and Archeological Properties of Local Significance

File Number: D20-08

Historic Name: Gould House (temp)
Common Name: Gould House
Current Owner Name: Linda Gould

Site Address: 1242 | Kent-Des Moines Road
Neighborhood: Des Moines
*Historic Significance: Important

Year Constructed: 1923
Architect/Engineer/Builder:
*Architecture Significance: Special Style

Other Historic Archives: None
Recommended By: Assessor 94

Current Status: Good, but unclear as to
*Risk to Status: NRA
Map Designation:

Notes: Could be big, white craftsman house. Interesting design. See Lamp House for conflict of identification.

Thomas Map Page No#: 685

Field Inspection Date: 9/21/94

File Number: D20-09

Historic Name: Peterson House (temp)
Common Name: Unknown
Current Owner Name: Tom Peterson

Site Address: 1816 | 220 Street South
Neighborhood: Des Moines
*Historic Significance: Important

Year Constructed: 1923
Architect/Engineer/Builder:
*Architecture Significance: Special Style

Other Historic Archives: None
Recommended By: Assessor 94

Current Status: Original, but poor condit
*Risk to Status: NRA
Map Designation:

Notes: House

Thomas Map Page No#: 685

Field Inspection Date: 9/6/94

214

*Historic Codes: A = Important, B = Rare Building, C = Common, U = Unknown
Architecture Codes: A = Special Style, B = Common, C = Minor Alteration of "A" or "B",
D = Larger Alteration, R = Remodel or Demolition
Risk Codes: None, NRA, nra3, Development -Owner

City of Des Moines
Historic and Archeological Properties of Local Significance

File Number: D20-17

Historic Name: Masonic Home of Washing
Common Name: Masonic Home
Current Owner Name: Grand Lodge/Tacoma

Site Address: 23660 Marine View Dr. South
Neighborhood: Zenith
***Historic Significance:** Important

Year Constructed: 1927
Architect/Engineer/Builder: Heath, Gove & Bell, Arch.
***Architecture Significance:** Special Style

Other Historic Archives: None
Recommended By: Kennedy 89

Current Status: Excellent Condition exte
***Risk to Status:** nra3
Map Designation: *

Notes: In the tradition of 20th Century Masonic Retirement Homes in the USA. Originally the facility had 260 sleeping rooms, solariums, social rooms, dining room and running hall.

Thomas Map Page No#: 715

Field Inspection Date: 8/19/94

File Number: D20-18

Historic Name: Wunsley House (temp)
Common Name: Unknown
Current Owner Name: Gary Wunsley

Site Address: 22525 6th Ave South
Neighborhood: Des Moines
***Historic Significance:** Important

Year Constructed: 1927
Architect/Engineer/Builder:
***Architecture Significance:** Special Style

Other Historic Archives: None
Recommended By: Assessor 94

Current Status: Original unaltered condit
***Risk to Status:** nra3
Map Designation:

Notes: Wooden House.

Thomas Map Page No#: 685

Field Inspection Date: 9/6/94

1629

City of Des Moines
Historic and Archeological Properties of Local Significance

File Number: D20-13A

Historic Name: Danish Colony
Common Name: Seashore Club
Current Owner Name: Several Owners

Site Address: 23641 7 Ave South
Neighborhood: Zenith
***Historic Significance:** Important

Year Constructed: 1926
Architect/Engineer/Builder: Danish Families
***Architecture Significance:** Special Style

Other Historic Archives: None
Recommended By: Kennedy 89

Current Status: Site Plan, lawn, gazebo
***Risk to Status:** nra3
Map Designation: *

Notes: A communal waterfront vacation development by 10 Danish families in the late 1920. Could be last remaining place that reflects early 20th century Puget Sound vacation home developments for middle class. After WW2, many houses made permanent. Contact: Robert Bleta in House #9 at 878-2825. Knew all Danish families in 1940s & 50s.

Thomas Map Page No#: 715

Field Inspection Date: 8/30/94

File Number: D20-16

Historic Name: Elsner House #2
Common Name: Draper House
Current Owner Name: Vernon and Melanie Elsner

Site Address: 23258 Marine View Drive South
Neighborhood: Zenith
***Historic Significance:** Important

Year Constructed: 1927
Architect/Engineer/Builder:
***Architecture Significance:** Special Style

Other Historic Archives: None
Recommended By: Draper 94, Kennedy 89

Current Status: Original condition
***Risk to Status:** nra3
Map Designation: *

Notes: Second House of Max Elsner with greenhouses on back of property. Vernon Draper is the son of Daddy Draper founder of Children's Industrial Home in early 1900s and Melanie Elsner Draper is the daughter of Max Elsner and founder of the Des Moines Historical Society and Museum.

Thomas Map Page No#: 685

Field Inspection Date: 8/30/94

City of Des Moines

Historic and Archeological Properties of Local Significance

File Number:	D20-21				
Historic Name:	Beasley House (temp)	Common Name:	Beasley House	Current Owner Name:	A.W. Beasley
Site Address:	22028 5 Place South	Neighborhood:	Des Moines	*Historic Significance:	Important
Year Constructed:	1927	Architect/Engineer/Builder:		*Architecture Significance:	Special Style
Other Historic Archives:	None	Recommended By:	Assessor 94		
Current Status:	Unaltered.	*Risk to Status:	nra3	Map Designation:	*
Notes:	Excellent and unusual mission style, craftsman house.			Thomas Map Page No#:	684
				Field Inspection Date:	9/10/94

File Number:	D00-01				
Historic Name:	Burke House (temp)	Common Name:	Unknown	Current Owner Name:	Catherine Burke
Site Address:	917 247 Street South	Neighborhood:	Zenith	*Historic Significance:	Important
Year Constructed:	1930	Architect/Engineer/Builder:		*Architecture Significance:	Special Style
Other Historic Archives:	None	Recommended By:	Assessor 94		
Current Status:	Fair, original condition.	*Risk to Status:	nra3	Map Designation:	
Notes:	One story, side gable wood house.			Thomas Map Page No#:	715
				Field Inspection Date:	9/21/94

214

July 24, 1995

*Historic Codes: A=Important, B=Rare Building, C=Common, U=Unknown
Architecture Codes: A=Special Style, B=Common, C=Minor Alteration of "A" or "B".
D=Larger Alteration, R=Remodel or Demolition
Risk Codes: None, NRA, nra3, Development -Owner

1630

City of Des Moines

Historic and Archeological Properties of Local Significance

File Number:	D20-19				
Historic Name:	Maher House (temp)	Common Name:	Unknown	Current Owner Name:	Robert Maher
Site Address:	22017 28th Ave South	Neighborhood:	Midway	*Historic Significance:	Important
Year Constructed:	1928	Architect/Engineer/Builder:		*Architecture Significance:	Special Style
Other Historic Archives:	None	Recommended By:	Assessor 94		
Current Status:	Good, unaltered conditio	*Risk to Status:	NRA	Map Designation:	
Notes:	Simple craftsman style, wooden, front gable house.			Thomas Map Page No#:	685
				Field Inspection Date:	9/6/94

File Number:	D20-20				
Historic Name:	Halfway House	Common Name:	Foam Rubber City	Current Owner Name:	Tomita Mikio
Site Address:	22613 Pacific Highway South	Neighborhood:	Midway	*Historic Significance:	Important
Year Constructed:	1928	Architect/Engineer/Builder:		*Architecture Significance:	Special Style
Other Historic Archives:	None	Recommended By:	Kennedy '89		
Current Status:	Original except for doubl	*Risk to Status:	NRA	Map Designation:	*
Notes:	One of the original restaurants during the height of Pacific Highway as the main road north and south. With Ross's Highway Inn, the Halfway House is one of the only remaining restaurant buildings in the "big house", steep roof style of the late 20s & early 30s.			Thomas Map Page No#:	685
				Field Inspection Date:	9/10/94

214

July 24, 1995

*Historic Codes: A=Important, B=Rare Building, C=Common, U=Unknown
Architecture Codes: A=Special Style, B=Common, C=Minor Alteration of "A" or "B".
D=Larger Alteration, R=Remodel or Demolition
Risk Codes: None, NRA, nra3, Development -Owner

City of Des Moines
Historic and Archeological Properties of Local Significance

File Number: D00-04
Historic Name: Sharp House (temp)
Common Name: Sharp House
Current Owner Name: Tim Sharp
Site Address: 917 | 249 Street South
Neighborhood: Zenith
*Historic Significance: Important
Year Constructed: 1933
Architect/Engineer/Builder:
*Architecture Significance: Special Style
Other Historic Archives: None
Recommended By: Assessor 94
Current Status: Fair original condition.
*Risk to Status: nra3
Map Designation:
Notes: One story, front gable, wood house.
Thomas Map Page No#: 715
Field Inspection Date: 9/21/94

File Number: D00-05
Historic Name: Barber House (temp)
Common Name: Barber House
Current Owner Name: James & Lonnie Barber
Site Address: 24024 | 24th Ave South
Neighborhood: Midway
*Historic Significance: Important
Year Constructed: 1934
Architect/Engineer/Builder:
*Architecture Significance: Special Style
Other Historic Archives: None
Recommended By: Assessor 94
Current Status: Unaltered.
*Risk to Status: NRA
Map Designation:
Notes: One Story, side gable, wooden house.
Thomas Map Page No#: 715
Field Inspection Date: 9/6/94

---

*Historic Codes: A=Important, B=Rare Building, C=Common, U=Unknown
Architecture Codes: A=Special Style, B=Common, C=Minor Alteration of "A" or "B".
D=Larger Alteration, R=Remodel or Demolition
Risk Codes: None, NRA, nra3, Development -Owner

214

1631

City of Des Moines
Historic and Archeological Properties of Local Significance

File Number: D00-02
Historic Name: Des Moines Masonic Lodge
Common Name: Bentz House
Current Owner Name: David & Francis Bentz
Site Address: 22202 | 8 Ave South
Neighborhood: Des Moines
*Historic Significance: Important
Year Constructed: 1930
Architect/Engineer/Builder:
*Architecture Significance: Special Style
Other Historic Archives: None
Recommended By: Kennedy 89
Current Status: Good condition. Probab
*Risk to Status: nra3
Map Designation: *
Notes: Masonic lodge started in 1921. First temple building constructed in 1930 according to Assessor records. Brick, two story structure purposebly altered.
Thomas Map Page No#: 685
Field Inspection Date: 8/30/94

File Number: D00-02
Historic Name: Elsey House (temp)
Common Name: Elsey House
Current Owner Name: Martha Elsey
Site Address: 22806 | 11th Ave South
Neighborhood: Des Moines
*Historic Significance: Important
Year Constructed: 1932
Architect/Engineer/Builder:
*Architecture Significance: Special Style
Other Historic Archives: None
Recommended By: Assessor 94
Current Status: Original, excellent condit
*Risk to Status: NRA
Map Designation:
Notes: Wooden house in excellent condition.
Thomas Map Page No#: 685
Field Inspection Date: 9/6/94

---

*Historic Codes: A=Important, B=Rare Building, C=Common, U=Unknown
Architecture Codes: A=Special Style, B=Common, C=Minor Alteration of "A" or "B".
D=Larger Alteration, R=Remodel or Demolition
Risk Codes: None, NRA, nra3, Development -Owner

214

City of Des Moines
Historic and Archeological Properties of Local Significance

File Number: D30-09

Historic Name: ? Camp Shelter & Cabin (t
Common Name: McGuthin House
Current Owner Name: Dean McGuthin

Site Address: 22304 | 14th Ave South
Neighborhood: Zenith
***Historic Significance:** Important

Year Constructed: 1935
Architect/Engineer/Builder:
***Architecture Significance:** Special Style

Other Historic Archives: None
Recommended By: Assessor 94

Current Status: Replacement windows a
***Risk to Status:** NRA
Map Designation: *

Notes: Original picnic shelter for camp on property to north of McGuthin property. Double gable cabin. Camp follows Massey Creek.
Thomas Map Page No#: 685

Field Inspection Date: 9/6/94

File Number: D30-10

Historic Name: Brown House (camp)
Common Name: Zenith House
Current Owner Name: R.R. Brown

Site Address: 20927 | 3rd Ave South
Neighborhood: Northhill
***Historic Significance:** Important

Year Constructed: 1935
Architect/Engineer/Builder:
***Architecture Significance:** Special Style

Other Historic Archives: None
Recommended By: Assessor 94

Current Status: Good Condition with me
***Risk to Status:** ara3
Map Designation:

Notes: Wooden House.
Thomas Map Page No#: 684

Field Inspection Date: 9/6/94

1632

City of Des Moines
Historic and Archeological Properties of Local Significance

File Number: D30-07

Historic Name: Covenant Beach Bible Ca
Common Name: Des Moines Beach Park
Current Owner Name: City of Des Moines

Site Address: 22000 | Cliff Ave South
Neighborhood: Des Moines
***Historic Significance:** Important

Year Constructed: 1934
Architect/Engineer/Builder:
***Architecture Significance:** Special Style

Other Historic Archives: SR 11/18/88
Recommended By: Washington Registry, Kennedy 89

Current Status: 13 original buildings and
***Risk to Status:** ara3
Map Designation: *

Notes: One of the last remaining examples a historic summer camp in King County of the rustic, vernacular style built between 1925 and the early 1940's. Secondly, an important component of Swedish-American heritage, serving as the camp ground & conference center as the Swedish Covenant Church between 1931 & 1986.
Thomas Map Page No#: 684

Field Inspection Date: 8/30/94

File Number: D30-08

Historic Name: ? Camp Dining Hall (camp)
Common Name: Iverson House
Current Owner Name: Jean Iverson

Site Address: 22304 | 14th Ave South
Neighborhood: Zenith
***Historic Significance:** Important

Year Constructed: 1935
Architect/Engineer/Builder:
***Architecture Significance:** Special Style

Other Historic Archives: None
Recommended By: Assessor 94

Current Status: Remodeled into house.
***Risk to Status:** NRA
Map Designation:

Notes: Mess hall for 1930's summer camp along Massey Creek according to Jean Iverson. One story, board and batten construction.
Thomas Map Page No#: 685

Field Inspection Date: 9/6/94

City of Des Moines
Historic and Archeological Properties of Local Significance

File Number: D30-15
Historic Name: Evanson House (temp) | **Common Name:** Evanson House | **Current Owner Name:** Patricia Evanson
Site Address: 1615 Kent-Des Moines Road | **Neighborhood:** Des Moines | ***Historic Significance:** Important
Year Constructed: 1935 | **Architect/Engineer/Builder:** | ***Architecture Significance:** Special Style
Other Historic Archives: None | **Recommended By:** Assessor 94
Current Status: Good original condition. | ***Risk to Status:** NRA | **Map Designation:**
Notes: One Story, front gable wood house. | **Thomas Map Page No#:** 685
Field Inspection Date: 9/21/94

File Number: D30-16
Historic Name: Jery House (temp) | **Common Name:** Unknown | **Current Owner Name:** Helen Jery
Site Address: 21904 Marine View Drive South | **Neighborhood:** Zenith | ***Historic Significance:** Important
Year Constructed: 1935 | **Architect/Engineer/Builder:** | ***Architecture Significance:** Special Style
Other Historic Archives: None | **Recommended By:** Assessor 94
Current Status: Original Condition. | ***Risk to Status:** nra3 | **Map Designation:**
Notes: Modern modest home. | **Thomas Map Page No#:** 715
Field Inspection Date: 9/6/94

1633

City of Des Moines
Historic and Archeological Properties of Local Significance

File Number: D20-12
Historic Name: Bernier House (temp) | **Common Name:** Unknown | **Current Owner Name:** James Bernier
Site Address: 833 223 Street South | **Neighborhood:** Des Moines | ***Historic Significance.** Important
Year Constructed: 1935 | **Architect/Engineer/Builder:** | ***Architecture Significance:** Special Style
Other Historic Archives: None | **Recommended By:** Assessor 94
Current Status: Excellent, unaltered one | ***Risk to Status:** nra3 | **Map Designation:**
Notes: Excellent condition 1930's Home. | **Thomas Map Page No#:** 685
Field Inspection Date: 9/6/94

File Number: D30-14
Historic Name: Erickson House (temp) | **Common Name:** Unknown | **Current Owner Name:** Thelma Erickson
Site Address: 22327 16th Ave South | **Neighborhood:** Des Moines | ***Historic Significance:** Important
Year Constructed: 1935 | **Architect/Engineer/Builder:** | ***Architecture Significance:** Special Style
Other Historic Archives: None | **Recommended By:** Assessor 94
Current Status: Unaltered . | ***Risk to Status:** NRA | **Map Designation:**
Notes: One story, side gable "shack". | **Thomas Map Page No#:** 685
Field Inspection Date: 9/6/94

City of Des Moines

Historic and Archeological Properties of Local Significance

Field	Value	Field	Value	Field	Value
File Number:	D30-19				
Historic Name:	? Camp Owner's House (s	Common Name:	Foster House	Current Owner Name:	Barbara Foster
Site Address:	23200 14th Ave South	Neighborhood:	Zenith	*Historic Significance:	Important
Year Constructed:	1936	Architect/Engineer/Builder:		*Architecture Significance:	Special Style
Other Historic Archives:	None	Recommended By:	Assessor 94		
Current Status:	Some alterations, but un	*Risk to Status:	NRA	Map Designation:	
Notes:	Owner's house for 1930's summer camp along Massey Creek according to Moss Hall owner Jean Iverson.	Thomas Map Page No#:	685	Field Inspection Date:	9/6/94

Field	Value	Field	Value	Field	Value
File Number:	D30-20				
Historic Name:	Bosma House (temp)	Common Name:	Bosma House	Current Owner Name:	Nelson Bosma
Site Address:	21324 4th Ave South	Neighborhood:	Northhill	*Historic Significance:	Important
Year Constructed:	1936	Architect/Engineer/Builder:		*Architecture Significance:	Special Style
Other Historic Archives:	None	Recommended By:	Assessor 94		
Current Status:	Unaltered except for plat	*Risk to Status:	nra3	Map Designation:	
Notes:	Wooden House.	Thomas Map Page No#:	684	Field Inspection Date:	9/6/94

1634

City of Des Moines

Historic and Archeological Properties of Local Significance

Field	Value	Field	Value	Field	Value
File Number:	D30-17				
Historic Name:	Parker House (temp)	Common Name:	Parker House	Current Owner Name:	Mary Parker
Site Address:	21228 4th Ave South	Neighborhood:	Northhill	*Historic Significance:	Important
Year Constructed:	1935	Architect/Engineer/Builder:		*Architecture Significance:	Special Style
Other Historic Archives:	None	Recommended By:	Assessor 94		
Current Status:	Good original condition.	*Risk to Status:	nra3	Map Designation:	
Notes:	Wooden House.	Thomas Map Page No#:	684	Field Inspection Date:	9/6/94

Field	Value	Field	Value	Field	Value
File Number:	D30-18				
Historic Name:	Witter House (temp)	Common Name:	Witter House	Current Owner Name:	Walter & Esther Witter
Site Address:	24036 24th Ave South	Neighborhood:	Midway	*Historic Significance:	Important
Year Constructed:	1935	Architect/Engineer/Builder:		*Architecture Significance:	Special Style
Other Historic Archives:	None	Recommended By:	Assessor 94		
Current Status:	Fair, unaltered condition.	*Risk to Status:	NRA	Map Designation:	
Notes:	Saltbox, side gable wooden house.	Thomas Map Page No#:	715	Field Inspection Date:	9/6/94

City of Des Moines
Historic and Archeological Properties of Local Significance

File Number: D00-23

Historic Name: North Hill Community Clu | **Common Name:** North Hill Community Club | **Current Owner Name:** North Hill Community Club

Site Address: 20827 3 Ave South | **Neighborhood:** Northhill | ***Historic Significance:** Important

Year Constructed: 1936 | **Architect/Engineer/Builder:** | ***Architecture Significance:** Special Style

Other Historic Archives: None | **Recommended By:** Kennedy 89

Current Status: Fair condition with metal | ***Risk to Status:** nra3 | **Map Designation:** *

Notes: Community meeting place since at least 1957. One story, Front-gable building with Board & Batten wood siding.

Thomas Map Page No#: 684

Field Inspection Date: 8/30/94

File Number: D00-23

Historic Name: Simmester House (temp) | **Common Name:** Unknown | **Current Owner Name:** Owen David Simmester

Site Address: 1223 230 Street South | **Neighborhood:** Des Moines | ***Historic Significance:** Important

Year Constructed: 1936 | **Architect/Engineer/Builder:** | ***Architecture Significance:** Special Style

Other Historic Archives: None | **Recommended By:** Assessor 94

Current Status: Original condition. | ***Risk to Status:** nra3 | **Map Designation:**

Notes: Small cottage or even shack.

Thomas Map Page No#: 685

Field Inspection Date: 9/6/94

1635

City of Des Moines
Historic and Archeological Properties of Local Significance

File Number: D00-21

Historic Name: Coil House (temp) | **Common Name:** Coil House | **Current Owner Name:** Jess Coil

Site Address: 1218 236th Street South | **Neighborhood:** Des Moines | ***Historic Significance:** Important

Year Constructed: 1936 | **Architect/Engineer/Builder:** | ***Architecture Significance:** Special Style

Other Historic Archives: None | **Recommended By:** Assessor 94

Current Status: Fair, unaltered condition. | ***Risk to Status:** NRA | **Map Designation:**

Notes: Wooden House.

Thomas Map Page No#: 685

Field Inspection Date: 9/6/94

File Number: D00-22

Historic Name: Dickenson House (temp) | **Common Name:** Dickenson House | **Current Owner Name:** Bryan Dickenson

Site Address: 24305 7th Ave South | **Neighborhood:** Zenith | ***Historic Significance:** Important

Year Constructed: 1936 | **Architect/Engineer/Builder:** | ***Architecture Significance:** Special Style

Other Historic Archives: None | **Recommended By:** Assessor 94

Current Status: Good, unaltered conditi | ***Risk to Status:** nra3 | **Map Designation:** *

Notes: Normandy style, brick house.

Thomas Map Page No#: 715

Field Inspection Date: 9/6/94

City of Des Moines

Historic and Archeological Properties of Local Significance

File Number:	D30-27
Historic Name:	Weaver House (temp)
Common Name:	Weaver House
Current Owner Name:	Scott Weaver
Site Address:	21815 31st Ave South
Neighborhood:	Midway
*Historic Significance:	Important
Year Constructed:	1938
Architect/Engineer/Builder:	
*Architecture Significance.	Special Style
Other Historic Archives:	None
Recommended By:	Assessor 94
Current Status:	Fair Condition, Unaltered
*Risk to Status:	NRA
Map Designation:	
Notes:	Fair condition, wooden modest house.
Thomas Map Page No#:	685
Field Inspection Date:	9/6/94

File Number:	D30-28
Historic Name:	Assembly House (temp)
Common Name:	Unknown
Current Owner Name:	Des Moines Assembly of G
Site Address:	21816 24th Ave South
Neighborhood:	Des Moines
*Historic Significance.	Important
Year Constructed:	1939
Architect/Engineer/Builder:	
*Architecture Significance:	Special Style
Other Historic Archives:	None
Recommended By:	Assessor 94
Current Status:	Fair, unaltered condition.
*Risk to Status:	NRA
Map Designation:	
Notes:	One & 1/2 story, wooden, front gable house.
Thomas Map Page No#:	685
Field Inspection Date:	9/6/94

1636

City of Des Moines

Historic and Archeological Properties of Local Significance

File Number:	D30-25
Historic Name:	Lutz House (temp)
Common Name:	Lutz House
Current Owner Name:	Raymond & Cynthia Lutz
Site Address:	23258 Marine View Drive South
Neighborhood:	Zenith
*Historic Significance:	Important
Year Constructed:	1937
Architect/Engineer/Builder:	
*Architecture Significance:	Special Style
Other Historic Archives:	None
Recommended By:	Assessor 94
Current Status:	Good Condition, But ad
*Risk to Status:	nra3
Map Designation:	*
Notes:	Very unique, french eclectic style. Stone building with round tower entrance. Mrs. Lutz did not know the history of the house.
Thomas Map Page No#:	685
Field Inspection Date:	9/6/94

File Number:	D30-26
Historic Name:	Bundy House, Marc (temp)
Common Name:	Bundy House
Current Owner Name:	Marc Lee Bundy
Site Address:	1716 223 Street South
Neighborhood:	Des Moines
*Historic Significance:	Important
Year Constructed:	1938
Architect/Engineer/Builder:	
*Architecture Significance:	Special Style
Other Historic Archives:	None
Recommended By:	Assessor 94
Current Status:	Unaltered.
*Risk to Status:	NRA
Map Designation:	
Notes:	Modest modern house.
Thomas Map Page No#:	685
Field Inspection Date:	9/6/94

City of Des Moines
Historic and Archeological Properties of Local Significance

File Number: D40-01

Historic Name: Hemenway House (temp) | **Common Name:** Unknown | **Current Owner Name:** Patricia Hemenway

Site Address: 22612 24th Ave South | **Neighborhood:** Des Moines | ***Historic Significance:** Important

Year Constructed: 1940 | **Architect/Engineer/Builder:** | ***Architecture Significance:** Special Style

Other Historic Archives: None | **Recommended By:** Assessor 94

Current Status: Good, unaltered conditio | ***Risk to Status:** NRA | **Map Designation:**

Notes: One story, front gable, | **Thomas Map Page No#:** 685

Field Inspection Date: 9/6/94

File Number: D40-02

Historic Name: Sherman House (temp) | **Common Name:** Unknown | **Current Owner Name:** Lois Sherman

Site Address: 22343 30th Ave South | **Neighborhood:** Midway | ***Historic Significance:** Important

Year Constructed: 1940 | **Architect/Engineer/Builder:** | ***Architecture Significance:** Special Style

Other Historic Archives: None | **Recommended By:** Assessor 94

Current Status: Good conditoin. | ***Risk to Status:** NRA | **Map Designation:**

Notes: Wooden house. | **Thomas Map Page No#:** 685

Field Inspection Date: 9/6/94

1637

City of Des Moines
Historic and Archeological Properties of Local Significance

File Number: D30-29

Historic Name: Booth House (temp) | **Common Name:** Booth House | **Current Owner Name:** Karen Booth

Site Address: 1005 242 Street South | **Neighborhood:** Zenith | ***Historic Significance:** Important

Year Constructed: 1939 | **Architect/Engineer/Builder:** | ***Architecture Significance:** Special Style

Other Historic Archives: None | **Recommended By:** Assessor 94

Current Status: Original Condition, unalte | ***Risk to Status:** nra3 | **Map Designation:**

Notes: One story, modern modest wood house with basement. | **Thomas Map Page No#:** 715

Field Inspection Date: 9/21/94

File Number: D30-30

Historic Name: Des Moines Field House | **Common Name:** Des Moines Field House | **Current Owner Name:** City of Des Moines

Site Address: 1000 220 Street South | **Neighborhood:** Des Moines | ***Historic Significance:** Important

Year Constructed: 1939 | **Architect/Engineer/Builder:** Works Progress Administration | ***Architecture Significance:** Special Style

Other Historic Archives: KCLM | **Recommended By:** KC Survey 78, Kennedy 89, Draper 75

Current Status: Excellent. Unaltered ext | ***Risk to Status:** NRA | **Map Designation:** *

Notes: One of five field houses in King County built by the Works Progress Administration. Part of national wide economic recovery program of the 1930s Depression. All field houses are in the rustic, National Park Service design ideas of the 1920s and 30s. | **Thomas Map Page No#:** 685

Field Inspection Date: 8/30/94

City of Des Moines
Historic and Archeological Properties of Local Significance

File Number:	D40-06				
Historic Name:	Escaines House (temp)	Common Name:	Unknown	Current Owner Name:	James Escaines
Site Address:	22215 8th Ave South	Neighborhood:	Des Moines	*Historic Significance:	Important
Year Constructed:	1942	Architect/Engineer/Builder:		*Architecture Significance.	Special Style
Other Historic Archives:	None	Recommended By:	Assessor 94		
Current Status:	Original condition.	*Risk to Status:	NRA	Map Designation:	
Notes:	One room cottage.			Thomas Map Page No#:	685
				Field Inspection Date:	9/6/94

File Number:	D40-07				
Historic Name:	Goddie House (temp)	Common Name:	Unknown	Current Owner Name:	Lee Goddie
Site Address:	615 225 Street South	Neighborhood:	Des Moines	*Historic Significance:	Important
Year Constructed:	1942	Architect/Engineer/Builder:		*Architecture Significance:	Special Style
Other Historic Archives:	None	Recommended By:	Assessor 94		
Current Status:	Excellent original conditi	*Risk to Status:	nra3	Map Designation:	
Notes:	House.			Thomas Map Page No#:	685
				Field Inspection Date:	9/6/94

214

*Historic Codes: A = Important, B = Rare Building, C = Common, U = Unknown
Architecture Codes: A = Special Style, B = Common, C = Minor Alteration of "A" or "B",
D = Larger Alteration, R = Remodel or Demolition
Risk Codes: None, NRA, nra3, Development -Owner

1638

City of Des Moines
Historic and Archeological Properties of Local Significance

File Number:	D30-31				
Historic Name:	Owen House (temp)	Common Name:	Unknown	Current Owner Name:	Thomas Owen
Site Address:	21645 24th Ave South	Neighborhood:	Des Moines	*Historic Significance.	Important
Year Constructed:	1930	Architect/Engineer/Builder:		*Architecture Significance.	Special Style
Other Historic Archives:	None	Recommended By:	Assessor 94		
Current Status:	Fair Condition. Unaltere	*Risk to Status:	NRA	Map Designation:	
Notes:	One story, front gable house.			Thomas Map Page No#:	685
				Field Inspection Date:	9/6/94

File Number:	D30-34				
Historic Name:	Wilson House (temp)	Common Name:	Unknown	Current Owner Name:	Robert & Shirley Wilson
Site Address:	22238 Cliff Ave South	Neighborhood:	Des Moines	*Historic Significance.	Important
Year Constructed:	1939	Architect/Engineer/Builder:		*Architecture Significance.	Special Style
Other Historic Archives:	None	Recommended By:	Assessor 94		
Current Status:	Original condition	*Risk to Status:	nra3	Map Designation:	
Notes:	Modest Modern wood home.			Thomas Map Page No#:	685
				Field Inspection Date:	9/6/94

214

*Historic Codes: A = Important, B = Rare Building, C = Common, U = Unknown
Architecture Codes: A = Special Style, B = Common, C = Minor Alteration of "A" or "B",
D = Larger Alteration, R = Remodel or Demolition
Risk Codes: None, NRA, nra3, Development -Owner

City of Des Moines
Historic and Archeological Properties of Local Significance

File Number: D40-12

Historic Name: Bartholomew House (temp | Common Name: Bartholomew House | Current Owner Name: Mary & Graham Bartholom

Site Address: 24121 | 21st Ave South | Neighborhood: Midway | *Historic Significance: Important

Year Constructed: 1943 | Architect/Engineer/Builder: | *Architecture Significance: Special Style

Other Historic Archives: None | Recommended By: Assessor 94

Current Status: Good, unaltered conditio | *Risk to Status: NRA | Map Designation:

Notes: One Story, wooden side gable house.

Thomas Map Page No#: 715

Field Inspection Date: 9/6/94

File Number: D40-13

Historic Name: Beal House (temp) | Common Name: Unknown | Current Owner Name: Eric or Dick Beal

Site Address: 2812 | 226 Street South | Neighborhood: Midway | *Historic Significance: Important

Year Constructed: 1943 | Architect/Engineer/Builder: | *Architecture Significance: Special Style

Other Historic Archives: None | Recommended By: Assessor 94

Current Status: Excellent original conditi | *Risk to Status: NRA | Map Designation:

Notes: Brick, one & one-half story front gable house.

Thomas Map Page No#: 685

Field Inspection Date: 9/6/94

214

*Historic Codes: A=Important, B=Rare Building, C=Common, U=Unknown
Architecture Codes: A=Special Style, B=Common, C=Minor Alteration of "A" or "B",
D=Larger Alteration, R=Remodel or Demolition
Risk Codes: None, NRA, nra3, Development -Owner

1639

City of Des Moines
Historic and Archeological Properties of Local Significance

File Number: D40-03

Historic Name: Jensen House (temp) | Common Name: Jensen House | Current Owner Name: Greg Jensen

Site Address: 22752 | 30th Ave South | Neighborhood: Des Moines | *Historic Significance: Important

Year Constructed: 1941 | Architect/Engineer/Builder: | *Architecture Significance: Special Style

Other Historic Archives: None | Recommended By: Assessor 94

Current Status: One metal replacement | *Risk to Status: NRA | Map Designation:

Notes: One story, wooden, side gable house with porch.

Thomas Map Page No#: 685

Field Inspection Date: 9/6/94

File Number: D40-04

Historic Name: Pacific Telephone & Telegr | Common Name: US West | Current Owner Name: US West

Site Address: 802 | 223 Street South | Neighborhood: Des Moines | *Historic Significance: Important

Year Constructed: 1941 | Architect/Engineer/Builder: | *Architecture Significance: Special Style

Other Historic Archives: None | Recommended By: Kennedy 89

Current Status: Unaltered. Good Conditi | *Risk to Status: nra3 | Map Designation:

Notes: International, Main style steel and brick infill structure. Only three windows.

Thomas Map Page No#: 685

Field Inspection Date: 8/30/94

214

*Historic Codes: A=Important, B=Rare Building, C=Common, U=Unknown
Architecture Codes: A=Special Style, B=Common, C=Minor Alteration of "A" or "B",
D=Larger Alteration, R=Remodel or Demolition
Risk Codes: None, NRA, nra3, Development -Owner

City of Des Moines
Historic and Archeological Properties of Local Significance

File Number:	D40-17				
Historic Name:	Bergman House (temp)	Common Name:	Bergman House	Current Owner Name:	Jerry Bergman
Site Address:	21030 7th Ave South	Neighborhood:	Northhill	*Historic Significance:	Important
Year Constructed:	1944	Architect/Engineer/Builder:		*Architecture Significance:	Special Style
Other Historic Archives:	None	Recommended By:	Assessor 94		
Current Status:	Good Condition. Unalter	*Risk to Status:	nra3	Map Designation:	
Notes:	One story, wooden, flat roof, contemporary.			Thomas Map Page No#:	685
				Field Inspection Date:	9/6/94

File Number:	D40-18				
Historic Name:	Gelroy House (temp)	Common Name:	Unknown	Current Owner Name:	Catheryn Gelroy
Site Address:	22308 24th Place South	Neighborhood:	Midway	*Historic Significance:	Important
Year Constructed:	1944	Architect/Engineer/Builder:		*Architecture Significance:	Special Style
Other Historic Archives:	None	Recommended By:	Assessor 94		
Current Status:	Good, unaltered conditio	*Risk to Status:	NRA	Map Designation:	
Notes:	Simple, one story, wooden house.			Thomas Map Page No#:	685
				Field Inspection Date:	9/6/94

214

*Historic Codes: A=Important, B=Rare Building, C=Common, U=Unknown
Architecture Codes: A=Special Style, B=Common, C=Minor Alteration of "A" or "B", D=Larger Alteration, R=Remodel or Demolition
Risk Codes: None, NRA, nra3, Development -Owner

1640

City of Des Moines
Historic and Archeological Properties of Local Significance

File Number:	D40-08				
Historic Name:	Hartman House (temp)	Common Name:	Hartman House	Current Owner Name:	Thomas & Kathleen Hartman
Site Address:	22804 16th Ave South	Neighborhood:	Des Moines	*Historic Significance:	Important
Year Constructed:	1942	Architect/Engineer/Builder:		*Architecture Significance:	Special Style
Other Historic Archives:	None	Recommended By:	Assessor 94		
Current Status:	Small cottage in good, u	*Risk to Status:	NRA	Map Designation:	
Notes:	One story, side gable cottage on back of property is the 1942 house.			Thomas Map Page No#:	685
				Field Inspection Date:	9/6/94

File Number:	D40-09				
Historic Name:	Hickman House (temp)	Common Name:	Hickman House	Current Owner Name:	William Hickman
Site Address:	24433 Marine View Drive South	Neighborhood:	Zenith	*Historic Significance:	Important
Year Constructed:	1942	Architect/Engineer/Builder:		*Architecture Significance:	Special Style
Other Historic Archives:	None	Recommended By:	Assessor 94		
Current Status:	Original Condition	*Risk to Status:	nra3	Map Designation:	
Notes:	House			Thomas Map Page No#:	715
				Field Inspection Date:	9/6/94

214

*Historic Codes: A=Important, B=Rare Building, C=Common, U=Unknown
Architecture Codes: A=Special Style, B=Common, C=Minor Alteration of "A" or "B", D=Larger Alteration, R=Remodel or Demolition
Risk Codes: None, NRA, nra3, Development -Owner

City of Des Moines
Historic and Archeological Properties of Local Significance

File Number: D40-23

Historic Name: Steinkler Hardware
Common Name: Blais of Des Moines
Current Owner Name: Ken Blais

Site Address: 22607 Marine View Drive South
Neighborhood: Des Moines
***Historic Significance:** Important

Year Constructed: 1947
Architect/Engineer/Builder:
***Architecture Significance:** Special Style

Other Historic Archives: None
Recommended By: Kennedy 89

Current Status: Remodeled in 1957 with
***Risk to Status:** nra3
Map Designation:

Notes: Built as Steinkler Hardware in 1947. Steinkler sold to Ken Blais and he remodel the store for selling boats and marine supplies in 1957. Metal building.

Thomas Map Page No#: 685
Field Inspection Date: 9/21/94

File Number: D40-24

Historic Name: Sturdy House (temp)
Common Name: Sturdy House
Current Owner Name: Annie Sturdy

Site Address: 825 222 Street South
Neighborhood: Des Moines
***Historic Significance:** Important

Year Constructed: 1947
Architect/Engineer/Builder:
***Architecture Significance:** Special Style

Other Historic Archives: None
Recommended By: Keiser 94

Current Status: Unaltered.
***Risk to Status:** nra3
Map Designation: *

Notes: Unique stone house with metal industrial windows from 1940s.

Thomas Map Page No#: 685
Field Inspection Date: 9/15/94

---

*Historic Codes: A=Important, B=Rare Building, C=Common, U=Unknown
Architecture Codes: A=Special Style, B=Common, C=Minor Alteration of "A" or "B", D=Larger Alteration, R=Remodel or Demolition
Risk Codes: None, NRA, nra3, Development -Owner

City of Des Moines
Historic and Archeological Properties of Local Significance

File Number: D40-14

Historic Name: Goldsbury House (temp)
Common Name: Goldsbury House
Current Owner Name: Gary Goldsbury

Site Address: 23457 14th Ave South
Neighborhood: Des Moines
***Historic Significance:** Important

Year Constructed: 1943
Architect/Engineer/Builder:
***Architecture Significance:** Special Style

Other Historic Archives: None
Recommended By: Assessor 94

Current Status: Unaltered.
***Risk to Status:** NRA
Map Designation:

Notes: Pyramid roof style.

Thomas Map Page No#: 685
Field Inspection Date: 9/6/94

File Number: D40-15

Historic Name: Pacific Telephone Station
Common Name: US West Switching Station
Current Owner Name: US West

Site Address: 22600 20th Ave South
Neighborhood: Midway
***Historic Significance:** Important

Year Constructed: 1943
Architect/Engineer/Builder:
***Architecture Significance:** Special Style

Other Historic Archives: None
Recommended By: Assessor 94

Current Status: Original condition.
***Risk to Status:** NRA
Map Designation:

Notes: One story, small brick structure with no window and one door.

Thomas Map Page No#: 685
Field Inspection Date: 9/6/94

---

*Historic Codes: A=Important, B=Rare Building, C=Common, U=Unknown
Architecture Codes: A=Special Style, B=Common, C=Minor Alteration of "A" or "B", D=Larger Alteration, R=Remodel or Demolition
Risk Codes: None, NRA, nra3, Development -Owner

City of Des Moines
Historic and Archeological Properties of Local Significance

File Number:	D50-04				
Historic Name:	Olympic Elementary Scho	Common Name:	Olympic Elementary Scho	Current Owner Name:	Highline School District
Site Address:	615 / 200 Street South	Neighborhood:	Northhill	*Historic Significance:	Important
Year Constructed:	1954	Architect/Engineer/Builder:		*Architecture Significance:	Special Style
Other Historic Archives:	None	Recommended By:	Kennedy 89		
Current Status:	Original Condition.	*Risk to Status:	nra3	Map Designation:	*
Notes:	One of many modern, suburban elementary schools for Post WWII growth. Modern style of single story with steel frame, brick and window walls.			Thomas Map Page No#:	685
				Field Inspection Date:	9/21/94

File Number:	D50-05				
Historic Name:	Wesley Homes - The Gard	Common Name:	Wesley Gardens	Current Owner Name:	United Methodist Church
Site Address:	815 / 216 Street South	Neighborhood:	Des Moines	*Historic Significance:	Important
Year Constructed:	1954	Architect/Engineer/Builder:	William Bain & Harrison Overt	*Architecture Significance:	Special Style
Other Historic Archives:	None	Recommended By:	Kennedy 89		
Current Status:	Excellent condition.	*Risk to Status:	NRA	Map Designation:	*
Notes:	One of few remaining international style buildings in King County without remodeling or additions. Designed by William Bain on his way to creating NBBJ, one of the largest architectural firms in the United States.			Thomas Map Page No#:	685
				Field Inspection Date:	8/30/94

1642

City of Des Moines
Historic and Archeological Properties of Local Significance

File Number:	D40-19				
Historic Name:	Nesser House (temp)	Common Name:	Unknown	Current Owner Name:	Alan Nesser
Site Address:	22436 / 30th Ave South	Neighborhood:	Midway	*Historic Significance:	Important
Year Constructed:	1944	Architect/Engineer/Builder:		*Architecture Significance:	Special Style
Other Historic Archives:	None	Recommended By:	Assessor 94		
Current Status:	Original condition.	*Risk to Status:	NRA	Map Designation:	
Notes:	Modest contemporary house.			Thomas Map Page No#:	685
				Field Inspection Date:	9/6/94

File Number:	D40-20				
Historic Name:	Bay Cleaners & Tailor	Common Name:	Neptune Books	Current Owner Name:	Merle & Bonnie Osgood
Site Address:	22319 / Marine View Drive South	Neighborhood:	Des Moines	*Historic Significance:	Important
Year Constructed:	1946	Architect/Engineer/Builder:		*Architecture Significance:	Special Style
Other Historic Archives:	None	Recommended By:	Kennedy 89		
Current Status:	Remodeled in 1994 with	*Risk to Status:	nra3	Map Designation:	
Notes:	Bay Cleaners was started and built by Ralph & Alice Weissenstein. The business ran between 1946 & 1976.			Thomas Map Page No#:	685
				Field Inspection Date:	9/21/94

City of Des Moines
Historic and Archeological Properties of Local Significance

File Number: D50-08

Historic Name: Chapel of the Bells | **Common Name:** Discovery World Day Care | **Current Owner Name:** Unknown

Site Address: 22038 | 9 Ave South | **Neighborhood:** Des Moines | ***Historic Significance:** Important

Year Constructed: 1956 | **Architect/Engineer/Builder:** | ***Architecture Significance:** Special Style

Other Historic Archives: None | **Recommended By:** Kennedy 89

Current Status: Original condition exter | ***Risk to Status:** nra3 | **Map Designation:**

Notes: Used by Baptists and Christian Scientists as church.

Thomas Map Page No#: 685

Field Inspection Date: 8/30/94

File Number: D50-09

Historic Name: Lutheran Church of the Re | **Common Name:** Highline Reformed Presbyt | **Current Owner Name:** Unknown

Site Address: 106 | 206 Street South | **Neighborhood:** Northhill | ***Historic Significance.** Important

Year Constructed: 1956 | **Architect/Engineer/Builder:** | ***Architecture Significance:** Special Style

Other Historic Archives: None | **Recommended By:** Kennedy 89

Current Status: Non Surveyed. | ***Risk to Status:** nra3 | **Map Designation:**

Notes:

Thomas Map Page No#: 684

Field Inspection Date:

214

*Historic Codes: A=Important, B=Rare Building, C=Common, U=Unknown
Architecture Codes: A=Special Style, B=Common, C=Minor Alteration of "A" or "B",
D=Larger Alteration, R=Remodel or Demolition
Risk Codes: None, NRA, nra3, Development -Owner

1643

City of Des Moines
Historic and Archeological Properties of Local Significance

File Number: D50-01

Historic Name: Fire District #26 Station | **Common Name:** Quality Auto Electric | **Current Owner Name:** Sven Heinonen

Site Address: 22231 | Marine View Drive South | **Neighborhood:** Des Moines | ***Historic Significance:** Important

Year Constructed: 1952 | **Architect/Engineer/Builder:** | ***Architecture Significance:** Special Style

Other Historic Archives: None | **Recommended By:** Kennedy 89

Current Status: Original condition with r | ***Risk to Status:** nra3 | **Map Designation:**

Notes: First Des Moines Fire House. One story, brick structure.

Thomas Map Page No#: 685

Field Inspection Date: 9/21/94

File Number: D50-02

Historic Name: Northhill Subdivision '53 | **Common Name:** Unknown | **Current Owner Name:** Nine Owners

Site Address: 20801 | 7th Place South | **Neighborhood:** Northhill | ***Historic Significance:** Important

Year Constructed: 1953 | **Architect/Engineer/Builder:** | ***Architecture Significance:** Special Style

Other Historic Archives: None | **Recommended By:** Assessor 94

Current Status: All nine houses in excell | ***Risk to Status:** nra3 | **Map Designation:** *

Notes: Only ranch house subdivision intact in Des Moines from 1945-54. Single hip roof, long brick construction. Garage in basement. Nine buildings on both side of street. Numbers are 20801, 02, 09, 10, 16, 17, 21, 22, 31.

Thomas Map Page No#: 685

Field Inspection Date: 9/6/94

214

*Historic Codes: A=Important, B=Rare Building, C=Common, U=Unknown
Architecture Codes: A=Special Style, B=Common, C=Minor Alteration of "A" or "B",
D=Larger Alteration, R=Remodel or Demolition
Risk Codes: None, NRA, nra3, Development -Owner

City of Des Moines
Historic and Archeological Properties of Local Significance

File Number:	D60-13				
Historic Name:	Mt. Rainier High School	Common Name:	Mt. Rainier High School	Current Owner Notes:	Highline School District
Site Address:	22450 19 Ave South	Neighborhood:	Midway	*Historic Significance:	Important
Year Constructed:	1958	Architect/Engineer/Builder:	Steinhart, Theiriault, Anderson.	*Architecture Significance:	Special Style
Other Historic Archives:	None	Recommended By:	Kennedy 94		
Current Status:	Most likely in original co	*Risk to Status:	NRA	Map Designation:	
Notes:	First and only regional high school in Des Moines.			Thomas Map Page No#:	685
				Field Inspection Date:	8/30/94

File Number:	D60-01				
Historic Name:	Assembly of God Church	Common Name:	Assembly of God Church	Current Owner Name:	Assembly of God Church
Site Address:	21650 24 Ave South	Neighborhood:	Midway	*Historic Significance:	Important
Year Constructed:	1960	Architect/Engineer/Builder:	Gordon Walen, Bld.	*Architecture Significance:	Special Style
Other Historic Archives:	None	Recommended By:	Kennedy 89		
Current Status:	Good Condition. Under	*Risk to Status:	NRA	Map Designation:	
Notes:	Community church organization.			Thomas Map Page No#:	685
				Field Inspection Date:	8/30/94

1644

City of Des Moines
Historic and Archeological Properties of Local Significance

File Number:	D60-06				
Historic Name:	Midway Intermediate Scho	Common Name:	Midway Elementary School	Current Owner Name:	Highline School District
Site Address:	22447 24 Ave South	Neighborhood:	Midway	*Historic Significance:	Important
Year Constructed:	1955	Architect/Engineer/Builder:		*Architecture Significance:	Special Style
Other Historic Archives:	None	Recommended By:	Kennedy 89		
Current Status:	Additions in 1957. Good	*Risk to Status:	NRA	Map Designation:	*
Notes:	Major intermediate school in post-WWII school planning of elementary, intermediate and high schools.			Thomas Map Page No#:	685
				Field Inspection Date:	8/30/94

File Number:	D60-07				
Historic Notes:	St. Philomena Catholic Ch	Common Name:	St. Philomena Catholic Ch	Current Owner Name:	St. Philomena
Site Address:	1790 222 Street South	Neighborhood:	Des Moines	*Historic Significance:	Important
Year Constructed:	1955	Architect/Engineer/Builder:	Roger Gotteland, Arch.	*Architecture Significance:	Special Style
Other Historic Archives:	None	Recommended By:	Kennedy 89		
Current Status:	Original condition excep	*Risk to Status:	NRA	Map Designation:	*
Notes:	Catholic Services had been held in Des Moines since 1925 and in a remodeled home since 1927. New church designed by prominent Seattle architect Roger Gotteland in 1954. In 1989, the church had 2500 members. The design is concrete frame infilled with brick and industrial metal glazing.			Thomas Map Page No#:	685
				Field Inspection Date:	8/30/94

City of Des Moines
Historic and Archeological Properties of Local Significance

File Number: D60-04

Historic Name: Rocky House | Common Name: Miller Estate | Current Owner Name: SeaTac Port Authority

Site Address: 1622 | 216 Street South | Neighborhood: Des Moines | *Historic Significance: Important

Year Constructed: 1960 | Architect/Engineer/Builder: Howard Fidler, Arch. | *Architecture Significance: Special Style

Other Historic Archives: None | Recommended By: SAM Tour 63

Current Status: Abandoned. Windows b | *Risk to Status: NRA | Map Designation:

Notes: Seattle Art Museum Tour, 1963. In 1994, community movement to use home as a SAVE home for Des Moines area high school students. See P-I, Sept. 26, 1994, page B1

Thomas Map Page No#: 685

Field Inspection Date: 8/30/94

File Number: D60-05

Historic Name: Pacific Middle School | Common Name: Pacific Middle School | Current Owner Name: Highline School District

Site Address: 22705 | 24 Place South | Neighborhood: Midway | *Historic Significance: Important

Year Constructed: 1961 | Architect/Engineer/Builder: | *Architecture Significance: Special Style

Other Historic Archives: None | Recommended By: Kennedy 89

Current Status: Complete Remodel. In 1 | *Risk to Status: NRA | Map Designation:

Notes: Suburban school. Good Design.

Thomas Map Page No#: 685

Field Inspection Date: 8/30/94

---

*Historic Codes: A=Important, B=Rare Building, C=Common, U=Unknown
Architecture Codes: A=Special Style, B=Common, C=Minor Alteration of "A" or "B", D=Larger Alteration, R=Remodel or Demolition
Risk Codes: None, NRA, ara3, Development -Owner

City of Des Moines
Historic and Archeological Properties of Local Significance

File Number: D50-10

Historic Name: Grace Lutheran Church | Common Name: Grace Lutheran Church | Current Owner Name: Grace Lutheran Church

Site Address: 22975 | 24 Ave South | Neighborhood: Midway | *Historic Significance: Important

Year Constructed: 1957 | Architect/Engineer/Builder: | *Architecture Significance: Special Style

Other Historic Archives: None | Recommended By: Kennedy 89

Current Status: Additions made in 1981. | *Risk to Status: NRA | Map Designation:

Notes: The Lutheran Church was founded in 1956 with 151 members and had grown to 1160 members by 1989. The church as contributed Des Moines through the Des Moines Food Bank and the resettlement of Southasian refugees.

Thomas Map Page No#: 685

Field Inspection Date: 8/30/94

File Number: D50-12

Historic Name: Fire District #26 Station | Common Name: Des Moines Fire Station | Current Owner Name: Fire District

Site Address: 2238 | 223 Street South | Neighborhood: Midway | *Historic Significance: Important

Year Constructed: 1958 | Architect/Engineer/Builder: | *Architecture Significance: Special Style

Other Historic Archives: None | Recommended By: Kennedy 89

Current Status: Extensive remodeling wi | *Risk to Status: NRA | Map Designation:

Notes: Second Des Moines Firehouse.

Thomas Map Page No#: 685

Field Inspection Date: 9/21/94

---

*Historic Codes: A=Important, B=Rare Building, C=Common, U=Unknown
Architecture Codes: A=Special Style, B=Common, C=Minor Alteration of "A" or "B", D=Larger Alteration, R=Remodel or Demolition
Risk Codes: None, NRA, ara3, Development -Owner

City of Des Moines
Historic and Archeological Properties of Local Significance

File Number: D60-08

Historic Name: Marcus Whitman Presbyter
Common Name: Marcus Whitman Presbyter
Current Owner Name: Whitman Presbyterian

Site Address: 2130 | 248 Street South
Neighborhood: Midway
***Historic Significance:** Important

Year Constructed: 1962
Architect/Engineer/Builder:
***Architecture Significance:** Special Style

Other Historic Archives: None
Recommended By: Kennedy 89

Current Status: Original unaltered condit
***Risk to Status:** NRA
Map Designation:

Notes: Community church since 1962. Good Contemporary Design in dark wood.
Thomas Map Page No#: 715

Field Inspection Date: 9/21/94

File Number: D60-09

Historic Name: Victory Baptist Church
Common Name: Victory Baptist Church
Current Owner Name: Victory Baptist Church

Site Address: 1807 | 223 Street South
Neighborhood: Des Moines
***Historic Significance:** Important

Year Constructed: 1963
Architect/Engineer/Builder: Donald Freeman, Arch.
***Architecture Significance:** Special Style

Other Historic Archives: None
Recommended By: Kennedy 89

Current Status: Good Condition. Unalter
***Risk to Status:** NRA
Map Designation:

Notes: Community church organization.
Thomas Map Page No#: 685

Field Inspection Date: 8/30/94

214

1646

City of Des Moines
Historic and Archeological Properties of Local Significance

File Number: D60-02

Historic Name: Des Moines Methodist Chu
Common Name: Des Moines Methodist Chu
Current Owner Name: Des Moines Methodist

Site Address: 22225 | 9 Ave South
Neighborhood: Des Moines
***Historic Significance:** Important

Year Constructed: 1960
Architect/Engineer/Builder:
***Architecture Significance:** Special Style

Other Historic Archives: None
Recommended By: Kennedy 89

Current Status: 1960 is Sanctuary date.
***Risk to Status:** NRA
Map Designation:

Notes: Active church in the Des Moines community.
Thomas Map Page No#: 685

Field Inspection Date: 8/30/94

File Number: D60-03

Historic Name: Parkside Primary School
Common Name: Parkside Primary School
Current Owner Name: Highline School District

Site Address: 2104 | 247 Street South
Neighborhood: Midway
***Historic Significance:** Important

Year Constructed: 1960
Architect/Engineer/Builder:
***Architecture Significance:** Special Style

Other Historic Archives: None
Recommended By: Kennedy 89

Current Status: Additions in 1964
***Risk to Status:** NRA
Map Designation:

Notes: One of many modern, suburban elementary schools for Post WWII growth. Modern style of single story with steel frame, brick and window walls.
Thomas Map Page No#: 715

Field Inspection Date: 9/21/94

214

City of Des Moines
Historic and Archeological Properties of Local Significance

File Number: D60-12

Historic Name: Des Moines Masonic Tem | **Common Name:** Des Moines Masonic Temp | **Current Owner Name:** Des Moines Masonic Templ

Site Address: 2208 | 223 Street South | **Neighborhood:** Des Moines | ***Historic Significance:** Important

Year Constructed: 1968 | **Architect/Engineer/Builder:** | ***Architecture Significance:** Special Style

Other Historic Archives: None | **Recommended By:** Kennedy 89

Current Status: Original condition | ***Risk to Status:** NRA | **Map Designation:**

Notes: Masonic lodge for Des Moines chapter started before 1921. Concrete block walls and glue laminated roof beams.

Thomas Map Page No#: 685

Field Inspection Date: 8/30/94

File Number: D99-01

Historic Name: M.V.D. Unknown House | **Common Name:** Unknown | **Current Owner Name:** Unknown

Site Address: 22220 | Marine View Drive South | **Neighborhood:** Zenith | ***Historic Significance:** Important

Year Constructed: | **Architect/Engineer/Builder:** | ***Architecture Significance:** Special Style

Other Historic Archives: None | **Recommended By:** Weiss 94

Current Status: Good Condition. Unalter | ***Risk to Status:** nra3 | **Map Designation:**

Notes: Original craftsman style house. House not listed in assessor's pre-1945 list.

Thomas Map Page No#: 715

Field Inspection Date: 9/6/94

1647

City of Des Moines
Historic and Archeological Properties of Local Significance

File Number: D60-06

Historic Name: Wesley Homes - The Terra | **Common Name:** Wesley Gardens | **Current Owner Name:** United Methodist Chur

Site Address: 816 | 216 Street South | **Neighborhood:** Des Moines | ***Historic Significance:** Important

Year Constructed: 1961 | **Architect/Engineer/Builder:** William Bain & Harmson Overt | ***Architecture Significance:** Special Style

Other Historic Archives: None | **Recommended By:** SAM Tour Brochure, Kennedy 89

Current Status: Excellent. Unaltered | ***Risk to Status:** NRA | **Map Designation:**

Notes: Design by William Bain. Seattle Art Museum Tour, 1983

Thomas Map Page No#: 685

Field Inspection Date: 8/30/94

File Number: D60-07

Historic Name: Judson Park Retirement C | **Common Name:** Judson Park Retirement C | **Current Owner Name:** Baptist Church

Site Address: 23600 | Marine View Drive South | **Neighborhood:** Zenith | ***Historic Significance:** Important

Year Constructed: 1962 | **Architect/Engineer/Builder:** | ***Architecture Significance:** Special Style

Other Historic Archives: None | **Recommended By:** Kennedy 89

Current Status: Excellent. Unaltered. | ***Risk to Status:** nra3 | **Map Designation:**

Notes: One of three major retirement facilities in Des Moines. Designed in American modernism, open balcony hotel style.

Thomas Map Page No#: 685

Field Inspection Date: 8/30/94

City of Des Moines
Historic and Archeological Properties of Local Significance

File Number: H50-03
Historic Name: Woodside School
Common Name: Woodside School
Current Owner Name: Highline School District
Site Address: 18367 8 Ave South
Neighborhood: Northhill
*Historic Significance: Important
Year Constructed: 1958
Architect/Engineer/Builder:
*Architecture Significance: Special Style
Other Historic Archives: None
Recommended By: Kennedy 89
Current Status: Original Condition of bui
*Risk to Status: nra3
Map Designation:
Notes: Began as school for the mentally handicapped and currently used for special education programs and Highline School District facilities department.
Thomas Map Page No#: 685
Field Inspection Date:

File Number: W30-01
Historic Name: Salt Water State Park
Common Name: Salt Water State Park
Current Owner Name: State of Washington
Site Address: 25201 Marine View Drive S
Neighborhood: Woodmont
*Historic Significance: Important
Year Constructed: 1934
Architect/Engineer/Builder: Civilian Conservation Corps #
*Architecture Significance: Special Style
Other Historic Archives: None
Recommended By: Kennedy 89
Current Status: Manager's house unalter
*Risk to Status: nra3
Map Designation: *
Notes: Excellent CCC construction of log style manager's house with stone fire place, two shelters, stone park entrance and stone picnic point fireplace.
Thomas Map Page No#: 715
Field Inspection Date: 8/30/94

214

July 24, 1995

*Historic Codes: A=Important, B=Rare Building, C=Common, U=Unknown
Architecture Codes: A=Special Style, B=Common, C=Minor Alteration of "A" or "B",
D=Larger Alteration, R=Remodel or Demolition
Risk Codes: None, NRA, nra3, Development -Owner

1648

City of Des Moines
Historic and Archeological Properties of Local Significance

File Number: D60-10
Historic Name: Des Moines Library
Common Name: Grace Day Care
Current Owner Name: Unknown
Site Address: 22815 24 Ave South
Neighborhood: Midway
*Historic Significance: Important
Year Constructed: 1964
Architect/Engineer/Builder: John Kaisbam, Arch.
*Architecture Significance: Special Style
Other Historic Archives: None
Recommended By: Kennedy 89
Current Status: Exterior unaltered. Interi
*Risk to Status: NRA
Map Designation:
Notes: First building constructed in Des Moines as a Library.
Thomas Map Page No#: 685
Field Inspection Date: 8/30/94

File Number: D60-11
Historic Name: Highline Community Colle
Common Name: Highline Community Colle
Current Owner Name: State of Washington
Site Address: 2400 240 Street South
Neighborhood: Midway
*Historic Significance: Important
Year Constructed: 1964
Architect/Engineer/Builder: Ralph Burkhard, Arch.
*Architecture Significance: Special Style
Other Historic Archives: None
Recommended By: Kennedy 89
Current Status: Excellent with original 14
*Risk to Status: NRA
Map Designation:
Notes: Part of the Post-WWII community college movement and construction. Clean modern design. Very unique, concrete shell lecture hall in center of campus. Concrete relief murals on lecture hall by Inez Burkhard.
Thomas Map Page No#: 715
Field Inspection Date: 8/30/94

214

July 24, 1995

*Historic Codes: A=Important, B=Rare Building, C=Common, U=Unknown
Architecture Codes: A=Special Style, B=Common, C=Minor Alteration of "A" or "B",
D=Larger Alteration, R=Remodel or Demolition
Risk Codes: None, NRA, nra3, Development -Owner

214

CITY OF DES MOINES HISTORIC PROPERTIES SURVEY—1995

PROPERTIES DELETED FROM THE HISTORICAL AND ARCHEOLOGICAL PROPERTIES OF LOCAL SIGNIFICANCE

Updated July 24, 1995

City of Des Moines

Historic and Archeological Properties of Local Significance

File Number: 1830-01

Historic Name: North Hill Elementary | **Common Name:** North Hill Elementary | **Current Owner Name:** Highline School District

Site Address: 19835 8 Ave South | **Neighborhood:** Northhill | ***Historic Significance:** Important

Year Constructed: | **Architect/Engineer/Builder:** | ***Architecture Significance:** Special Style

Other Historic Archives: None | **Recommended By:** Kennedy 89

Current Status: Original Condition. | ***Risk to Status:** NRA | **Map Designation:**

Notes: One of many modern, suburban elementary schools for Post WWII growth. Modern style of single story with steel frame, brick and window walls.

Thomas Map Page No#: 685

Field Inspection Date: 8/30/94

File Number: 1830-02

Historic Name: Southminister Presbyteria | **Common Name:** Southminister Presbyterian | **Current Owner Name:** Southminister Presbyterian

Site Address: 19834 8 Ave South | **Neighborhood:** Northhill | ***Historic Significance:** Important

Year Constructed: 1957 | **Architect/Engineer/Builder:** | ***Architecture Significance:** Special Style

Other Historic Archives: None | **Recommended By:**

Current Status: Original unaltered condit | ***Risk to Status:** NRA | **Map Designation:**

Notes: Community church since 1957. Contemporary Design.

Thomas Map Page No#: 685

Field Inspection Date: 9/21/94

---

*Historic Codes: A=Important, B=Rare Building, C=Common, U=Unknown
Architecture Codes: A=Special Style, B=Common, C=Minor Alteration of "A" or "B", D=Larger Alteration, R=Remodel or Demolition
Risk Codes: None, NRA, nra3, Development -Owner

City of Des Moines
Properties Deleted from the
Historic and Archeological Properties of Local Significance

File Number: D00-06

Historic Name: Smith House | **Common Name:** Pool House | **Current Owner Name:** Lonnie Pool

Site Address: 22204 9 Ave South | **Neighborhood:** Des Moines | ***Historic Significance:** Important

Year Constructed: 1900 | **Architect/Engineer/Builder:** | ***Architecture Significance:** Special Style

Other Historic Archives: KC 0464 | **Recommended By:** KC Survey 78, Kennedy 89, Draper 75

Current Status: Good, unaltered conditi | ***Risk to Status:** nra3 | **Map Designation:** *

Notes: Excellent surviving example of the Pioneer Classic Box. Very little is known about the L.M.Smith.

Thomas Map Page No#: 685

Field Inspection Date: 8/30/94

File Number: D00-09

Historic Name: Wedell House (Temp) | **Common Name:** Manz House | **Current Owner Name:** David Manz

Site Address: 1105 240 Ave South | **Neighborhood:** Zenith | ***Historic Significance:** Important

Year Constructed: 1905 | **Architect/Engineer/Builder:** | ***Architecture Significance:** Special Style

Other Historic Archives: None | **Recommended By:** Draper 94

Current Status: Fair Condition newer sidi | ***Risk to Status:** NRA | **Map Designation:**

Notes: Older home remaining house. Folk, pyramid roof style with front porch.

Thomas Map Page No#: 715

Field Inspection Date: 8/30/94

214

*Historic Codes: A=Important, B=Rare Building, C=Common, U=Unknown
Architecture Codes: A=Special Style, B=Common, C=Minor Alteration of "A" or "B",
D=Larger Alteration, R=Remodel or Demolition
Risk Codes: None, NRA, nra3, Development -Owner

1650

City of Des Moines
Historic and Archeological Properties of Local Significance

File Number: W30-02

Historic Name: State's Highway Inn | **Common Name:** Ross's Highway Inn | **Current Owner Name:** Unknown

Site Address: 26915 Pacific Highway South | **Neighborhood:** Woodmont | ***Historic Significance:** Important

Year Constructed: 1939 | **Architect/Engineer/Builder:** | ***Architecture Significance:** Special Style

Other Historic Archives: None | **Recommended By:** Kennedy 89

Current Status: New vinyl siding and rep | ***Risk to Status:** NRA | **Map Designation:**

Notes: Started by Rose Wilcox in an abandoned restaurant called Mamie's. One of several "chicken restaurants" along Pacific Highway South before the open of I-5. Trudy's Tavern and Roses may be the last operating restaurants in South King County from the Pacific Highway Touring Days. "Big House" design with nice neon highway sign.

Thomas Map Page No#: 715

Field Inspection Date: 9/21/94

File Number: W50-11

Historic Name: Harvey's Skin Dive Suits | **Common Name:** Harvey's Skin Dive Suits | **Current Owner Name:** Harvey's Skin Dive Suits

Site Address: 2505 252 Street South | **Neighborhood:** Midway | ***Historic Significance:** Important

Year Constructed: 1957 | **Architect/Engineer/Builder:** | ***Architecture Significance:** Special Style

Other Historic Archives: None | **Recommended By:** Kennedy 89

Current Status: Unaltered, poured in pla | ***Risk to Status:** NRA | **Map Designation:**

Notes: Nationally recognized maker of skin diving suits. May be only manufacturing company in Des Moines.

Thomas Map Page No#: 715

Field Inspection Date: 9/21/94

214

*Historic Codes: A=Important, B=Rare Building, C=Common, U=Unknown
Architecture Codes: A=Special Style, B=Common, C=Minor Alteration of "A" or "B",
D=Larger Alteration, R=Remodel or Demolition
Risk Codes: None, NRA, nra3, Development -Owner

City of Des Moines
Properties Deleted from the
Historic and Archeological Properties of Local Significance

File Number: D10-06

Historic Name: Owen House (temp) **Common Name:** Owen House **Current Owner Name:** Barbara Owen

Site Address: 22335 6th Ave South **Neighborhood:** Des Moines ***Historic Significance:** Important

Year Constructed: 1914 **Architect/Engineer/Builder:** ***Architecture Significance:** Special Style

Other Historic Archives: None **Recommended By:** Assessor 94

Current Status: Under restoration in 199 ***Risk to Status:** nra3 **Map Designation:**

Notes: Craftsman bungalow. **Thomas Map Page No#:** 685

Field Inspection Date: 9/6/94

File Number: D10-09

Historic Name: Dooley House (temp) **Common Name:** Dooley House **Current Owner Name:** Marguerite Dooley

Site Address: 24218 7th Ave South **Neighborhood:** Zenith ***Historic Significance:** Important

Year Constructed: 1917 **Architect/Engineer/Builder:** ***Architecture Significance:** Special Style

Other Historic Archives: None **Recommended By:** Assessor 94

Current Status: Good Condition. Unalter ***Risk to Status:** nra3 **Map Designation.** *

Notes: Original craftsman style house. May have been guesthouse to Carby House. **Thomas Map Page No#:** 715

Field Inspection Date: 9/6/94

1651

City of Des Moines
Properties Deleted from the
Historic and Archeological Properties of Local Significance

File Number: D00-01

Historic Name: Qab-waila **Common Name:** Glistening Rock **Current Owner Name:** Des Moines Marina

Site Address: 421 227 Street South **Neighborhood:** Des Moines ***Historic Significance.** Important

Year Constructed: **Architect/Engineer/Builder:** ***Architecture Significance:** Special Style

Other Historic Archives: KC E10 **Recommended By:** Kennedy 89, Bourge 89, KC Sites 92

Current Status: Buried under the parking ***Risk to Status:** nra3 **Map Designation:** *

Notes: Ko-KWOl-li-ash Story of the Native peoples. The wife of Ko-KWOl-li-ash was transformed into stone. Qab-waila has been translated as "glistening white". **Thomas Map Page No#:** 684

Field Inspection Date: 8/30/94

File Number: D00-03

Historic Name: Van Gasken House **Common Name:** Bury House **Current Owner Name:** Henrietta Bury

Site Address: 402 222 Street South **Neighborhood:** Des Moines ***Historic Significance:** Important

Year Constructed: 1889 **Architect/Engineer/Builder:** Van Gasken, Bld. ***Architecture Significance:** Special Style

Other Historic Archives: KC 0457 **Recommended By:** KC Survey 78, Kennedy 89, Draper 75

Current Status: Excellent condition. Re ***Risk to Status:** nra3 **Map Designation:** *

Notes: William Van Gasken purchased the waterfront sawmill and built the house in 1889, and then sold both in 1892. He returned to the house in 1910 and became active citizen. In 1978, Van Gasken's daughter lived in the house. **Thomas Map Page No#:** 684

Field Inspection Date: 8/30/94

City of Des Moines
Properties Deleted from the
Historic and Archeological Properties of Local Significance

File Number: D20-05

Historic Name: Haines House (Temp) | **Common Name:** Haines House | **Current Owner Name:** Elizabeth Haines

Site Address: 601 240 Street South | **Neighborhood:** Zenith | ***Historic Significance:** Important

Year Constructed: 1922 | **Architect/Engineer/Builder:** | ***Architecture Significance:** Special Style

Other Historic Archives: None | **Recommended By:** Draper 94

Current Status: Original, unaltered from a | ***Risk to Status:** nra3 | **Map Designation:** *

Notes: Two story, pyramid wood home in Prairie large brackets at overhang.

Thomas Map Page No#: 715

Field Inspection Date: 8/30/94

File Number: D20-07

Historic Name: Fisher Compound | **Common Name:** Fisher Compound | **Current Owner Name:** D.K. Fisher

Site Address: 23435 Moines View Drive South | **Neighborhood:** Zenith | ***Historic Significance:** Important

Year Constructed: 1923 | **Architect/Engineer/Builder:** | ***Architecture Significance:** Special Style

Other Historic Archives: None | **Recommended By:** Kennedy 89, Draper 94

Current Status: Asbuilt, unaltered conditi | ***Risk to Status:** nra3 | **Map Designation:** *

Notes: One of summer vacation properties built in 1920's. The compound has four buildings. Normandy style guest house, mission style bungalow, farmhouse style mainhouse and 1960s organ house. The Fishers own KOMO radio and television.

Thomas Map Page No#: 685

Field Inspection Date: 8/30/94

214

*Historic Codes: A = Important, B = Rare Building, C = Common, U = Unknown
Architecture Codes: A = Special Style, B = Common, C = Minor Alteration of "A" or "B", D = Larger Alteration, R = Remodel or Demolition
Risk Codes: None, NRA, nra3, Development -Owner

1652

City of Des Moines
Properties Deleted from the
Historic and Archeological Properties of Local Significance

File Number: D10-01

Historic Name: Jorgensen House | **Common Name:** Simkins House | **Current Owner Name:** Simkins

Site Address: 24011 Moines View Drive South | **Neighborhood:** Zenith | ***Historic Significance:** Important

Year Constructed: 1914 | **Architect/Engineer/Builder:** | ***Architecture Significance:** Special Style

Other Historic Archives: None | **Recommended By:** Kennedy 89

Current Status: Moved from Mosonic Ho | ***Risk to Status:** nra3 | **Map Designation:** *

Notes: J.P. Jorgensen grew and sold flowers. He was the founding "master" of the Zenith Grange in 1911. Prairie style house.

Thomas Map Page No#: 715

Field Inspection Date: 8/30/94

File Number: D10-02

Historic Name: Lindahl House | **Common Name:** McConnaughey House | **Current Owner Name:** Ralph McConnaughey

Site Address: 304 216 Street South | **Neighborhood:** Des Moines | ***Historic Significance:** Important

Year Constructed: 1911 | **Architect/Engineer/Builder:** | ***Architecture Significance:** Special Style

Other Historic Archives: KC 0465 | **Recommended By:** KC Survey 78, Draper 75

Current Status: Close to original shape | ***Risk to Status:** nra3 | **Map Designation:** *

Notes: Little history is known, but valuable for original condition of architecture.

Thomas Map Page No#: 684

Field Inspection Date: 8/30/94

214

*Historic Codes: A = Important, B = Rare Building, C = Common, U = Unknown
Architecture Codes: A = Special Style, B = Common, C = Minor Alteration of "A" or "B", D = Larger Alteration, R = Remodel or Demolition
Risk Codes: None, NRA, nra3, Development -Owner

City of Des Moines
Properties Deleted from the
Historic and Archeological Properties of Local Significance

File Number:	D20-15				
Historic Name:	Seman House (temp)	Common Name:	Seman House	Current Owner Name:	Norma Seman
Site Address:	23533 7th Ave South	Neighborhood:	Des Moines	*Historic Significance:	Important
Year Constructed:	1926	Architect/Engineer/Builder:		*Architecture Significance:	Special Style
Other Historic Archives:	None	Recommended By:	Assessor 94		
Current Status:	Probable addition and a	*Risk to Status:	nra3	Map Designation:	
Notes:	Large, summer house in Neo-colonial eclectic. Norma Seman and her husband John Seman founded Johnny's Food Centers in 1945. (See Ellington House as earlier residence in Des Moines)			Thomas Map Page No#:	685
				Field Inspection Date:	9/6/94

File Number:	D30-06				
Historic Name:	Booth House (temp)	Common Name:	Booth House	Current Owner Name:	Betty Booth
Site Address:	1118 222 Street South	Neighborhood:	Des Moines	*Historic Significance.	Important
Year Constructed:	1934	Architect/Engineer/Builder:		*Architecture Significance:	Special Style
Other Historic Archives:	None	Recommended By:	Assessor 94		
Current Status:	Excellent original conditi	*Risk to Status:	nra3	Map Designation:	
Notes:	Excellent 1930's House.			Thomas Map Page No#:	685
				Field Inspection Date:	9/6/94

*Historic Codes: A=Important, B=Rare Building, C=Common, U=Unknown
Architecture Codes: A=Special Style, B=Common, C=Minor Alteration of "A" or "B".
D=Larger Alteration, R=Remodel or Demolition
Risk Codes: None, NRA, nra3, Development -Owner

City of Des Moines
Properties Deleted from the
Historic and Archeological Properties of Local Significance

File Number:	D10-10				
Historic Name:	AMCO House (temp)	Common Name:	Unknown	Current Owner Name:	AMCO Investments
Site Address:	1855 216 Street South	Neighborhood:	Des Moines	*Historic Significance:	Important
Year Constructed:	1918	Architect/Engineer/Builder:		*Architecture Significance:	Special Style
Other Historic Archives:	None	Recommended By:	Assessor 94		
Current Status:	Fair, unaltered condition.	*Risk to Status:	Dev	Map Designation:	
Notes:	Fair condition, craftsman style, side gable wooden house.			Thomas Map Page No#:	685
				Field Inspection Date:	9/6/94

File Number:	D20-02				
Historic Name:	Hill Farm (temp)	Common Name:	SH Ranch	Current Owner Name:	Elbert Hill
Site Address:	21815 24th Ave South	Neighborhood:	Midway	*Historic Significance:	Important
Year Constructed:	1920	Architect/Engineer/Builder:		*Architecture Significance:	Special Style
Other Historic Archives:	None	Recommended By:	Assessor 94		
Current Status:	Original house with poss	*Risk to Status:	Dev	Map Designation:	*
Notes:	Last farm remaining in Des Moines. Original craftsman style house.			Thomas Map Page No#:	685
				Field Inspection Date:	9/6/94

*Historic Codes: A=Important, B=Rare Building, C=Common, U=Unknown
Architecture Codes: A=Special Style, B=Common, C=Minor Alteration of "A" or "B".
D=Larger Alteration, R=Remodel or Demolition
Risk Codes: None, NRA, nra3, Development -Owner

City of Des Moines
Properties Deleted from the
Historic and Archeological Properties of Local Significance

File Number:	D00-33				
Historic Name:	Van Lack House (temp)	Common Name:	Van Lack House	Current Owner Name:	Gladys Van Lack
Site Address:	1915 222 Street South	Neighborhood:	Des Moines	*Historic Significance:	Important
Year Constructed:	1939	Architect/Engineer/Builder:		*Architecture Significance:	Special Style
Other Historic Archives:	None	Recommended By:	Assessor 94		
Current Status:	Good, original condition.	*Risk to Status:	NRA	Map Designation:	
Notes:	One story, side gable wooden house.			Thomas Map Page No#:	685
				Field Inspection Date:	9/6/94

File Number:	D40-05				
Historic Name:	Butler House	Common Name:	Butler House	Current Owner Name:	H.E. "Gene" Butler
Site Address:	2219 222 Street South	Neighborhood:	Des Moines	*Historic Significance:	Important
Year Constructed:	1942	Architect/Engineer/Builder:		*Architecture Significance:	Special Style
Other Historic Archives:	None	Recommended By:	Assessor 94, Kennedy 89		
Current Status:	Good Condition. Unalter	*Risk to Status:	NRA	Map Designation:	
Notes:	One story, side gable wooden home with garage. Gene Butler is the 1994 owner of Del's Auto Service. His father Wave Butler worked for Del Osterhout. The home is one block away from the Osterhout house on 222 Street South.			Thomas Map Page No#:	685
				Field Inspection Date:	9/6/94

1654

City of Des Moines
Properties Deleted from the
Historic and Archeological Properties of Local Significance

File Number:	D20-10				
Historic Name:	Sanju Cottage (temp)	Common Name:	Unknown	Current Owner Name:	Daisy Sanju
Site Address:	24800 16th Ave South	Neighborhood:	Des Moines	*Historic Significance:	Important
Year Constructed:	1924	Architect/Engineer/Builder:		*Architecture Significance:	Special Style
Other Historic Archives:	None	Recommended By:	Assessor 94		
Current Status:	Altered.	*Risk to Status:	NRA	Map Designation:	
Notes:	One room, cottage home.			Thomas Map Page No#:	685
				Field Inspection Date:	9/6/94

File Number:	D20-14				
Historic Name:	Somers Cottage (temp)	Common Name:	Somers House	Current Owner Name:	Norma Somers
Site Address:	23525 7th Ave South	Neighborhood:	Des Moines	*Historic Significance:	Important
Year Constructed:	1926	Architect/Engineer/Builder:		*Architecture Significance:	Special Style
Other Historic Archives:	None	Recommended By:	Assessor 94		
Current Status:	Unaltered except glass b	*Risk to Status:	nra3	Map Designation:	
Notes:	Craftsman, beach cottage.			Thomas Map Page No#:	685
				Field Inspection Date:	9/6/94

City of Des Moines
Properties Deleted from the
Historic and Archeological Properties of Local Significance

File Number:	D40-16
Historic Name:	Unino House (temp)
Common Name:	Unino House
Current Owner Name:	Paul Unino
Site Address:	2458 220 Street South
Neighborhood:	Midway
*Historic Significance:	Important
Year Constructed:	1943
Architect/Engineer/Builder:	
*Architecture Significance:	Special Style
Other Historic Archives:	None
Recommended By:	Assessor 94
Current Status:	Fair, original condition.
*Risk to Status:	NRA
Map Designation:	
Notes:	One story, hip roof, wooden house.
Thomas Map Page No#:	685
Field Inspection Date:	9/6/94

File Number:	D40-21
Historic Name:	? Camp House (temp)
Common Name:	Opsted House
Current Owner Name:	Chris Opsted
Site Address:	23415 14th Ave South
Neighborhood:	Zenith
*Historic Significance:	Important
Year Constructed:	1947
Architect/Engineer/Builder:	
*Architecture Significance:	Special Style
Other Historic Archives:	None
Recommended By:	Assessor 94
Current Status:	Excellent condition orig.
*Risk to Status:	NRA
Map Designation:	
Notes:	Original condition wooden Board & Batten home in same style and construction as ? summer camp on Massey Creek. Perhaps moved building or later addition to camp.
Thomas Map Page No#:	685
Field Inspection Date:	9/6/94

214

*Historic Codes: A=Important, B=Rare Building, C=Common, U=Unknown
Architecture Codes: A=Special Style, B=Common, C=Minor Alteration of "A" or "B",
D=Larger Alteration, R=Remodel or Demolition
Risk Codes: None, NRA, nra3, Development -Owner

1655

City of Des Moines
Properties Deleted from the
Historic and Archeological Properties of Local Significance

File Number:	D30-11
Historic Name:	Del's Service
Common Name:	Butler's Auto Repair
Current Owner Name:	Howard & Mary Butler
Site Address:	22341 Marine View Drive South
Neighborhood:	Des Moines
*Historic Significance:	Important
Year Constructed:	1935
Architect/Engineer/Builder:	Del Osterhoudt, Bld.
*Architecture Significance:	Special Style
Other Historic Archives:	None
Recommended By:	Kennedy 89
Current Status:	Excellent. Form, siding
*Risk to Status:	nra3
Map Designation:	*
Notes:	Delbert Osterhoudt built the garage in 1935 with salvaged timber from the Des Moines Dock. Del and his wife Elvina created the first volunteer fire department and stored the fire truck in the garage. Elvina was the first female mayor of Des Moines in 1964 and drafted women as volunteer firefighters, nicknamed the "hen brigade."
Thomas Map Page No#:	685
Field Inspection Date:	8/19/94

File Number:	D30-32
Historic Name:	Schuch House (temp)
Common Name:	Schuch House
Current Owner Name:	Thomas & Claudia Schuch
Site Address:	1228 216 Street South
Neighborhood:	Des Moines
*Historic Significance:	Important
Year Constructed:	1939
Architect/Engineer/Builder:	
*Architecture Significance:	Special Style
Other Historic Archives:	None
Recommended By:	Assessor 94
Current Status:	Excellent Condition. Mo
*Risk to Status:	NRA
Map Designation:	
Notes:	House
Thomas Map Page No#:	685
Field Inspection Date:	9/6/94

214

*Historic Codes: A=Important, B=Rare Building, C=Common, U=Unknown
Architecture Codes: A=Special Style, B=Common, C=Minor Alteration of "A" or "B",
D=Larger Alteration, R=Remodel or Demolition
Risk Codes: None, NRA, nra3, Development -Owner

City of Des Moines
Properties Deleted from the
Historic and Archeological Properties of Local Significance

File Number: D20-13B

Historic Name: Danish Colony | **Common Name:** Seahaven Club | **Current Owner Name:** Several Owners

Site Address: 23641 7 Ave South | **Neighborhood:** Zenith | ***Historic Significance:** Important

Year Constructed: 1926 | **Architect/Engineer/Builder:** Danish Families | ***Architecture Significance:** Special Style

Other Historic Archives: None | **Recommended By:** Kennedy 89

Current Status: Site Plan, lawn, gazebo | ***Risk to Status:** ara3 | **Map Designation:** *

Notes: A communal waterfront vacation development by 10 Danish families in the late 1920. Could be last remaining place that reflects early 20th century Puget Sound vacation home developments for middle class. After WW2, many houses made permanent. Contact: Robert Blake in House #9 at 878-2825. Knew all Danish families in 1940s & 50s

Thomas Map Page No#: 715

Field Inspection Date: 8/30/94

214

*Historic Codes: A=Important, B=Rare Building, C=Common, U=Unknown
Architecture Codes: A=Special Style, B=Common, C=Minor Alteration of "A" or "B", D=Larger Alteration, R=Remodel or Demolition
Risk Codes: None, NRA, ara3, Development -Owner

1656

City of Des Moines
Properties Deleted from the
Historic and Archeological Properties of Local Significance

File Number: D40-10

Historic Name: Simms House (temp) | **Common Name:** Unknown | **Current Owner Name:** James Simms

Site Address: 1136 220 Street South | **Neighborhood:** Des Moines | ***Historic Significance:** Important

Year Constructed: 1942 | **Architect/Engineer/Builder:** | ***Architecture Significance:** Special Style

Other Historic Archives: None | **Recommended By:** Assessor 94

Current Status: Good, original condition | ***Risk to Status:** NRA | **Map Designation:**

Notes: House

Thomas Map Page No#: 685

Field Inspection Date: 9/6/94

File Number: D40-11

Historic Name: Sanja House (temp) | **Common Name:** Sanja House | **Current Owner Name:** Daisy Sanja

Site Address: 24728 16th Ave South | **Neighborhood:** Des Moines | ***Historic Significance:** Important

Year Constructed: 1942 | **Architect/Engineer/Builder:** | ***Architecture Significance:** Special Style

Other Historic Archives: None | **Recommended By:** Assessor 94

Current Status: Good unaltered conditi | ***Risk to Status:** NRA | **Map Designation:**

Notes: Wooden modest home.

Thomas Map Page No#: 685

Field Inspection Date: 9/6/94

214

*Historic Codes: A=Important, B=Rare Building, C=Common, U=Unknown
Architecture Codes: A=Special Style, B=Common, C=Minor Alteration of "A" or "B", D=Larger Alteration, R=Remodel or Demolition
Risk Codes: None, NRA, ara3, Development -Owner

214

1994

Historic Properties Survey

A Survey of Historic Properties within the Boundaries of the A.C.C. Cities

City of Normandy Park

Prepared by Glenn Weiss
for the
Airport Communities Coalition
Robert Olander, Executive Director

Airport Communities Coalition

City of Burien
City of Des Moines
City of Normandy Park
City of Tukwila

1657

City of Des Moines

Properties Deleted from the Historic and Archeological Properties of Local Significance

File Number: D40-22

Historic Name: Des Moines Theater
Common Name: AAA Liquidating & Auction
Current Owner Name: Richard Peppes

Site Address: 22325 Marine View Drive South
Neighborhood: Des Moines
*Historic Significance: Important

Year Constructed: 1947
Architect/Engineer/Builder: Del Ostenbeck, Bld.
*Architecture Significance: Special Style

Other Historic Archives: None
Recommended By: Kennedy 89

Current Status: Probably excellent. Orig
*Risk to Status: nra3
Map Designation: *

Notes: Built by Delbert Ostenbeck as a theater, retail and office building. Simple masonry construction with double hung windows and flat roof.

Thomas Map Page No#: 685

Field Inspection Date: 8/19/94

File Number: D50-03

Historic Name: Ostenbeck House
Common Name: Ostenbeck House
Current Owner Name: Elvina Ostenbeck

Site Address: 2037 222 Street South
Neighborhood: Des Moines
*Historic Significance: Important

Year Constructed: 1953
Architect/Engineer/Builder:
*Architecture Significance: Special Style

Other Historic Archives: None
Recommended By: Assessor 94, Kennedy 89

Current Status: Excellent condition exc
*Risk to Status: NRA
Map Designation: *

Notes: Home of Del and Elvina "Wally" Ostenbeck since 1953. Owners of Del's Auto Service and built the Des Moines Theater. Elvina Ostenbeck founded an all female branch of the Des Moines Volunteer Fire Department. She served on the City Council after the incorporation of Des Moines in 1959 and was mayor in 1964.

Thomas Map Page No#: 685

Field Inspection Date: 9/6/94

---

*Historic Codes: A=Important, B=Rare Building, C=Common, U=Unknown
Architecture Codes: A=Special Style, B=Common, C=Minor Alteration of "A" or "B", D=Larger Alteration, R=Remodel or Demolition
Risk Codes: None, NRA, nra3, Development -Owner

214

214

1994 Historic Properties Survey:

Introduction

The 1994 Historic Properties Survey was developed for the Airport Communities Coalition and was conducted by Glenn Weiss, Planning Intern for the Coalition and supervised by Steve Bennett, Assistant City Planner, from the City of Normandy Park. The survey was intended to be as broad as possible and to identify all potentially valuable historic properties in the cities of Burien, Des Moines, Normandy Park and Tukwila. Significant properties in the City of SeaTac and nearby unincorporated King County were also surveyed to a lesser extent.

Except in unusual circumstances, a structure should be at least 50 years old to be eligible for listing in the National Register of Historic Places. In light of this criteria, all pre-1945 buildings were surveyed in August and September, 1994. Pre-1955 buildings of significance were also surveyed for a local landmarks designation program with a 40 year old eligibility requirement. Due to time constraints, Burien and Tukwila were comprehensively surveyed only between First Ave South and Fifty-first Ave South. Although, previously published historic sites were surveyed in the remainder of these two cities. To the extent possible, the survey also reflects whether potentially significant properties have been alter from their original form. Although some property have undergone substantial alterations, they may constitute a unique and important resource that is eligible for listing in the National Register or local landmark status.

The survey produced prioritized lists of properties for listing in the National Register of Historic Places and local landmark designation programs. The prioritized list was identified by the surveyor after consultation with Julie Koler, King County Landmarks Preservation Officer, on the application of national and local standards during a tour of Normandy Park and Des Moines. The list is summarized in the report contained in this document and is indicated geographically on the accompanying maps.

The results of the survey includes a report document on the historic resources for each city, one comprehensive report, the master database file (in Paradox for Windows) and hanging files with the surveyor's notes and photocopied research. The survey hanging files include 1994 King County Assessor Lists, for each city, of buildings constructed before 1945 and 1955. The pre-1945 list is arranged by street address and the pre-1955 list is arranged by year, and then address.

1994 Historic Properties Survey:

Contents

214

Historic Properties in the City of Normandy Park

Prioritized Sites Report Date: January 25, 1995

The Windshield Survey

Based on a "windshield survey" of all buildings constructed before 1945, I can report the following summary of existing buildings in original condition. Each of the buildings in the columns below is based upon a preliminary assessment that requires further research to verify the history and integrity of each building. The first column contains sites with the potential to join the National Register of Historic Places. The second column includes special architectural examples that might (or do) qualify for designation in a future local landmarks designation program. The third column includes all existing buildings with no readily apparent alterations. Three other groups exist in the survey, but are not displayed in the chart: existing buildings with minor changes; existing buildings with significant alterations; and completely remodeled or demolished buildings.

Potential Landmark Buildings from Each Major Historic Period

Period of Construction	National Register	Local Landmark	Original Condition
Pre-1910	0	0	0
1910-19	0	2	3
1920-29	2*	4	7
1930-39	3*	8	19
1940-44	0	5	28
1945-54	Survey Incomplete	12	Survey Incomplete
Total	5*	31	57

*All buildings nominated as one multiple listing for the original "Normandy Park Development".

A Few Conclusion Based in the Survey

- **Native American Sites** Although no recorded myth sites exist, archeological sites have been found in coastal Normandy Park.
- **Early Normandy Park** Only two existing buildings from the farming community period have not been extremely remodeled, but both have been altered. Two craftsman style houses remain in good condition from the period before the Normandy Park Development. The Cook House is in excellent condition.
- Waterfront Vacation Retreat: 1920-39 The Normandy Park waterfront became a place to build temporary camping shelters or small houses for vacation retreats on the water. Over time the buildings became more permanent. Three buildings appear in unaltered condition from this period.
- Normandy Park Development: 1926-36 Formed by Phinney and Alvenslaben, The Seattle-Tacoma Land Company commissioned Bebb and Gould to design the site plan for Normandy Park in the late 1920s. Only a few buildings were completed in the "Normandy Style" before the corporation lapsed in bankruptcy during the Depression. These houses, Clark, Gustin, Hughett, Barricklow and Penny Prudence House #1, are in original exterior condition and might qualify for the National Registry in a multiple nomination.
- Architectural Design: 1940-64 Normandy Park occupies a unique Northwest position as a center for architectural design from 1940 to 1965. Architects who comprised the core of the nationally recognized "Northwest School" of modern American architecture and other significant architects designed many buildings in Normandy Park. Two buildings designed by Paul Hayden Kirk (Hubbart & Latimer Houses, 1940) are eligible for landmark status. A future historic district may be proposed for Edgecliff Drive which features buildings by Frank Lloyd Wright, A.O. Bumgardner, Jack Byrant, Fred Bassettl, Elizabeth Ayers and others. Significant buildings were designed by Paul Thiry, Ralph Anderson, Ralph Burkhard, Robert Therlault, Alexander Sasonoff, Joseph Skoog, and Howard Kenney. Normandy Park Elementary School by Deitz and Waldron was recognized nationally by *Architectural Record* magazine in 1955 as a model of modern school design.

1994 Historic Properties Survey: **Survey Methodology**

Between August 1 and September 30, 1994, Airport Communities Coalition Planning Intern, Glenn Weiss, researched and surveyed potential historic properties in the cities of Burien, Des Moines, Normandy Park and Tukwila. The research involved reading all available histories of those cities completed since 1972 (see Sources List in appendix) and recording a list of sites discussed in those texts. Other potential sites were identified through the King County Landmarks Commission's 1979 Survey of King County Historic Properties, through private discussions with local historians, and by contacting prominent architects regarding past work in the study area.

A windshield survey of these properties was conducted. For this study, "windshield survey" means a visual inspection of the front elevation from the street or driveway. Each building was judged to fall in one of five categories based on the front elevation only and without checking any photographic records. (see Database Codes in appendix) Therefore, buildings were judged to be altered or unaltered based on the surveyor's judgment of appropriateness of materials and design related to the researched construction date of the property. For example, if horizontal windows were present in a dated 1910 structure, then the surveyor presumed the windows were a later change to the building, since vertical windows were typical for 1910.

The surveyor is aware of some inconsistencies in the survey especially related to siding materials and addresses, such that structures may be judged "unaltered" when newer siding materials existed and some addresses may have caused the wrong building to be judged. Finally, due to lack of time, the surveyor always presumed the correctness of the researched date of construction and therefore declared buildings demolished or remodeled if the structures appeared totally constructed at a later date. The surveyor estimates errors related to siding to be less than 3%, and errors related to address and date of construction to be less than 1%.

After surveying all buildings referenced in historic writings, the surveyor acquired lists of all properties developed before 1945 and 1955. The lists were generated by the King County Assessor by searching tax records for the date of construction. The surveyor conducted a "windshield survey" of all pre-1945 buildings in Normandy Park and Des Moines, all pre-1945 buildings east of First Avenue South in Burien and all pre-1945 buildings west of 51st Avenue South in Tukwila. Additionally, Subdivision 44', Chelsea Park and several other pre-1955 subdivisions were surveyed in Burien. The subdivisions were found by analysis of the King County Assessor lists to locate series of buildings constructed in the same year on the same street.

With a survey of over 3000 structures completed, a database of over 700 records was created of all historically referenced buildings that were presumed extant in 1994 and any unaltered buildings surveyed from the assessor's records. The database is accurate for use in identifying and locating historically valuable properties and as a list of properties to re-survey buildings to determine scarcity of buildings and comparative quality. Since no verification techniques were used, the list is not recommended as a sole source for establishing landmark designation status.

Historic Properties in the City of Normandy Park

Prioritized Sites Report Date: January 25, 1995

Local Landmark

A future Normandy Park landmarks program might recognize landmark status for the following structures pending further research into the precise scarcity and integrity of the buildings. Sites qualifying as local landmarks should be important to the history of Normandy Park and retain their architectural integrity. In reference to common buildings, complete architectural integrity is usually essential. Buildings increase in historic importance with the scarcity of that building type during a given historic period. Any nomination for designation would include a list of other similar buildings remaining from the same period. (All buildings and sites in the National categories above should be considered for local landmark status.)

Andrews Log Cabin (temp), 1913, Small Log Storage Shed, 104 214th Street SW
Beko House(temp), 1935, Romantic Log House, 230 SW 164th St
Bush Beach House(temp), 1918, Original Beach House, 220 219th Street South
Cook House, 1922, Craftsman Style House, 21311 Marine View Drive South
Dobszinsky House, 1937, Late Normandy Style House, 1822 Terrace Court SW
Fish House, 1942, One Story 1940s House, 801 168 Street SW
Byron Fish was a well known columnist for the Seattle Times
Hubbart House, 1940, Romantic European Farmhouse Style, 17424 13th Ave SW
Designed by Paul Kirk, Architect
Latimer House, 1940, Romantic Farmhouse Style, 1229 174th Street SW
Designed by Paul Kirk, Architect
Mayer House, 1937, Large 1930's House, 18641 4th Ave SW
Residence of Vic Meyers, Jr. while State Senator
Powell House(temp), 1941, Modest Home Pattern, 17121 2nd Ave SW
Raymond House #1, 1937, 204 Normandy Road SW
Municipal Judge Raymond's first Normandy Park house
Reitze House, 1940, 18541 Normandy Terrace SW
Designed by Young & Richardson, Architects (in 1994: TRA Architects)
Spenger Beach House(temp), 1927, Original Beach House, 232 South 218 St.
Stone Beach House(temp), 1935, Large, Permanent Beach House, 222 South 219th St.

The following is a list of structures and buildings that might qualify for landmark status in community program recognizing historic properties 40 years old and older.

Christie House(temp), 1951, Ranch House, 17941 Brittany Drive SW
Cole House, 1951, Excellent Pattern House, 18125 Brittany Drive SW
Cordell House, 1954, Modern House, 645 SW 174th Street
Designed by A.O. Bumgardner
Dawson House, 1952, Ranch House, 18902 Marine View Dr SW
Former Mayor of Normandy Park, John T. "Tom" Dawson
Alverson House, 1951, 17916 Brittany Drive SW, Art Leonard, Builder
D. Lee Alverson, Director of Bureau of Commercial Fisheries in Washington, DC.
Dodd House, 1950, Modern House, 19203 Edgecliff Dr SW*
Designed by Fred Bassetti, Architect
John Knox Presbyterian Church Sanctuary, 1954, 109 Normandy Park Road
First Modern Church designed by Robert Theriault, Architect
Normandy Park Elementary School (City Hall), 1954, 801 174th Street SW
Suburban school won national recognition. Designed by Dietz and Waldron, Architects
Northwest Archery Museum, 1950, 19807 First Ave South. Finest archery museum in Northwest
Pevosky House, 1947, Modern House, 17622 12th Ave SW.
Designed by Paul H. Kirk, Architect
Raymond House #2, 1952, Judge Raymond's Ranch House, 17925 Normandy Terrace SW
Skoog House, 1950, Rambler House, 18191 Brittany Drive SW
Architect Joseph Skoog's residence.

214

Historic Properties in the City of Normandy Park

Prioritized Sites Report Date: January 25, 1995

- <u>NIKE Missile Base</u> Civic Center Park was the site of a Western Washington NIKE Missile Base, a civic defense installation from post-WWII. Two original buildings remain on the site, one of which was the first city-owned City Hall for Normandy Park. Olympic View Swim Club was built on the anti-missile armament location.
- <u>Community Facilities: 1945-64</u> Church, recreation and school structures from the 1950s and 60s reflect the history of post-WWII Normandy Park and its dramatic growth as a residential community. Designed by Robert Theriault, John Knox Presbyterian Church (1954) was the only church completed before 1965. Community recreation facilities include Normandy Park Community Club (*The Cove*), (1959); Normandy Park Swim Club,(1956); and Olympic View Swim Club, 1961. Normandy Park Elementary School, (1954); and Marvista Elementary School, (1957) were constructed during this period. These facilities, along with single family houses and parks, reflected national ideals of the times about residential communities.
- <u>Post WWII Suburban Homes: 1945-64</u> Many quality examples of Post-WWII pattern book houses exist in Normandy Park. These houses reflect the 1950 American ideals that led to the incorporation of Normandy Park, but many houses are endangered by contemporary remodeling. Houses exist that are also tied to Normandy Park history such as the homes of former Normandy Park Mayor John T. "Tom" Dawson, former municipal judge Charles Raymond and worldwide fishery expert, D. Lee Alverson.
- **<u>Historic Persons</u> Normandy Park has been home to several persons important in their fields of endeavors including Byron Fish, noted Seattle Times columnist, Vic Meyers, Jr., State Senator from Normandy Park and son of Washington State Lieutenant Governor; Homer Hadley, designer of the world's first floating bridge; Bill Bennett, leader in amateur radio; Glenn St. Charles, founder of Northwest Archery Museum; T.A. Wilson, former CEO of the Boeing Company; and Philip Hamlin, inventor of the cable TV electronic components. Artists living in Normandy Park have included Camella Patha, Marianne Cassar, Constance Smith and Paul Gustin.**

Legal Designation

Potential historic properties are divided into several categories below. These categories are determined by the criteria established for the National Register of Historic Places and the King County Landmark Commission program. The properties in each category are based on limited research and will most likely be reduced in number with further research that may discover physical changes to the structures.

National Historic Places Nomination

The following buildings and sites appear in excellent physical condition with an intact architectural integrity from the date of construction. Each building or site responds to a significant national, regional or community historic movement.

Barricklow House*, 1931, Normandy Style, 18135 Brittany Drive SW
Clark House*, 1929, Normandy Style, 17915 Normandy Terrace SW
Gustin House*, 1931, Normandy Style, 17985 Normandy Terrace SW
Home of artist Paul Gustin, well-known painter and muralist.
Hughett House*, 1929, Normandy Style, 17999 Normandy Terrace SW
Prudence Penny House #1*, 1928, Brick Modest Home, 17970 Brittany Drive SW
Normandy Park Site Plan, 1929, Street Plans of Normandy Park, Bebb & Gould, Arch.

* Note: Julie Koler, King County Historic Preservation Office and a nationally recognized expert in northwest United States historic preservation, recommended a multiple nomination of these buildings based a windshield tour of historic buildings in Normandy Park on September 7, 1994.

214

Index by Historic Name in Each City

Friday, October 14, 1994

M.	Historic Name	Common Name	File #	City	St. #	Site Street Name	Date	Pg.
•	Albee Estate	Ruth Dykeman Children's	B10-06	Burien	1033	152 Street SW	1916	654
	Anderson House (temp)	Anderson House	B40-33	Burien	12912	8 Ave South	1943	655
	Anderson House (temp)	Unknown	B30-35	Burien	14811	Des Moines Way South	1939	655
	Archeological Sites	Shell Middens	B00-00	Burien		Not Publicly Accessible		654
	Bakken House (temp)	Bakken House	B30-31	Burien	826	136 Street South	1938	655
	Bartholomew House	Bartholomew House	B60-01	Burien	16258	25 Ave. SW	1960	654
	Baxter House (temp)	Baxter House	B40-34	Burien	1047	138 Street South	1943	655
•	Belknap House	Klopfenstein House	B20-03	Burien	3750	Three Tree Point SW	1923	654
	Benson Houses (temp)	Unknown	B20-05	Burien	1239	136 Street South	1924	655
	Betz House (temp)	Betz House	B40-01	Burien	13806	8 Ave South	1940	655
•	Brick Commercial (temp)	Unknown	B99-01	Burien	658	152 Street South		655
	Brunette House (temp)	Brunette House	B40-02	Burien	13458	4 Ave South	1940	655
	Bryan House	Leetch House	B00-13	Burien	1029	146 Street South	1908	655
	Buckles House (temp)	Unknown	B20-06	Burien	828	176 Street South	1925	655
	Burch House (temp)	Burch House	B30-22	Burien	1236	134 Street South	1937	655
•	Burien Business District	Burien Historic Business	B10-07	Burien		152 Street SW, Ambaum-10th	1918	654
	Burien Gardens (temp)	Burien Gardens	B40-55	Burien	13601	Ambaum Blvd. SW	1948	654
	Burien Seventh Day Adventi	7th Day Adventist Church	B60-02	Burien	14237	Des Moines Way South	1960	655
	Campbell House (temp)	Campbell House	B40-35	Burien	13443	7 Ave South	1943	655
•	Carpenter House	Unknown	B10-05	Burien	14508	25 Ave SW	1914	654
	Carr House (temp)	Unknown	B30-12	Burien	13218	8 Ave South	1936	655
•	Cedarhurst Elementary	Cedarhurst Elementary S	B50-07	Burien	611	132 Street South	1954	655
•	Chelsea Park Elementary	Unknown	B50-08	Burien	417	142 Street SW .	1954	654
	Church of Latter-day Saints	Morman Church	B60-03	Burien	14200	Ambaum Way SW	1960	654
	Clark House	Unknown	B60-05	Burien	2205	170 Street SW	1962	654
	Coates House (temp)	Unknown	B40-08	Burien	13421	4 Ave South	1941	655
	Colson House(temp)	Unknown	B40-14	Burien	12907	10 Ave South	1942	655
•	Community Family (temp)	Community Family Practic	B50-01	Burien	13624	First Ave South	1950	654
•	Crosby House	Brown Home	B00-06	Burien	14628	8 Ave. South	1900	655
	Cummings House (temp)	Unknown	B50-12	Burien	16759	Marine View Drive SW	1959	654
•	Dashley Home	Coury House	B10-03	Burien	1235	152 Street SW	1912	654
	Davis House (temp)	Davis House	B40-15	Burien	13025	12 Ave South	1942	655
	Dean House (temp)	Dean House	B30-06	Burien	14835	6 Ave South	1931	655
•	Dearborn House	Unknown	B50-03	Burien	16765	Maplewild Drive SW	1951	654
	Dempsey House (temp)	Dempsey House	B40-16	Burien	13416	12 Ave South	1942	655
•	Deroin House	Deroin House	B50-02	Burien	505	150 Street South	1950	655
•	Des Moines Memorial Way	Des Moines Memorial Wa	B20-02	Burien		Memorial Way, 96 to 231 S.	1922	655
•	Dodd Homestead	Sutton Farm	B00-04	Burien	606	140 Street South	1888	655
	Droz House (temp)	Droz House	B30-32	Burien	13248	10 Ave South	1938	655
•	Duffy Estate	Duffy Estate	B30-09	Burien	2727	156 Street SW	1934	654
	Eakins House (temp)	Eakins House	B30-14	Burien	14061	Des Moines Way South	1936	655
	Edmonds House (temp)	Edmonds/Walker House	B30-10	Burien	639	150 Ave South	1935	655
	Elkins House (temp)	Unknown	B40-17	Burien	12806	8 Ave South	1942	655
	Ernst House (temp)	Ernst Home	B40-18	Burien	13419	10 Ave South	1942	655
	Ferguson House (temp)	Ferguson House	B30-15	Burien	13127	12 Ave South	1936	655
	Fire District #2 Station	Burien Fire Station	B40-53	Burien	15100	8 Ave South	1949	655
	Fleming House (temp)	Unknown	B40-47	Burien	14404	5 Ave South	1944	655
	Flygare House (temp)	Flygare House	B30-23	Burien	13004	First Ave South	1937	654
	Genzale House (temp)	Genzale House	B20-17	Burien	651	150 Street South	1929	655
	Ghiglione House	Wintermute House	B00-10	Burien	3541	171 Street SW	1907	654
	Gilmore House (temp)	Unknown	B40-36	Burien	12922	15 Ave South	1943	655
•	Glendale Lutheran Church	Glendale Evangelical Luth	B40-54	Burien	13405	2nd Ave SW	1949	654
	Goodau House (temp)	Goodau House	B30-01	Burien	1261	132 Street South	1930	655
	Graham House	Unknown	B60-04	Burien	16222	25 Ave SW	1962	654
•	Gregory House	Bailey House	B10-01	Burien	3730	171 Street SW	1910	654
•	Gunther Building	Unknown	B00-07	Burien	16660	Marine View Dr. SW	1900	654
	Hagstrom House (temp)	Hagstrom House	B40-03	Burien	13035	6 Ave South	1940	655
	Hart House (temp)	Hart House	B40-48	Burien	839	140 Street South	1944	655
•	Haselton Home	Haseltown-Zwiefelhofer H	B00-11	Burien	12829	9 Ave. SW	1907	654
•	Hazel Valley Elementary	Hazel Valley Elementary	B40-51	Burien	402	132 Street SW	1947	654
	Higgins House	Unknown	B10-09	Burien	16220	Maple Wild SW	1919	654
•	Highline High School	Highline High School	B20-07	Burien	251	152 Street South	1925	655
•	Highline Men's Progressive	The Log Hall	B30-11	Burien	15403	Ambaum Blvd SW	1935	654

214

Historic Properties in the City of Normandy Park

Prioritized Sites Report   Date: January 25, 1995

In the future, a significant group of modern buildings exist in original condition. These historic properties of recognized architectural design could be designated as they pass the minimum age for landmark designation in the future. (None of the following are located on accompanying maps)

Bauner House, 1963, Designed by Paul Thiry, 18175 Normandy Terrace SW
Bergman House, 1973, Design by Ralph Anderson, 17968 Normandy Terrace SW
Bramel House, 1963, Design by A.O. Bumgardner, 19273 Edgecliff Dr. SW*
Cosgrove House, 1962, Design by Alexander Sasonoff, 18602 Brittany Dr. SW
Forland House, 1963, Design by Elizabeth Ayers, 18939 Edgecliff Dr. SW*
Cane House, 1962, Design by Howard Kenney, 1923 170th St SW
McInturff House, 1956, Excellent Design, 18958 Edgecliff Drive SW*
Normandy Park Community Club, "The Cove", 1959, 1500 Shorebrook SW
Design by Robert Theriault
Tracy House, 1956, Design by Frank Lloyd Wright, 18971 Edgecliff Dr. SW*

Note * Along with restoration of the carport on the 1954 Cooper House by Jack Bryant at 18961 Edgecliff Dr. SW, these houses might make a historic district of significant modern design. Also include the Dodd House listed in the column above.

Significant Buildings which may have Compromised Integrity

The following structures have had a significant role in Normandy Park history, but the architectural integrity may have been compromised due to renovations or additions or the buildings are less than 40 years old.

Bill Bennett House*, 18549 Normandy Terrace SW (Completely Remodeled)
World Famous in Amateur Radio
Marianne Cassar*, 18902 8th Ave SW
Well-known artist for stained glass of for churches in 1950s & 60s.
Dunbar, Aaron, House, 1890 & 1914, Farmhouse, 18617 4th Ave SW
First Normandy Park house and farm
Dunbar, Grant, House, 1913, 18818 First Place SW
Son of Aaron Dunbar
Homer Hadley House*, 807 SW 207 Place
Designer of Lake Washington Bridge, world's first floating bridge
Phillip Hamlin House*, 18527 Normandy Terrace SW
One of original inventors of cable TV systems
Hilson House (temp)*, 1910, Farmhouse, 18419 First Ave South
NIKE Missile Base(Early City Hall), 19900 4th Ave SW
WWII Missile Defense and First City Hall in the late 1950s
Normandy Park Club House, 1926, 1865 Miller Creek Drive SW
Original Club House and Jeweler Ben Tipp's home beginning in 1934.
Camilla Patha House*, 19427 Edgecliff Drive SW
Painter. Well-known for Hilton Hotel Mural
Penny Prudence House #2*, 17954 Brittany Drive SW
Designed by William Bain & Lionel Preis, Architects
Constance Ewing Smith House*, 1360 SW 175th Street (Completely Remodeled)
Portrait painter
T.A. Wilson House*, 126 SW 171 Street
President & CEO of the Boeing Company

*Note: Not located on accompanying maps.

214

Index by Historic Name in Each City

Friday, October 14, 1994

M.	Historic Name	Common Name	File #	City	St. #	Site Street Name	Date	Pg.
•	Subdivision '44 - 7th Ave S	7th Ave South	B40-50	Burien	12804	7th Ave South	1944	655
•	Subdivision '51 - 18 Ave SW	Unknown	B50-04	Burien	15607	18th Ave SW	1951	654
•	Subdivision '52 - 22 Ave SW	Unknown	B50-05	Burien	16901	22nd Ave SW	1952	654
•	Subdivision '52 - 7th Ave S	Unknown	B50-06	Burien	14612	7th Ave SW	1952	654
•	Subdivision '54 - 13 Ave SW	Unknown	B50-09	Burien	16703	13th Ave SW	1954	654
•	Subdivision '54 - SW 133rd	Unknown	B50-10	Burien	614	133 Street SW	1954	654
	Sullivan House (temp)	Sullivan House	B30-44	Burien	13815	Des Moines Way South	1939	655
	Sunnydale Church	Burien Free Methodist Ch	B00-12	Burien	520	150 Ave South	1907	655
•	Sunnydale School	Sunnydale School	B20-15	Burien	15631	8 Ave South	1928	655
	Sweeney House (temp)	Unknown	B40-28	Burien	13017	3 Ave South	1942	655
	Teague House	Wick House	B10-04	Burien	419	140 Street South	1912	655
	Tedrow House (temp)	Tedrow House	B30-27	Burien	13233	10 Ave South	1937	655
	Thamert House (temp)	Thamert House	B40-45	Burien	504	150 Street South	1943	655
	Thomas House (temp)	Unknown	B40-29	Burien	13420	10 Ave South	1942	655
•	Three Tree Point Developm	Three Tree Point	B00-08	Burien		Maplewild, 172, & the Point	1900	654
•	Three Tree Point Store	Three Tree Point Store	B00-09	Burien	16957	Maple Wild SW	1903	654
	Tingley House (temp)	TingleyHouse	B20-10	Burien	13039	Occidental Ave South	1926	654
•	Treisch House	Eilers House	B00-14	Burien	3506	172 Street SW	1908	654
	Tumelson House (temp)	Tumelson House	B30-28	Burien	13115	12 Ave South	1937	655
	Unknown	Brunelle House	B00-05	Burien	1243	140 Street South	1890	655
	Vanderhoof House (temp)	Vanderhoof House	B30-29	Burien	13431	3 Ave South	1937	655
	Vittone House (temp)	Unknown	B40-13	Burien	1229	129 Street South	1941	655
	Voog House (temp)	Voog House	B40-05	Burien	16203	Des Moines Way South	1940	655
	Vorvell House (temp)	Vorvell House	B40-30	Burien	1235	128 Street South	1942	655
	Wagner House (temp)	Unknown	B30-30	Burien	17225	Ambaum Blvd South	1937	654
	Wallace House (temp)	Wallace House	B40-31	Burien	12839	First Ave South	1942	654
	Webster Home	Webster House	B10-08	Burien	16262	13 Ave SW	1918	654
	Weigel House (temp)	Weigel House	B40-06	Burien	12852	Occidental Ave South	1940	654
	Weston-Fox House (temp)	Weston-Fox House	B40-06	Burien	13227	12 Ave South	1940	655
	Wick House (temp)	Unknown	B30-08	Burien	518	140 Street South	1933	655
	Wines House (temp)	Wines House	B40-46	Burien	13426	8 Ave South	1943	655
	Wingstrand House (temp)	Wingstrand House	B20-20	Burien	836	146 Street South	1929	655
	Woods House	Del Villar House	B00-15	Burien	16806	Des Moines Way South	1908	655
	Wuesthoff House (temp)	Wuesthoff House	B40-32	Burien	1245	128 Street South	1942	655
•	YMCA House (temp)	YMCA - Highline	B20-16	Burien	17874	Des Moines Way South	1928	655
•	aya'hos	Three Tree Point	B00-02	Burien		NA		654
	kah-kah-AHL-ko	Crow's water	B00-03	Burien		Seacoma Blvd SW		654
	? Camp Dining Hall (temp)	Iversen House	D30-08	Des Moine	23204	14th Ave South	1935	685
	? Camp House (temp)	Opstad House	D40-21	Des Moine	23415	14th Ave South	1947	685
	? Camp Owner's House (te	Foster House	D30-19	Des Moine	23200	14th Ave South	1936	685
•	? Camp Shelter & Cabin (te	McGushin House	D30-09	Des Moine	23304	14th Ave South	1935	685
	AMCO House (temp)	Unknown	D10-10	Des Moine	1855	216 Street South	1918	685
	Archeological Sites	Shell Middens	D00-00	Des Moine		Not Publicly Accessible		684
	Assembly House (temp)	Unknown	D30-28	Des Moine	21816	24th Ave South	1939	685
	Assembly of God Church	Assembly of God Church	D60-01	Des Moine	21650	24 Ave South	1960	685
	Ault House (temp)	Ault House	D10-05	Des Moine	20932	First Ave South	1914	684
•	Baarley House (temp)	Baarley House	D20-21	Des Moine	22028	5 Place South	1927	684
	Barber House (temp)	Barber House	D30-05	Des Moine	24324	24th Ave South	1934	715
	Bartholomew House (temp)	Bartholomew House	D40-12	Des Moine	24121	21st Ave South	1943	715
•	Baum (Fisher) House	Cunningham House	D10-04	Des Moine	23207	Marine View Drive S	1913	685
•	Bauman House	Ramsey House	D10-11	Des Moine	23235	10th Ave South	1918	685
	Bay Cleaners & Tailor	Neptune Books	D40-20	Des Moine	22319	Marine View Drive South	1946	685
	Beal House (temp)	Unknown	D40-13	Des Moine	2812	228 Street South	1943	685
	Bergman House (temp)	Bergman House	D40-17	Des Moine	21030	7th Ave South	1944	685
	Bierma House (temp)	Bierma House	D30-20	Des Moine	21324	4th Ave South	1936	684
	Bisbee House (temp)	Maczko House	D00-13	Des Moine	1917	240 Ave South	1908	715
	Booth House (temp)	Booth House	D30-06	Des Moine	1118	222 Street South	1934	685
	Booth House (temp)	Booth House	D30-29	Des Moine	1005	242 Street South	1939	715
	Brown House (temp)	Brown House	D30-10	Des Moine	20927	3rd Ave South	1935	684
	Bundy House, Marc (temp)	Bundy House	D30-26	Des Moine	1716	223 Street South	1938	685
	Bundy House, Mike (temp)	Bundy House	D10-14	Des Moine	1609	223 Street South	1919	685
	Burke House (temp)	Unknown	D30-01	Des Moine	917	247 Street South	1930	715
	Butler House	Butler House	D40-05	Des Moine	2219	222 Street South	1942	685
•	Case House	Cunningham House	D00-11	Des Moine	22006	10 Ave South	1907	685

214

Index by Historic Name in Each City

Friday, October 14, 1994

Index Page 2

M.	Historic Name	Common Name	File #	City	St. #	Site Street Name	Date	Pg.
	Hubbard House #2 (temp)	Unknown	B40-09	Burien	13825	Des Moines Way South	1941	655
	Hubbard House (temp)	Hubbard House	B20-08	Burien	13811	Des Moines Way South	1926	655
	Hungerford House (Temp)	Anderson House	B20-11	Burien	17306	21 Ave SW	1928	654
	Ingraham House (temp)	Ingraham House	B30-26	Burien	13002	2 Ave South	1939	655
	Jenks House	Cedar Crest	B10-10	Burien	14403	24 Ave SW	1911	654
	Johannesen House (temp)	Johannesen House	B30-37	Burien	16466	Ambaum Blvd South	1939	654
	Judkins House (temp)	Unknown	B30-38	Burien	1426	134 Street South	1939	655
	Keenan House (temp)	Keenan House	B40-19	Burien	13007	Occidental Ave South	1942	654
	Kennedy House (temp)	Kennedy House	B40-38	Burien	812	132 Street South	1943	655
	Kormasoff House	Unknown	B10-02	Burien	122	168 Street South	1910	654
	Kretzschmar House (temp)	Kretzschmar House	B30-16	Burien	1243	136 Street South	1938	655
	Kuehl House (temp)	Kuehl House	B40-39	Burien	835	136 Street South	1943	655
	Laurencio House (temp)	Laurencio House	B40-20	Burien	13442	6 Ave South	1942	655
	Lawter House (temp)	Unknown	B30-39	Burien	812	136 Street South	1939	655
	Lee House (temp)	Lee House	B30-17	Burien	422	156 Street South	1936	655
	Lehman House (temp)	Lehman House	B30-02	Burien	1019	146 Street South	1930	655
	Linder House (temp)	Linder House	B30-40	Burien	12855	Occidental Ave South	1939	654
	Lohman House (temp)	Unknown	B40-40	Burien	13207	6 Ave South	1943	655
	Lombard House (temp)	Lombard House	B40-21	Burien	13012	3 Ave South	1942	655
	Lopez House (temp)	Lopez House	B40-22	Burien	13045	2 Ave South	1942	655
	MacKenzie House (temp)	MacKenzie House	B30-41	Burien	16920	Ambaum Blvd South	1939	654
	Magnuson House (temp)	Magnuson House	B40-23	Burien	13424	2nd Ave South	1942	655
	Marian House (temp)	Unknown	B30-04	Burien	14636	4 Place South	1930	655
	McCamish House (temp)	McCamish House	B30-42	Burien	853	148 Street South	1939	655
	McCann House (temp)	McCann House	B20-09	Burien	1219	140 Street South	1926	655
	McEvoy House (temp)	McEvoy House	B40-10	Burien	12833	First Ave South	1941	654
	McInerny House (temp)	Unknown	B20-12	Burien	148	152 Street South	1928	655
	Merz House (temp)	Merz House	B30-33	Burien	17002	Ambaum Blvd South	1938	654
	Miller House (temp)	Miller House	B30-18	Burien	1220	136 Street South	1936	655
	Moe House (temp)	Unknown	B20-13	Burien	1225	129 Street South	1928	655
	Monroe House (temp)	Unknown	B40-11	Burien	16830	Des Moines Way South	1941	655
	Moore Family House (temp)	Unknown	B40-24	Burien	12833	Occidental Ave South	1942	654
	More House (temp)	More House	B40-04	Burien	1415	129 Street South	1940	655
	Naud House (temp)	Unknown	B30-24	Burien	1050	140 Street South	1937	655
	Olson House (temp)	Olson House	B30-07	Burien	13433	12 Ave South	1933	655
•	Osterman House #1	Aasness House	B20-18	Burien	17204	Hillcrest Terrace SW	1929	654
	Osterman House #2	McShane House	B20-14	Burien	17210	Hillcrest Terrace	1928	654
	Osterman House #3	Crawford House	B30-25	Burien	17225	Hillcrest Terrace SW	1937	654
•	Pacific Telephone Building	US West Building	B40-52	Burien	14605	8th Ave South	1948	655
	Palmer House (temp)	Palmer House	B30-26	Burien	13413	2 Ave South	1937	655
•	Pollock House (temp)	Pollock Building	B30-34	Burien	654	152 Street South	1938	655
	Quesnell House (temp)	Quesnell House	B40-49	Burien	13700	8 Ave South	1944	655
	Radenbaugh House (temp)	Radenbaugh House	B40-12	Burien	13231	Occidental Ave South	1941	654
	Regan House (temp)	Unknown	B30-19	Burien	13030	Occidental Ave South	1936	654
	Rein House (temp)	Unknown	B30-43	Burien	13028	First Ave South	1939	654
	Rosler House (temp)	Rosler House	B30-05	Burien	13425	6 Ave South	1930	655
	Ross House (temp)	Ross House	B40-25	Burien	13015	Des Moines Way South	1942	655
	S-he-lahb	Three Tree Point	B00-01	Burien		NA		654
•	Schoening House	Perry Residence	B00-16	Burien	15407	11 Ave. SW	1909	654
•	Seahurst Park Development	Seahurst	B99-02	Burien		152 SW to 144 SW east of 16 Ave SW		654
	Seahurst Village	Seahurst Village Apartme	B40-56	Burien	13608	12 Ave SW	1948	654
	Shaw House (temp)	Unknown	B30-20	Burien	543	150 Street South	1936	655
	Sofie House (temp)	Unknown	B20-04	Burien	16615	Ambaum Blvd South	1923	654
	Soper House (temp)	Soper House	B40-41	Burien	13431	7 Ave South	1943	655
•	Southgate Masonic Temple	Southgate Masonic Templ	B20-01	Burien	1004	152 Street SW	1920	654
•	St. Elizabeth Episcopal Chur	St. Elizabeth	B50-11	Burien	1005	152 Street SW	1955	654
•	St. Francis Church	St. Francis Church	B20-19	Burien	15236	21 Ave SW	1929	654
	Stackhouse House (temp)	Unknown	B30-21	Burien	623	160 Street South	1936	655
	Stokes House (temp)	Stokes House	B40-42	Burien	12823	Occidental Ave South	1943	654
	Subdivision '42, First & 2nd	Chelsea Park Northeast	B40-27	Burien	13204	First Ave SW	1942	654
	Subdivision '42, First Ave S	First Ave South	B40-26	Burien	13217	First Ave Sout	1942	654
•	Subdivision '43 - Chelsea P	Chelsea Park	B40-43	Burien		2 Ave to Ambaum south of 136	1943	654
	Subdivision '43, 128th South	128 Street South	B40-44	Burien	1423	128 Street South	1943	654

214

Index by Historic Name in Each City

Friday, October 14, 1994

Index Page 5

M.	Historic Name	Common Name	File #	City	St. #	Site Street Name	Date	Pg.
	Mt. Rainier High School	Mt. Rainier High School	D50-13	Des Moine	22450	19 Ave South	1958	685
•	North Hill Community Club	North Hill Community Clu	D30-23	Des Moine	20827	3 Ave South	1936	684
•	Northhill Subdivision '53	Unknown	D50-02	Des Moine	20801	7th Place South	1953	685
	Nunner House (temp)	Unknown	D40-19	Des Moine	22436	30th Ave South	1944	685
•	Olympic Elementary School	Olympic Elementary Scho	D50-04	Des Moine	615	200 Street South	1954	685
•	Osterhoudt House	Osterhoudt House	D50-03	Des Moine	2037	222 Street South	1953	685
	Owen House (temp)	Owen House	D10-06	Des Moine	22335	6th Ave South	1914	685
	Owen House (temp)	Unknown	D30-31	Des Moine	21645	24th Ave South	1939	685
	Pacific Middle School	Pacific Middle School	D60-05	Des Moine	22705	24 Place South	1961	685
	Pacific Telephone & Telegra	US West	D40-04	Des Moine	802	223 Street South	1941	685
	Pacific Telephone Station	US West Switching Statio	D40-15	Des Moine	22600	28th Ave South	1943	685
	Parker House (temp)	Parker House	D30-17	Des Moine	21228	4th Ave South	1935	684
	Parkside Primary School	Parkside Primary School	D60-03	Des Moine	2104	247 Street South	1960	715
	Petersen House (temp)	Unknown	D20-09	Des Moine	1816	220 Street South	1923	685
•	Qah-wells	Glistening Rock	D00-01	Des Moine	421	227 Street South		684
•	Rayback House	Foote House	D10-07	Des Moine	22018	11 Ave South	1916	685
	Roehr House	Miller Estate	D60-04	Des Moine	1622	216 Street South	1960	685
	Schuch House (temp)	Schuch House	D30-32	Des Moine	1228	216 Street South	1939	685
	Sharp House (temp)	Sharp House	D30-04	Des Moine	917	249 Street South	1933	715
	Simmerer House (temp)	Unknown	D30-24	Des Moine	1223	230 Street South	1936	685
	Simms House (temp)	Unknown	D40-10	Des Moine	1136	220 Street South	1942	685
	Sleeman House (temp)	Unknown	D40-02	Des Moine	22843	30th Ave South	1940	685
•	Smith House	Pool House	D00-06	Des Moine	22204	9 Ave South	1900	685
	Somers Cottage (temp)	Somers House	D20-14	Des Moine	23525	7th Ave South	1926	685
	Somers House (temp)	Somers House	D20-15	Des Moine	23525	7th Ave South	1926	685
	Sonju Cottage (temp)	Unknown	D20-10	Des Moine	24800	16th Ave South	1924	685
	Sonju House (temp)	Sonju House	D40-11	Des Moine	24728	16th Ave South	1942	685
•	St. Philomena Catholic Chur	St. Philomena Catholic Ch	D50-07	Des Moine	1790	222 Street South	1955	685
	Strickler Hardware	Blais of Des Moines	D40-23	Des Moine	22607	Marine View Drive South	1947	685
•	Sturdy House (temp)	Sturdy House	D40-24	Des Moine	825	222 Street South	1947	685
	Ursino House (temp)	Ursino House	D40-16	Des Moine	2458	220 Street South	1943	685
•	Van Gasken House	Bray House	D00-02	Des Moine	402	222 Street South	1889	684
	Van Laak House (temp)	Van Laak House	D30-33	Des Moine	1915	222 Street South	1939	685
•	Vassar's Blacksmith Shop	Inglet House	D00-07	Des Moine	21216	Des Moines Memorial Dr. S.	1900	685
	Victory Baptist Church	Victory Baptist Church	D60-09	Des Moine	1807	223 Street South	1963	685
•	Walsworth House	Schaeffer House	D10-08	Des Moine	1104	223 Street South	1916	685
	Wamsley House (temp)	Unknown	D20-18	Des Moine	22525	6th Ave South	1927	685
	Weaver House (temp)	Weaver House	D30-27	Des Moine	21815	31st Ave South	1938	685
•	Wesley Homes - The Garde	Wesley Gardens	D50-05	Des Moine	815	216 Street South	1954	685
	Wesley Homes - The Terrac	Wesley Gardens	D60-06	Des Moine	816	216 Street South	1961	685
	Widell House (Temp)	Manz House	D00-09	Des Moine	1105	240 Ave South	1905	715
•	Wilson Hotel	Granberg House	D00-16	Des Moine	603	240 Street South	1908	715
	Wilson House (temp)	Unknown	D30-34	Des Moine	22238	Cliff Ave South	1939	685
	Witter House (temp)	Witter House	D30-18	Des Moine	24036	24th Ave South	1935	715
•	Zenith Grocery Store	Zenith Grocery Store	D10-13	Des Moine	23659	Marine View Dr South	1918	715
	Harvey's Skin Dive Suits	Harvey's Skin Dive Suits	W50-1	King Count	2505	252 Street South	1957	715
	North Hill Elementary	North Hill Elementary	H50-01	King Count	19835	8 Ave South		685
	Rose's Highway Inn	Rose's Highway Inn	W30-0	King Count	26915	Pacific Highway South	1939	715
•	Salt Water State Park	Salt Water State Park	W30-0	King Count	25201	Marine View Drive S	1934	715
	Southminister Presbyterian	Southminister Presbyteria	H50-02	King Count	19834	8 Ave South	1957	685
	Woodside School	Woodside School	H50-03	King Count	18367	8 Ave South	1958	685
•	Alverson House	Alverson House	N50-01	Normandy	17916	Brittany Dr SW	1950	654
	Anderson House (temp)	Anderson/Shea House	N20-01	Normandy	18317	2 Ave SW	1920	684
•	Andrews Log Cabin (temp)	Andrews Log Cabin	N10-02	Normandy	104	214 Street SW	1913	684
	Archeological Sites	Shell Middens	N00-00	Normandy		Not Publicly Accessible		684
•	Barricklow House	Hayes House	N30-01	Normandy	18135	Brittany Drive SW	1931	684
	Bauner House	P. Walters House	N50-17	Normandy	18175	Normandy Terrace SW	1959	684
•	Beko House (temp)	Beko House	N30-07	Normandy	230	164 Street SW	1935	654
	Benson House	Johnson House	N20-05	Normandy	20803	Marine View Drive SW	1927	684
	Bergman House	Alder House	N70-01	Normandy	17968	Normandy Terrace SW	1973	684
	Blesener House (temp)	Blesener House	N10-05	Normandy	21608	6 Ave South	1916	684
	Bramel House	Bramel House	N60-04	Normandy	19273	Edgecliff Dr. SW	1963	684
	Brown House	Unknown	N50-10	Normandy	19254	Edgecliff SW	1955	684
•	Bush Beach House (temp)	Bush Beach House	N10-06	Normandy	220	219 Street South	1918	684

Index by Historic Name In Each City

Friday, October 14, 1994

M.	Historic Name	Common Name	File #	City	St. #	Site Street Name	Date	Pg.
	Chamber Office (temp)	Greater Des Moines Cha	D20-12	Des Moine	22237	Cliff Ave South	1926	685
	Chapel of the Bells	Discovery World Day Car	D50-08	Des Moine	22038	9 Ave South	1956	685
•	Chesney House	Gracy House	D00-02	Des Moine	1255	216 Street South	1890	685
	Coffy House (temp)	Coffy House	D20-06	Des Moine	22220	11th Place South	1923	685
	Coil House (temp)	Coil House	D30-21	Des Moine	1218	216th Street South	1936	685
•	Commercial Club Hall	Des Moines Odd Fellows	D10-03	Des Moine	22342	7 Ave South	1912	685
	Commons House	Scott House	D00-14	Des Moine	23627	Marine View Drive South	1908	715
•	Corby House (temp)	Corby House	D10-12	Des Moine	24224	7th Ave South	1918	715
•	Covenant Beach Bible Cam	Des Moines Beach Park	D30-07	Des Moine	22000	Cliff Ave South	1934	684
•	Danish Colony	Seashore Club	D20-13	Des Moine	23641	7 Ave South	1926	715
•	Del's Service	Butler's Auto Repair	D30-11	Des Moine	22341	Marine View Drive South	1935	685
•	Des Moines Field House	Des Moines Field House	D30-30	Des Moine	1000	220 Street South	1939	685
	Des Moines Library	Grace Day Care	D60-10	Des Moine	22815	24 Ave South	1964	685
•	Des Moines Masonic Lodge	Brate House	D30-02	Des Moine	22202	8 Ave South	1930	685
	Des Moines Masonic Templ	Des Moines Masonic Tem	D60-12	Des Moine	2208	223 Street South	1968	685
	Des Moines Methodist Chur	Des Moines Methodist Ch	D60-02	Des Moine	22225	9 Ave South	1960	685
•	Des Moines Public School	Des Moines Elementary	D20-11	Des Moine	22001	9 Ave South	1925	685
•	Des Moines Theater	AAA Liquidating & Auction	D40-22	Des Moine	22325	Marine View Drive South	1947	685
•	Dickensen House (temp)	Dickensen House	D30-22	Des Moine	24305	7th Ave South	1936	715
•	Dooley House (temp)	Dooley House	D10-09	Des Moine	24218	7th Ave South	1917	715
•	Draper Print Shop	Langston House	D00-05	Des Moine	600	220 Street South	1900	685
	Eernisse House (temp)	Unknown	D30-12	Des Moine	833	223 Street South	1935	685
	Eernissee House (temp)	Unknown	D40-06	Des Moine	22215	8th Ave South	1942	685
•	Ellington House	Sherman House	D20-01	Des Moine	22530	8th Ave South	1920	685
•	Elsey House	Laukaitis House	D10-01	Des Moine	921	223 Street South	1911	685
	Elsey House (temp)	Elsey House	D30-03	Des Moine	22000	11th Ave South	1932	685
	Elsner Greenhouses	Zenith Holland Nursery	D00-12	Des Moine	23269	Marine View Drive S	1907	685
	Elsner House	Unknown	D00-15	Des Moine	1217	240 Ave South	1908	715
•	Elsner House #2	Draper House	D20-16	Des Moine	23258	Marine View Drive South	1927	685
•	Engeset Home	Hartfield House	D00-08	Des Moine	21434	13 Ave South	1904	685
	Erickson House (temp)	Unknown	D30-14	Des Moine	22327	16th Ave South	1935	685
	Evanson House (temp)	Evanson House	D30-15	Des Moine	1615	Kent-Des Moines Road	1935	685
	Finnell / Dickerson House	**Demolished or Moved**	D00-10	Des Moine	22514	6 Ave South	1906	685
	Fire District #26 Station	Des Moines Fire Station	D50-12	Des Moine	2238	223 Street South	1958	685
	Fire District #26 Station	Quality Auto Electric	D50-01	Des Moine	22231	Marine View Drive South	1952	685
•	Fisher Compound	Fisher Compound	D20-07	Des Moine	23435	Marine View Drive South	1923	685
	Goedde House (temp)	Unknown	D40-07	Des Moine	615	225 Street South	1942	685
	Gokey House (temp)	Unknown	D40-18	Des Moine	22808	24th Place South	1944	685
	Goldsbery House (temp)	Goldsbery House	D40-14	Des Moine	23457	14th Ave South	1943	685
	Gould House (temp)	Gould House	D20-08	Des Moine	1242	Kent-Des Moines Road	1923	685
	Grace Lutheran Church	Grace Lutheran Church	D50-10	Des Moine	22975	24 Ave South	1957	685
•	Haines House (Temp)	Haines House	D20-05	Des Moine	601	240 Street South	1922	715
•	Halfway House	Foam Rubber City	D20-20	Des Moine	22613	Pacific Highway South	1928	685
	Hanson House (temp)	Hanson House	D10-15	Des Moine	22502	10th Ave South	1919	685
	Hartman House (temp)	Hartman House	D40-08	Des Moine	22604	16th Ave South	1942	685
	Hemenway House (temp)	Unknown	D40-01	Des Moine	21612	24th Ave South	1940	685
	Hickman House (temp)	Hickman House	D40-09	Des Moine	24433	Marine View Drive South	1942	715
	Highline Community College	Highline Community Colle	D60-11	Des Moine	2400	240 Street South	1964	715
•	Hill Farm (temp)	5H Ranch	D20-02	Des Moine	21815	24th Ave South	1920	685
	Janssen House (temp)	Janssen House	D40-03	Des Moine	22752	10th Ave South	1941	685
•	Jorgenson House	Simkus House	D10-01	Des Moine	24011	Marine View Drive South	1914	715
	Jory House (temp)	Unknown	D30-16	Des Moine	21904	Marine View Drive South	1935	715
	Judson Park Retirement Co	Judson Park Retirement	D60-07	Des Moine	23600	Marine View Drive South	1962	685
	Lamp House (temp)	Lamp House	D20-03	Des Moine	1251	230 Street South	1920	685
•	Latimer House	Old Gay House	D00-04	Des Moine	21616	7 Place South	1890	685
•	Lindahl House	McConnaughey House	D10-02	Des Moine	304	216 Street South	1911	684
•	Lute House (temp)	Lute House	D30-25	Des Moine	23235	Marine View Drive South	1937	685
	Lutheran Church of the Res	Highline Reformed Presby	D50-09	Des Moine	106	206 Street South	1956	684
	M.V.D. Unknown House	Unknown	D99-01	Des Moine	32220	Marine View Drive South		715
	Maher House (temp)	Unknown	D20-19	Des Moine	22017	28th Ave South	1928	685
	Marcus Whitman Presbyteri	Marcus Whitman Presbyt	D60-08	Des Moine	2130	248 Street South	1962	715
•	Masonic Home of Washingt	Masonic Home	D20-17	Des Moine	23660	Marine View Dr. South	1927	715
•	Midway Intermediate School	Midway Elementary Scho	D50-06	Des Moine	22447	24 Ave South	1955	685
	Motteler House (temp)	Motteler House	D20-04	Des Moine	22702	10th Ave South	1921	685

Index by Historic Name In Each City

Friday, October 14, 1994

M.	Historic Name	Common Name	File #	City	St. #	Site Street Name	Date	Pg.
•	Pevosky House	Bolles House	N40-35	Normandy	17622	12 Ave SW	1947	654
	Pirogoff House (temp)	Pirogoff House	N40-15	Normandy	18721	Edgecliff Dr SW	1941	684
	Pollard House	Pollard House	N10-04	Normandy	6167	187 or 189 Street SW	1913	684
•	Powell House (temp)	Powell House	N40-16	Normandy	17121	2 Ave SW	1941	654
	Provo House (temp)	Provo House	N40-28	Normandy	1607	168 Street SW	1942	654
•	Prudence Penny Home #1	Osborne House	N20-08	Normandy	17970	Brittany Drive SW	1928	684
	Prudence Penny Home #2	Thompson House	N30-03	Normandy	17954	Brittany Drive SW	1931	684
	Randall House (temp)	Randall House	N40-05	Normandy	1627	168 Street SW	1940	654
•	Raymond House #1	Holmes House?	N30-16	Normandy	204	Normandy Road SW	1937	684
•	Raymond House #2	Duff House	N50-06	Normandy	17925	Normandy Terrace SW	1952	654
•	Reitze House	Martin House	N40-06	Normandy	18541	Normandy Terrace SW	1940	684
	Riebe House (temp)	Riebe House	N40-29	Normandy	235	171 Street SW	1942	654
	Ringdahl House (Temp)	Ringdahl House	N20-04	Normandy	406	Normandy Road SW	1926	684
	Rova House (temp)	Unknown	N40-07	Normandy	18105	Brittany Dr SW	1940	684
	Sargent House	Sargent House	N40-30	Normandy	17941	Riviera Place SW	1942	654
•	Skoog House	David House	N50-04	Normandy	18191	Brittany Drive SW	1950	684
	Slaker House (temp)	Slaker House	N40-31	Normandy	18645	8 Ave SW	1942	684
•	Sprenger Beach House	Sprenger Beach House	N20-06	Normandy	232	218 Street South	1927	684
	Steele House (temp)	Steele House	N40-32	Normandy	131	171 Street SW	1942	654
•	Stone Beach House (temp)	Stone Beach House	N30-06	Normandy	222	219 Street South	1934	684
	Stoneman House (temp)	Unknown	N30-17	Normandy	635	207 Street SW	1937	684
	Storey House	Unknown	N50-13	Normandy	18705	Edgecliff SW	1956	684
	Tracy House	Tracy House	N50-14	Normandy	18971	Edgecliff Dr. SW	1956	684
	Trainer House (temp)	Tranier House	N40-33	Normandy	133	168 Street SW	1942	654
	Treaty Tree	Treaty Tree	N00-01	Normandy	17107	2 Ave SW		654
	Walker House	Carl Hansen House	N40-08	Normandy	17424	13 Ave SW	1940	654
	Westby House (temp)	Westby House	N40-17	Normandy	20647	6 Ave SW	1941	684
	Williams House (temp)	Williams House	N30-21	Normandy	17980	Brittany Dr SW	1939	684
	Angle Lake Elementary Sch	SeaTac City Hall	S50-01	SeaTac			1953	685
	Fire District #24 Station	SeaTac Fire Station	S50-04	SeaTac	2929	200 Ave South	1959	685
•	Hillgrove Cemetery	Hillgrove Cemetery	S00-03	SeaTac	1551	200 Street South	1900	685
	Marywood Elementary Scho	Port of Seattle Marywood	S50-03	SeaTac		200 Street South	1958	685
	Mayer House	Unknown	S30-01	SeaTac	15025	Military Road South	1935	655
•	Military Road	Military Road	S00-01	SeaTac		Military Road South	1860	655
	Pancake Chef Shopping Ce	Pancake Chef	S50-02	SeaTac	15201	Military Road South	1955	655
•	Paul House	Unknown	S00-02	SeaTac	839	157 Street South	1885	655
	Prince of Peace Lutheran C	Prince of Peace Lutheran	S50-05	SeaTac	19030	8 Ave South	1959	685
•	Vacca Farm	Vacca Farm, Pumpkin Pat	S20-01	SeaTac	15208	Des Moines Mem. Way South	1927	655
•	Allentown Acres Addition	Allentown Acres Addition	T00-17	Tukwila		42-50 Ave S Between 122 & 124	1906	625
•	Allentown Bridge	Allentown Bridge	T20-44	Tukwila	12600	42 Ave South	1927	655
	Anderson House (temp)	Anderson House	T30-16	Tukwila	4908	114 Street South	1932	625
	Anderson House (temp)	Anderson House	T40-69	Tukwila	13703	42 Ave South	1944	655
	Anderson House (temp)	Unknown	T40-44	Tukwila	12054	44 Place South	1943	625
	Anderson House (temp)	Unknown	T40-45	Tukwila	12533	51 Place South	1943	655
	Angle House (temp)	Angle House	T40-46	Tukwila	4831	146 Street South	1943	655
	Archeological Sites	Shell Middens, Burial Gro	T00-00	Tukwila		Not Publicly Accessible		655
	Atkins House (temp)	Atkins House	T30-43	Tukwila	4321	140 Street South	1936	655
	Auto Cabins	Alva Pease Property	T20-01	Tukwila	11540	East Marginal Way South	1920	625
	Axelson House (temp)	Unknown	T40-47	Tukwila	4602	164 Street South	1943	655
	Babcock House (temp)	Babcock House	T10-41	Tukwila	4027	128 Street South	1919	655
	Bailey House (temp)	Unknown	T40-48	Tukwila	12227	44 Ave South	1943	625
	Baker House (temp)	Baker House	T40-01	Tukwila	11662	42 Ave South	1940	625
	Baker's Kitchen	Unknown	T20-02	Tukwila	11850	East Marginal Way South	1920	625
	Bales House	Bales House	T20-03	Tukwila	14100	42 Ave South	1920	655
	Baney House (temp)	Baney House	T20-42	Tukwila	4511	136 Street South	1926	655
	Barber House (temp)	Barber House	T30-17	Tukwila	4231	148 Street South	1932	655
	Barene House (temp)	Barene House	T40-23	Tukwila	13423	48 Ave South	1942	655
	Barnes House (temp)	Unknown	T40-49	Tukwila	12222	47 Ave South	1943	625
	Barrett House (temp)	Unknown	T30-11	Tukwila	12250	48 Ave South	1931	625
	Baugart House (temp)	Baumgart House	T30-12	Tukwila	3241	135 Street South	1931	655
•	Ben Carol Motel Sign	Ben Carol Motel Sign	T40-24	Tukwila	14110	Pacific Highway South	1942	655

Index by Historic Name In Each City

Friday, October 14, 1994 | Index Page 6

M.	Historic Name	Common Name	File #	City	St. #	Site Street Name	Date	Pg.
	Caddock House (temp)	Caddock House	N40-09	Normandy	18951	Marine View Drive SW	1941	684
•	Christie House (temp)	Christie House	N50-20	Normandy	17941	Brittany Drive SW	1951	684
•	Clark House	Andrews House	N20-09	Normandy	17915	Normandy Terrace SW	1929	654
•	Cole House	Cole House	N50-21	Normandy	18125	Brittany Drive SW	1951	684
	Colin House (temp)	Colin House	N40-18	Normandy	18911	Edgecliff Dr SW	1942	684
	Cook Beach House	Cook Beach House	N20-07	Normandy	21333	Marine View Drive SW	1928	684
•	Cook House	Unknown	N20-02	Normandy	21311	Marine View Drive South	1922	684
	Cooper House	Cooper House	N50-07	Normandy	18961	Edgecliff Drive SW	1954	684
•	Cordell House	Cordell House	N50-11	Normandy	645	174 Street SW	1955	654
	Cosgrove House	Unknown	N60-01	Normandy	18602	Brittany Dr. SW	1961	684
	Dalseg House (temp)	Unknown	N30-04	Normandy	16405	3 Ave SW	1932	654
	Davis House	Davis House	N40-10	Normandy	18135	Normandy Terrace SW	1941	684
•	Dawson House	Dawson House	N50-05	Normandy	18902	Marine View Drive SW	1952	684
	Delich House (Temp)	Delich House	N30-05	Normandy	18222	Terrace Court SW	1933	684
	Dibble House	Ramel House	N30-20	Normandy	18915	Marine View Drive SW	1939	684
•	Dobszinsky (Anderson) Hou	Evans House	N30-14	Normandy	18107	Normandy Terrace SW	1937	684
•	Dodd House	Dodd House	N50-02	Normandy	19203	Edgecliff Drive SW	1950	684
•	Dunbar House	Christensen House	N00-01	Normandy	18617	4 Ave SW	1890	684
•	Dunbar House, Grant	Bruening House	N10-03	Normandy	18818	First Place SW	1913	684
	Ettel House (temp)	Ettel House	N40-19	Normandy	17942	Riviera Place SW	1942	654
	Fichtner House (temp)	Fichtner House	N30-12	Normandy	19205	First Ave South	1936	684
•	Fish House	Fish House	N40-20	Normandy	801	168 Street South	1942	654
	Fleener House (Temp)	Wendal & Phyllis Fleener	N40-11	Normandy	18177	Normandy Terrace SW	1941	684
	Fogelberg House (temp)	Unknown	N30-08	Normandy	18619	2 Ave SW	1935	684
	Fooks House (temp)	Fooks House	N20-04	Normandy	21636	6 Ave South	1924	684
	Forland House	Unknown	N60-05	Normandy	18939	Edgecliff Dr. SW	1963	684
•	Gustin House	Gustin House	N30-02	Normandy	17985	Normandy Terrace SW	1931	684
	Hanson House (temp)	Unknown	N40-34	Normandy	129	164 Street SW	1943	654
	Hardy House (temp)	Hardy House	N40-21	Normandy	226	171 Street SW	1942	654
	Helland House (temp)	Helland House	N40-22	Normandy	18901	Edgecliff Dr SW	1942	684
	Hilson House (temp)	Hilson House	N10-01	Normandy	18449	First Ave South	1910	684
	Hixson House (temp)	Hixson House	N30-13	Normandy	132	166 Street SW	1936	654
•	Hubbart House	Kludt House	N40-01	Normandy	17424	13 Ave SW	1940	654
•	Hughett House	Elchey House	N20-10	Normandy	17999	Normandy Terrace SW	1929	684
	Huhn House	Southgate Assembly of G	N20-03	Normandy	16625	First Ave South	1923	654
•	John Knox Presbyterian Ch	John Knox Presbyterian C	N50-08	Normandy	109	Normandy Road SW	1954	684
	Johnson House (temp)	Johnson House	N40-23	Normandy	18514	Marine View Drive SW	1942	684
	Kane House	Kane House	N60-03	Nôrmandy	1923	170 Street SW	1962	654
	Keeble House (temp)	Unknown	N40-24	Normandy	420	218 Street South	1942	684
	Kimmel House (temp)	Kimmel House	N40-25	Normandy	1635	168 Street SW	1942	654
	Kobela House (temp)	Unknown	N30-09	Normandy	112	166 Street SW	1935	654
	Larsen House	Larsen House	N60-06	Normandy	20600	6 Ave SW	1964	684
•	Latimer House	Rosser House	N40-02	Normandy	1229	174 Street SW	1940	654
	LePenske House (temp)	LePenske House	N40-26	Normandy	18410	8 Ave SW	1942	684
	Leon House (temp)	Leon House	N30-10	Normandy	111	166 Street SW	1935	654
	Lingwood House (temp)	Lingwood House	N30-11	Normandy	17623	First Ave South	1935	654
	Martin House	LePenski House	N40-03	Normandy	16884	2nd Ave SW	1940	654
	Mavista Elementary School	Mavista Elementary Scho	N50-15	Normandy	19800	Marine View Dr SW	1957	684
•	Mayer House	Riddling House	N30-15	Normandy	18641	4 Ave SW	1937	684
	McInturff House	McInturff House	N50-16	Normandy	18958	Edgecliff Drive SW	1957	684
	Moore House	Moore House	N30-18	Normandy	18521	Brittany Drive SW	1938	684
	Mulvihill House (temp)	Unknown	N40-12	Normandy	20829	2 Place SW	1941	684
•	NIKE Missile Base	Civic Center Park	N40-04	Normandy	19900	4 Ave SW	1940	684
•	Normandy Park Club House	Ben Tipp House	N20-04	Normandy	1865	Miller Creek Dr SW	1926	654
	Normandy Park Community	The Cove	N50-18	Normandy	1500	Shorebrook Dr. SW	1959	654
•	Normandy Park Elementary	Normandy Park City Hall	N50-09	Normandy	801	174 Street SW	1954	654
•	Normandy Park Site Plan	Normandy Park	N20-11	Normandy		From Shorebrook to Normandy Pk. Dr.	1929	654
	Normandy Park Swim Club	Normandy Park Swim Clu	N50-12	Normandy	17655	12 Ave SW	1956	654
•	Northwest Archery Museum	Northwest Archery Museu	N50-03	Normandy	19807	First Ave South	1950	684
	Olympic View Swim Club	Olympic View Swim Club	N60-02	Normandy	19800	4th Ave SW	1961	684
	Parks House	Labenz House	N40-13	Normandy	18529	Normandy Terrace SW	1941	684
	Pearce House (temp)	Pearce House	N40-14	Normandy	1221	174 Street SW	1941	654
	Pedersen House	Pedersen House	N30-19	Normandy	609	207 Street SW	1938	684
	Pelger House (temp)	Pelger House	N40-27	Normandy	20938	Marine View Drive SW	1942	684

Index by Historic Name In Each City

Friday, October 14, 1994 | Index Page 9

M.	Historic Name	Common Name	File #	City	St. #	Site Street Name	Date	Pg.
	Fackrell House (temp)	Unknown	T00-28	Tukwila	13027	37 Ave South	1909	655
	Fencl House (temp)	Fencl House	T30-53	Tukwila	12840	33 Place South	1937	655
	Ferrell House (temp)	Ferrell House	T00-23	Tukwila	14025	44 Ave South	1908	655
•	Fetters House (temp)	Unknown	T10-30	Tukwila	14019	37 Ave South	1918	655
	Fokkema House (temp)	Fokkema House	T30-18	Tukwila	4440	160 Street South	1932	655
•	Foster Golf Course	Foster Golf Links	T20-40	Tukwila	13900	Interurban Ave South	1925	655
•	Foster High School Stadium	Werner Neudorf Memorial	T50-02	Tukwila	4242	144 Street South	1952	655
	Foster Library	Foster Library	T50-04	Tukwila	4205	142 Street South	1959	655
•	Foster Maple Tree	Large Maple Tree	T00-02	Tukwila	Northe	Foster Golf Links	1865	655
	Foster Senior High School	**Demolished**	T50-03	Tukwila	4242	144 Street South	1952	655
	Foster-Tukwila Presbyterian	Tukwila Presbyterian Chu	T00-29	Tukwila	14401	56 Ave South	1909	655
	Fowler House (temp)	Fowler House	T00-30	Tukwila	3517	130 Street South	1909	655
	Fox House (temp)	Fox House	T40-28	Tukwila	11863	44 Ave South	1942	625
	Fredericks Store	Unknown	T20-06	Tukwila	11602	42 Ave South	1920	625
	Frymier House (temp)	Fymier House	T30-29	Tukwila	13650	Military Road South	1934	655
	Fuller House	Painter House	T20-07	Tukwila	13526	53 Ave South	1920	655
	Gaviglio House (temp)	Gaviglio House	T40-29	Tukwila	4008	114 Street South	1942	625
	Geehan House (temp)	Unknown	T10-08	Tukwila	14261	Macadam Road South	1912	655
	Glenn House (temp)	Glenn House	T40-15	Tukwila	10333	51 Ave South	1941	625
	Glessner House (temp)	Glessner House	T30-67	Tukwila	12092	44 Place South	1939	625
	Gomez House (temp)	Unknown	T30-45	Tukwila	4518	124 Street South	1936	655
	Gonzalez Buildings (temp)	Unknown	T20-24	Tukwila	3827	130 Street South	1922	655
	Gonzalez House (temp)	Unknown	T20-08	Tukwila	13027	40 Ave South	1920	655
	Goodale House (temp)	Goodale House	T30-15	Tukwila	3726	128 Street South	1931	655
	Gradzuk House (temp)	Gradzuk House	T10-31	Tukwila	13041	38 Ave South	1918	655
	Greene House (temp)	Unknown	T40-30	Tukwila	11867	44 Ave South	1942	625
	Greeno House (temp)	Unknown	T40-16	Tukwila	13722	44 Ave South	1941	655
	Grotem House (temp)	Grotem House	T30-68	Tukwila	4802	150 Street South	1939	655
	Guess House (temp)	Unknown	T20-32	Tukwila	13319	42 Ave South	1918	655
	Gulla House (temp)	Gulla House	T30-04	Tukwila	11659	44 Ave South	1930	625
	Gustafson House #2 (temp)	Unknown	T40-05	Tukwila	3915	117 Street South	1940	625
	Gustafson House (temp)	Gustafson House	T40-17	Tukwila	14650	46 Ave South	1941	655
	Gustofson Buldings (temp)	Unknown	T20-47	Tukwila	11640	East Marginal Way South	1927	625
•	Haggard House (temp)	Haggard House	T00-12	Tukwila	11532	40 Ave South	1903	625
	Hale House	Most Likely 'Demolished'	T20-09	Tukwila	12550	51 Place South?	1920	655
	Harty House (temp)	Harty House	T10-11	Tukwila	13119	42 Ave South	1913	655
	Hellstrom House (temp)	Unknown	T10-33	Tukwila	4208	115 Street South	1918	625
	Henderson House		T20-25	Tukwila	4815	124 Street South	1922	655
•	Henke House	Moore House	T10-34	Tukwila	14222	58 Ave South	1918	655
	Henry House (temp)	Unknown	T00-19	Tukwila	14424	51 Ave South	1906	655
	Hibbs House (temp)	Hibbs House	T30-54	Tukwila	12633	37 Ave South	1937	655
	Hildner House (temp)	Hildner House	T20-26	Tukwila	3901	117 Street South	1922	625
	Hilmes House (temp)	Unknown	T20-27	Tukwila	3709	126 Street South	1922	655
	Hingorani House (temp)	Unknown	T20-58	Tukwila	15608	47 Ave South	1929	655
	Holdaas House (temp)	Holdaas House	T40-06	Tukwila	4432	148 Street South	1940	655
	Houle House (temp)	Houle House	T10-12	Tukwila	12910	East Marginal Way South	1913	655
	Hughes House (temp)	Hughes House	T20-10	Tukwila	13739	41 Ave South	1920	655
	Hunter House (temp)	Hunter House	T40-57	Tukwila	13442	34 Ave South	1943	655
	Ingersoll House (temp)	Ingersoll House	T40-31	Tukwila	13455	48 Ave South	1942	655
	Interurban Bridge	**Demolished 88**	T10-21	Tukwila	11500	East Marginal Way South	1915	625
	Iverson House (temp)	Unknown	T40-58	Tukwila	16226	51 Ave South	1943	655
	Jacobson House (temp)	Jacobson House	T20-11	Tukwila	12202	42 Ave South	1920	625
	Jenson Dairy	Basich House	T00-20	Tukwila	11854	42 Ave South	1906	625
	Jenson House (temp)	Jenson House	T40-70	Tukwila	14647	42 Ave South	1944	655
	Johnson House (temp)	Johnson House	T40-18	Tukwila	13048	34 Ave South	1941	655
	Johnson House (temp)	Johnson House	T20-59	Tukwila	14406	42 Ave South	1929	655
	Johnson Residence	Johnson House	T10-01	Tukwila	13136	42 Ave South	1910	655
	Jones House (temp)	Jones House	T30-55	Tukwila	10415	47 Ave South	1937	625
	Jordon House (temp)	Jordon House	T30-60	Tukwila	10918	49 Ave South	1938	625
•	Jorgensen Forge	Jorgenson Forge	T40-59	Tukwila	8531	East Marginal Way South	1943	625
	Jorgensen House (temp)	Jorgensen House	T10-18	Tukwila	13025	41 Ave South	1914	655

Index by Historic Name in Each City

Friday, October 14, 1994

M.	Historic Name	Common Name	File #	City	St. #	Site Street Name	Date	Pg.
	Benson House (temp)	Benson House	T40-12	Tukwila	3720	142 Street South	1941	655
•	Bergquist House	Marks House	T20-31	Tukwila	14455	58 Ave South	1924	655
	Berkman House (temp)	Unknown	T20-51	Tukwila	11914	Interurban South	1928	625
	Bigelow House	McCarton House	T00-09	Tukwila	11728	40 Ave South	1902	625
	Boardman House (temp)	Boardman House	T20-37	Tukwila	11926	Interurban South	1925	625
	Boardwalk House (temp)	Unknown	T10-23	Tukwila	13042	Pacific Highway South	1917	655
•	Boeing Company Building 1	The Red Barn	T00-27	Tukwila	9404	East Marginal Way South	1909	625
	Bohall House (temp)	Bohall House	T10-42	Tukwila	12840	35 Ave South	1919	655
	Bohleen House (temp)	Unknown	T40-50	Tukwila	12218	48 Ave South	1943	625
	Bosshart House (temp)	Bosshart House	T20-38	Tukwila	14220	Military Road South	1925	655
	Botham House (temp)	Unknown	T00-18	Tukwila	14702	51 Ave South	1906	655
	Bowen House (temp)	Unknown	T30-28	Tukwila	13311	37 Ave South	1934	655
	Brandeberry House (temp)	Unknown	T40-02	Tukwila	13908	45 Ave South	1940	655
	Braucher House (temp)	Braucher House	T30-13	Tukwila	12223	43 Ave South	1931	625
	Brethauer House (temp)	Brethauer House	T30-62	Tukwila	14065	33 Ave South	1939	655
	Brown House (temp)	Brown House	T10-26	Tukwila	3832	130 Street South	1918	655
	Burkey House (temp)	Burkey House	T40-51	Tukwila	3928	113 Street South	1943	625
	Buss House (temp)	Unknown	T40-03	Tukwila	11811	44 Ave South	1940	625
	Caldwell House (temp)	Caldwell House	T10-06	Tukwila	15650	42 Ave South	1912	655
	Calibuso House (temp)	Unknown	T30-64	Tukwila	15843	47 Ave South	1939	655
	Cantonwine House (temp)	Cantonwine House	T10-24	Tukwila	14454	51 Ave South	1917	655
	Capellaro House (temp)	Capellaro House	T10-27	Tukwila	4061	128 Street South	1918	655
	Capellaro House (temp)	Unknown	T20-32	Tukwila	4603	124 Street South	1924	655
	Carlson House (temp)	Unknown	T20-04	Tukwila	3818	116 Street South	1920	625
	Carlson House (temp)	Unknown	T40-25	Tukwila	12248	43 Ave South	1942	625
	Case House (temp)	Unknown	T40-52	Tukwila	12040	44 Ave South	1943	625
•	Cavanaugh House (temp)	Cavanaugh House	T00-07	Tukwila	4026	130 Street South	1901	655
	Chittenden House (temp)	Chittenden House	T40-04	Tukwila	13057	34 Ave South	1940	655
•	Christian Science Church	Primera Iglesia Bautista C	T30-22	Tukwila	13045	42 Ave South	1933	655
	Clark House	**Demolished 80s**	T00-10	Tukwila	13532	52 Ave South	1902	655
	Clark House (temp)	Clark House	T40-53	Tukwila	12217	46 Ave South	1943	625
	Cloutier House (temp)	Cloutier House	T20-39	Tukwila	4058	128 Street South	1925	655
	Codd House (temp)	Codd House	T30-23	Tukwila	4240	158 Street South	1933	655
•	Codiga Farm: Dairy Barn	Codiga Farm	T20-52	Tukwila	12523	50 Place South	1928	655
•	Codiga House	Codiga House	T10-43	Tukwila	12523	50 Place South	1919	655
	Codiga House #2 (temp)	Unknown	T20-33	Tukwila	12523	50 Place South	1924	655
	Cohen House (temp)	Unknown	T30-65	Tukwila	13738	45 Ave South	1939	655
	Coleman House (temp)	Coleman House	T40-13	Tukwila	12223	48 Ave South	1941	625
	Conner House (temp)	Conner House	T40-26	Tukwila	4616	146 Street South	1942	655
	Coon House (temp)	Coon House	T40-14	Tukwila	13018	41 Ave South	1941	655
	Dahl House (temp)	Dahl House	T10-28	Tukwila	11714	40 Ave South	1918	655
	Davidson House (temp)	Davidson House (temp)	T30-01	Tukwila	4020	128 Street South	1930	655
	Davidson House (temp)	Unknown	T40-54	Tukwila	4058	148 Street South	1943	655
	Davis House (temp)	Davis House	T40-55	Tukwila	4705	122 Street South	1943	625
	Dawe House (temp)	Dawe House	T40-56	Tukwila	2929	133 Street South	1943	655
	Delta Masonic Lodge	Delta Masonic Lodge	T20-45	Tukwila	13034	41 Ave South	1927	655
	Dennis House (temp)	Unknown	T10-29	Tukwila	3906	113 Street South	1918	625
	Derosier House (temp)	Unknown	T40-27	Tukwila	12214	42 Ave South	1942	625
	Desjardin House (temp)	Desjardin House	T20-53	Tukwila	3826	116 Street South	1928	625
	Dietsch House (temp)	Unknown	T30-66	Tukwila	4635	144 Street South	1939	655
	Dillon House (temp)	Unknown	T20-05	Tukwila	4210	115 Street South	1920	625
	Dingle House (temp)	Dingle House	T30-02	Tukwila	4115	114 Street South	1930	625
	Doty House	Unknown	T00-15	Tukwila	14711	57 Ave South	1905	655
	Doubleday House	**Demolished or Moved**	T00-11	Tukwila	14951	57 Ave South	1903	655
	Driscoll House (temp)	Driscoll House	T30-14	Tukwila	3944	113 Street South	1931	625
	Dukich House (temp)	Dukich House	T10-07	Tukwila	5001	114 Street South	1912	625
	Duncan House (temp)	Unknown	T30-03	Tukwila	11664	44 Ave South	1930	625
	Dunne House (temp)	Unknown	T30-44	Tukwila	12812	37 Ave South	1936	655
•	Duwamish 99 Bridge	Duwamish 99 Bridge	T20-46	Tukwila	11600	Pacific Highway South	1927	625
•	Duwamish Church	Duwamish Community Pr	T00-03	Tukwila	11814	42 Ave South	1870	625
	Easter House (temp)	Easter House	T10-20	Tukwila	4820	150 Street South	1915	655
	Eberhardt House (temp)	Eberhardt House	T30-36	Tukwila	12816	34 Ave South	1935	655
	Elliott House (temp)		T99-01	Tukwila				655
	Eng House (temp)	Eng House	T30-52	Tukwila	4836	150 Street South	1937	655

Index by Historic Name In Each City

Friday, October 14, 1994

M.	Historic Name	Common Name	File #	City	St. #	Site Street Name	Date	Pg.
	Orn House (Temp)	Orn House	T20-41	Tukwila	13415	48 Ave South	1925	655
	Patapoff House (temp)	Patapoff House	T20-23	Tukwila	3703	126 Street South	1921	655
	Patterson House (temp)	Patterson House	T30-69	Tukwila	3910	113 Street South	1939	625
	Pearce House (temp)	Unknown	T40-65	Tukwila	4627	125 Street South	1943	655
	Pearson House (temp)	Pearson House	T30-38	Tukwila	4221	148 Street South	1935	655
	Poirier House (temp)	Unknown	T10-09	Tukwila	13745	44 Ave South	1912	655
	Pollinger House (temp)	Unknown	T40-71	Tukwila	14910	51 Ave South	1944	655
	Presbyterian House (temp)	Unknown	T30-26	Tukwila	15820	Military Road South	1933	655
	Primacio House (temp)	Unknown	T40-72	Tukwila	12048	44 Place South	1944	625
	Radley House (temp)	Radley House	T20-48	Tukwila	13347	34 Ave South	1927	655
•	Rainier View Community Cl	Rainier View Community	T20-55	Tukwila	10915	51 Ave South	1928	625
	Ramsey House (temp)	Ramsey House	T40-08	Tukwila	14040	33 Ave South	1940	655
•	Ray House	Carrosino House	T00-04	Tukwila	11269	East Marginal Way South	1882	625
	Reed House (temp)	Reed House	T40-68	Tukwila	12202	44 Ave South	1943	625
	Regal House	Unknown	T99-02	Tukwila		56 Ave South?		655
	Reidl House (temp)	Unknown	T20-29	Tukwila	4653	150 Street South	1923	655
	Ristau House (temp)	Ristau House	T20-15	Tukwila	13642	Military Road South	1920	655
	Riverton Heights Post Office	Unknown	T99-04	Tukwila	35007	150 Street South		655
•	Riverton Heights Presbyteri	Riverton Heights Presbyte	T30-08	Tukwila	3728	160 Street South	1930	655
•	Riverton Hospital	Huls Apartments	T10-44	Tukwila	13041	East Marginal Way South	1919	655
	Riverton House #1 (temp)	Unknown	T20-16	Tukwila	13449	43 Ave South	1920	655
	Riverton House #2 (temp)	Unknown	T30-39	Tukwila	13517	43 Ave South	1935	655
•	Riverton Park United Metho	Beth Ha Shofar	T10-02	Tukwila	13001	37 Ave South	1910	655
	Roberson House (temp)	Roberson House	T20-17	Tukwila	14845	51 Ave South	1920	655
	Rochon House (temp)	Rochon House	T20-43	Tukwila	5136	151 Street South	1926	655
	Roland House (temp)	Roland House	T20-35	Tukwila	4633	160 Street South	1924	655
	Ruffino House (temp)	Unknown	T30-27	Tukwila	14862	Pacific Highway South	1933	655
	Ruggles House (temp)	Ruggles House	T40-39	Tukwila	12404	50 Place South	1942	655
	Ruja House (temp)	Ruja House	T30-47	Tukwila	3115	135 Street South	1936	655
	Runge House (temp)	Unknown	T40-22	Tukwila	3742	141 Street South	1941	655
	Rupp House (temp)	Rupp House	T30-57	Tukwila	4611	140 Street South	1937	655
	Rupp-Santora House (temp)	Unknown	T10-17	Tukwila	4647	140 Street South	1913	655
	Sampson House	Alva Pease Property	T30-58	Tukwila	11540	East Marginal Way South	1937	625
	Santora House (temp)	Santora House	T30-59	Tukwila	4617	140 Street South	1937	655
	Sarantos House (temp)	Unknown	T40-40	Tukwila	3725	126 Street South	1942	655
	Serfica House (temp)	Serfica House	T40-67	Tukwila	12542	50 Place South	1943	655
	Sherman House (temp)	Sherman House	T40-09	Tukwila	13715	42 Ave South	1940	655
•	Shoemaker House	Malone House	T00-21	Tukwila	14243	58 Ave South	1906	655
•	Showalter School	Showalter Intermediate S	T30-70	Tukwila	4628	144 Street South	1939	655
	Simkus House (temp)	Simkus House	T30-48	Tukwila	4320	150 Street South	1936	655
	Simpson House (temp)	Simpson House	T30-40	Tukwila	4615	148 Street South	1935	655
	Sims House (temp)	Unknown	T30-71	Tukwila	14118	37 Ave South	1939	655
	Smith House (temp)	Smith House	T00-22	Tukwila	4226	139 Street South	1906	655
•	Southcity Motel Sign	Southcity Motel	T30-33	Tukwila	14242	Pacific Highway South	1934	655
•	Southgate Elementary Scho	Tukwila Community Cente	T50-01	Tukwila	4101	131 Street South	1950	655
	St. Thomas Catholic Church	St. Thomas Church	T60-01	Tukwila	4415	140 Street South	1963	655
	Stanley House (temp)	Stanley House	T30-20	Tukwila	13029	41 Ave South	1932	655
	Steadman House (temp)	Steadman House	T40-41	Tukwila	3811	116 Street South	1942	625
	Steen House (temp)	Steen House	T20-49	Tukwila	14062	33 Ave South	1927	655
	Steffan House (temp)	Steffan House	T10-10	Tukwila	15207	40 Ave South	1912	655
	Strand House (temp)	Strand House	T30-72	Tukwila	13235	East Marginal Way South	1939	655
	Strayer House (temp)	Strayer House	T10-25	Tukwila	11830	42 Ave South	1917	625
•	Subdivision '44, Casade Vie	Casade View Homes	T40-73	Tukwila	13503	37 Ave South	1944	655
	Sundby 119th House	Schulhamer House	T20-50	Tukwila	4037	119 Street South	1927	625
	Sundby 40th House	**Wrong Address**	T20-56	Tukwila	11605	40 Ave South	1928	625
	Sundby Interurban House	Unknown	T30-34	Tukwila	11918	Interurban South	1934	625
	Swanberg House (temp)	Swanberg House	T30-49	Tukwila	14809	51 Ave South	1936	655
	Teays House (temp)	Teays House	T30-41	Tukwila	4633	150 Street South	1935	655
	Thompson House (temp)	Unknown	T20-18	Tukwila	4503	136 Street South	1920	655
•	Thompson Store/ Riverton C	Jakes Antiques	T20-57	Tukwila	4010	130 Street South	1928	655
•	Thompson, O.C., House	Bitzig House	T10-19	Tukwila	4049	128 Street South	1914	655

214

Index by Historic Name in Each City

Friday, October 14, 1994

Index Page 10

M.	Historic Name	Common Name	File #	City	St. #	Site Street Name	Date	Pg.
	Josie House (temp)	Josie House	T20-60	Tukwila	10035	East Marginal Way South	1929	625
	Judd House (temp)	Judd House	T20-12	Tukwila	4044	128 Street South	1920	655
	Kaiser #1 House	Violin House	T10-13	Tukwila	4128	130 Street South	1913	655
	Kaiser #2 House	Deatry House	T10-14	Tukwila	4136	130 Street South	1913	655
•	Kassner House	Unknown	T00-14	Tukwila	14406	59 Ave South	1904	655
	King County House (temp)	Unknown	T30-61	Tukwila	4029	144 Street South	1938	655
	Kirkland Building (temp)	Used Trucks and Equipm	T20-54	Tukwila	13500	Pacific Highway South	1928	655
	Knaus House (temp)	Knaus House	T40-60	Tukwila	16445	51 Ave South	1943	655
	Kolsky House (temp)	Kolsky House	T00-24	Tukwila	13001	41 Ave South	1908	655
	Lacava House	**Wrong Address**	T20-13	Tukwila	13012	40 Ave South	1920	655
	Larson House (temp)	Larson House	T40-32	Tukwila	12524	51 Place South	1942	655
	Lawrence House (temp)	Lawrence House	T30-46	Tukwila	4461	144 Street South	1936	655
	Lee House (temp)	Unknown	T20-61	Tukwila	4240	146 Street South	1929	655
	Lehmbeck House (temp)	Lehmbeck House	T20-34	Tukwila	13011	33 Ave South	1924	655
	Lewis House (temp)	Lewis House	T10-22	Tukwila	3403	132 Street South	1916	655
	Light Residence	Unknown	T00-13	Tukwila	14688	53 Ave (Macadam Rd) South	1903	655
	Liljestrand House (temp)	Liljestrand House	T10-33	Tukwila	13111	42 Ave South	1918	655
•	Lincoln House	Lautenschlager House	T00-25	Tukwila	13243	40 Ave South	1908	655
	Little Church by the Side of t	Little Church...	T30-24	Tukwila	14800	Pacific Highway South	1933	655
	Looney House (temp)	Looney House	T30-19	Tukwila	12218	49 Ave South	1932	625
	Lovell House (temp)	Unknown	T30-25	Tukwila	3235	135 Street South	1933	655
	Lucero House (temp)	Lucero House	T10-35	Tukwila	13219	East Marginal Way South	1918	655
	Marleau Building (temp)	Unknown	T30-05	Tukwila	12601	East Marginal Way South	1930	655
	Martin House (temp)	Unknown	T30-30	Tukwila	11682	44 Ave South	1934	625
	Mason House (temp)	Mason House	T40-19	Tukwila	13021	33 Ave South	1941	655
	Mathias House (temp)	Mathias House	T40-61	Tukwila	12056	44 Ave South	1943	625
	Matson House (temp)	Matson House	T30-06	Tukwila	12204	43 Ave South	1930	625
	Mauzeralle House (temp)	Mauzeraulle House	T30-56	Tukwila	4806	146 Street South	1937	655
	McCall House (temp)	Unknown	T10-36	Tukwila	13734	42 Ave South	1918	655
	McHugh House (temp)	McHugh House	T30-31	Tukwila	15222	42 Ave South	1934	655
	McNicholas House (temp)	McNicholas House	T10-37	Tukwila	10342	Beacon Ave South	1918	625
	Mechling House (temp)	Mechling House	T20-14	Tukwila	14011	Macadam Road South	1920	655
	Merkle House (temp)	Merkel House	T40-62	Tukwila	4602	122 Street South	1943	625
•	Merkle, Grandma, House	Kolstad House	T00-26	Tukwila	12244	42 Ave South	1908	625
	Merriam House (temp)	Unknown	T10-04	Tukwila	4939	114 Street South	1911	625
•	Mess Pioneer Family Ceme	Mess Cementary	T00-06	Tukwila	19200	Frager Ave South	1900	685
	Methodist House #1 (temp)	Unknown	T40-33	Tukwila	13842	Military Road South	1942	655
	Methodist House #2 (temp)	Unknown	T40-34	Tukwila	13848	Military Road South	1942	655
	Miller House (temp)	Miller House	T20-21	Tukwila	4629	144 Street South	1921	655
•	Miyao Greenhouse	Miyao House	T30-07	Tukwila	11600	39 Ave South	1930	625
	Miyao House (temp)	Miyao House	T10-38	Tukwila	12054	42 Ave South	1918	625
	Moltane House(temp)	Unknown	T30-32	Tukwila	12205	44 Ave South	1934	625
•	Monroe House	Ritch House	T20-62	Tukwila	11616	42 Ave South	1929	625
	Morgan House (temp)	Unknown	T40-20	Tukwila	16446	51 Ave South	1941	655
	Moriwaki House (temp)	Moriwaki House	T10-05	Tukwila	4033	128 Street South	1911	655
	Morrison House (temp)	Morrison House	T40-07	Tukwila	12562	50 Place South	1940	655
	Mosler House (temp)	Mosler House	T40-35	Tukwila	4411	146 Street South	1942	655
	NW Realty House (temp)	Unknown	T40-36	Tukwila	3224	135 Street South	1942	655
	Nash House	Cripe House	T10-15	Tukwila	4106	130 Street South	1913	655
	Nealy House (temp)	Nealy House	T40-63	Tukwila	4408	122 Street South	1943	625
	Nelsen House	Nelsen House	T00-16	Tukwila	15643	West Valley Road South	1905	655
	Nelson, Fred, Farm	Nelson Dairy	T00-08	Tukwila	7107	Grady Road South	1901	655
	Ness House (temp)	Unknown	T10-16	Tukwila	12607	East Marginal Way South	1913	655
	Newporter Motel	Newporter Apartments	T40-37	Tukwila	14848	Pacific Highway South	1942	655
	Nienaber House (temp)	Unknown	T30-37	Tukwila	16228	42 Ave South	1935	655
	Nistor House (temp)	Nistor House	T40-64	Tukwila	12253	44 Ave South	1943	625
	Norris House (temp)	Unknown	T20-22	Tukwila	11609	39 Ave South	1921	655
•	Northwest House (temp)	Unknown	T20-63	Tukwila	3730	142 Street South	1929	655
	O'Brien House (temp)	Unknown	T40-38	Tukwila	3429	144 Street South	1942	655
	O'Brien House (temp)	Unknown	T40-21	Tukwila	3468	148 Street South	1941	655

214

Historic Properties Survey: City of Normandy Park

Report Date: 10/14/94

Created in August, September & October, 1994
Glenn Weiss, Surveyor & Planning Intern

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
N00-00 Not Publicly Accessible 684 WA Arch. U U U	Archeological Sites WA Arch Not Publicly Accessible	Shell Middens NA Not Publicly Accessible Normandy Park 98166	See Washington State Office of Archeology for information on Native American Sites.
N00-01 Manhattan 684 None None 8/27/94 D A	*Dunbar House 1890 Dunbar, Bld. Kroll 81 Moved in 1910 to site. Small additions north and south. New windows and cedar siding.	Christensen House John Christensen 18617 4 Ave SW Normandy Park 98166	One of first families to establish residence in Normandy Park in 1889. Many of the children remained in the area. Original log cabin rebuilt before 1902 into pioneer style home.
N00-02 Manhattan 654 None None U U	Treaty Tree Joseph Weiland Exists.	Treaty Tree James Rogge 17107 2 Ave SW Normandy Park 98166	Not researched. Rumors in community believe the tree is a "Treaty Tree" that requires contacting the Duwamish Tribe before trimming.
N10-01 Manhattan 684 None Dev [illegible] C B	Hilson House (temp) 1910 None Fair condition with replacement metal slider windows. Danger of Demolition in 1994.	Hilson House Norm Hilson 18449 First Ave South Normandy Park 98166	Oldest remaining house in Normandy Park. One story, folk house in gable-front-and-wing family form.
N10-02 Marine View 684 None nra3 [illegible] B B	*Andrews Log Cabin (temp) 1913 Assessor 94 Cabin in good condition.	Andrews Log Cabin James & Deborah Andrews 104 214 Street SW Normandy Park 98166	Assessor lists date of house at 1913 which has been remodeled, but a small log cabin exists on the property.
N10-03 Manhattan 684 None None [illegible] F A	*Dunbar House, Grant 1913 G. Dunbar, Bld. Kroll 91 Extensive remodeled beyond recognition	Bruening House Alvin Bruening 18618 First Place SW Normandy Park 98166	Build by son of Aaron Dunbar.
N10-04 Manhattan 684 None None [illegible] D C	Pollard House 1913 Kroll 94 Completely remodeled in everyway. Old shape is visable.	Pollard House Mike Wall 8167 187 or 189 Street SW Normandy Park 98166	

Key to Categories Above (if field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives: WA State, King County Link to Site: None, NAA, nra3, Development & Owner Date of Windshield Survey Codes: Architecture & History (see left side)	*Original Site Name Date of Construction Architect or Builder, if known References 1994 Condition of Site * Asterisk designates Map Number	1994 Site Name, if known 1994 Owner, if Recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A: Important, B: Rare Building, C: Common, U: Unknown Architecture Codes: A: Special Style, B: Common, C: Minor Alteration of "A" or "B", D: Larger Alteration, F: Remodel or Demolition

214

Index by Historic Name in Each City

Friday, October 14, 1994

Index Page 12

M.	Historic Name	Common Name	File #	City	SL #	Site Street Name	Date	Pg.
	Thorndyke School	Thorndyke Community Cl	T10-45	Tukwila	15000	42 Ave South	1919	655
	Tinsley House (temp)	Unknown	T30-21	Tukwila	12219	49 Ave South	1932	625
	Tolland House (temp)	Tolland House	T30-50	Tukwila	13636	Military Road South	1936	655
	Tom House (temp)	Unknown	T30-73	Tukwila	13228	37 Ave South	1939	655
	Tomaso House (temp)	Unknown	T10-39	Tukwila	13751	41 Ave South	1918	655
	Tompkins House (temp)	Tompkins House	T20-28	Tukwila	4439	160 Street South	1922	655
•	Torre House	Unknown	T00-05	Tukwila	3914	115 Street South	1890	625
	Tractor House (temp)	Unknown	T40-42	Tukwila	4438	160 Street South	1942	655
	Tremana House (temp)	Unknown	T10-40	Tukwila	14211	37 Ave South	1918	655
	Trone House (temp)	Trone House	T30-09	Tukwila	14020	43 Ave South	1930	655
•	Trudy's Tavern Sign		T30-74	Tukwila	15001	Pacific Highway South	1939	655
•	Tukwila Community Club Ha	Tukwila Community Club	T20-30	Tukwila	14257	Interurban Ave South	1923	655
•	Tukwila Grade School	Tukwila City Hall	T20-19	Tukwila	14475	59 Ave South	1920	655
•	Tukwila Park	Tukwila Park	T30-42	Tukwila	15300	65 Ave South	1935	655
	Vanness House (temp)	Vanness House	T30-51	Tukwila	15210	42 Ave South	1936	655
	Vasilieff House (temp)	Vasillieff House	T40-68	Tukwila	13504	Military Road South	1943	655
	Verhoff Service Station	Vi's Tavern	T20-20	Tukwila	12539	East Marginal Way South	1920	655
	Walker House (temp)	Walker House	T20-38	Tukwila	4208	124 Street South	1924	625
	Walkley House (temp)	Walkley House	T30-35	Tukwila	13035	40 Ave South	1934	655
	Walkup House	Mayor Walkup House	T99-03	Tukwila	15001	65 Ave South		655
	Whitworth House (temp)	Unknown	T10-03	Tukwila	13749	45 Ave South	1910	655
	Wickstrom House (temp)	Wickstrom House	T40-43	Tukwila	12022	44 Ave South	1942	625
	Wood House (temp)	Unknown	T30-75	Tukwila	4926	107 Street South	1939	625
	Yellam House (temp)	Unknown	T40-10	Tukwila	12501	50 Place South	1940	655
	Zuvela House (temp)	Zuvela House	T30-10	Tukwila	15205	51 Ave South	1930	655
•	ku-LAH-hahd	Northwind Fishweir	T00-01	Tukwila	2800	112 Street South		625

214

Historic Properties Survey: City of Normandy Park

3

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
N20-04 Manhattan 684 None None 8/27/94 D C	**Ringdahl House (Temp)** 1926 Kvdt 94 Remodeled with new porch, window and garage.	Ringdahl House Oscar Ringdahl 406 Normandy Road SW Normandy Park 98166	Older house in Normandy Park.
N20-05 Marine View 684 None None 8/30/94 C C	**Benson House** 1927 None Remodeled in 1976. Not Surveyed	Johnson House Thedore Johnson 20803 Marine View Drive SW Normandy Park 98166	Henry Benson built the house. He acquired around 100-150 acres known as "Beaconsfield of the Sound" from the Bankrupt Scandinavian American Bank in the 1930s.
N20-06 Marine View 684 None n/a3 8/13/94 B B	***Sprenger Beach House** 1927 Assessor 94 Good Condition and apparently unaltered from beach view.	Sprenger Beach House James & Linda Sprenger 232 218 Street South Normandy Park 98166	Best beach house in original condition. Log house with shed porch. In the 1920's many beach houses existed on the coast, but now only a few in Normandy Park and elsewhere exist.
N20-07 Marine View 684 None Owner 8/10/94 C C	**Cook Beach House** 1926 Assessor Garage has new deck and openings. House has been "renovated". Check photos for original.	Cook Beach House Dan & Susan Cook 21333 Marine View Drive SW Normandy Park 98166	Craftsman style houses on the beach as part of Cook estate.
N20-08 Normandy Park 684 None None 8/26/94 B B	***Prudence Penny Home #1** 1926 Kvdt 94 Excellent exterior condition. Brick construction.	Osborne House Osborne 17870 Brittany Drive SW Normandy Park 98166	Part of budget model home proposals by builders and Seattle P-I. Prudence Penny was a fictious writer (Bernice Redington of Normandy Park) for the Seattle P-I.
N20-09 Normandy Park 654 KC 0340 None 8/25/94 A B	***Clark House** 1929 KC Survey 78, Kvdt 91 Excellent Condition.	Andrews House Scott Andrews 17915 Normandy Terrace SW Normandy Park 98166	One of three houses completed as part of original Normandy Park development plan. Included in sales brochure.

Key to Categories Above (if field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives: WA State, King County [illegible] Development & Owner Date of Windshield Survey Codes: Architecture & History (see below)	***Original Site Name** Date of Construction Architect or Builder, if known References 1994 Condition of Site * Accent designates Map Number	1994 Site Name, if known 1994 Owner, if Recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A: Important, B: Rare Building, C: Common, U: Unknown Architecture Codes: A: Special Style, B: Common, C: Minor Alteration of "A" or "B", D: Larger Alteration, F: Remodel or Demolition

214

Historic Properties Survey: City of Normandy Park

2

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
N10-06 Marine View 684 None nra3 [illegible] B U	**Blesener House (temp)** 1916 Assessor 94 Good Condition.	Blesener House Richard Blesener 21606 8 Ave South Normandy Park 98166	One of few craftsman style houses.
N10-06 Marine View 684 None nra3 [illegible] B B	* **Bush Beach House (temp)** 1918 Assessor 94 Good original condition	Bush Beach House J, G, M, & L Bush 220 219 Street South Normandy Park 98166	Original small wooden beach house. In the 1920-30s, beach houses were popular vacations, but today very few remain.
N20-01 Normandy Park 684 None None [illegible] B U	**Anderson House (temp)** 1920 Assessor 94 Good condition. Needs check with photo.	Anderson/Shea House E Anderson & S Shea 18317 2 Ave SW Normandy Park 98166	One of few craftsman style houses in Normandy Park.
N20-02 Marine View 684 None nra3 [illegible] A U	* **Cook House** 1922 Assessor 94 Excellent original condition.	Unknown Evelyn Cook 21311 Marine View Drive South Normandy Park 98166	Best condition, craftsman house in Normandy Park. Built by Seattle patent attorney Cook in 1920's.
N20-03 Five Corners 654 None None [illegible]	**Huhn House** 1923 Huhn, Bld. Shelt 91 Not Surveyed	Southgate Assembly of God Assembly of God 16825 First Ave South Normandy Park 98166	Large early Normandy Park house built by John Henry and Anna Huhn. Bought by the church in 1953.
N20-04 Marine View 684 None nra3 [illegible] B U	**Fooks House (temp)** 1924 Assessor 94 Good Condition.	Fooks House Gregory Fooks 21836 8 Ave South Normandy Park 98166	One of few craftsman style houses in Normandy Park.
N20-04 Normandy Park 654 None None [illegible] C A	* **Normandy Park Club House** 1926 Shelt 91, Burien Sites 90 Windows & dormers added to roof. Interior space altered to convert to private home.	Ben Tipp House John & Carol Longridge 1865 Miller Creek Dr SW Normandy Park 98166	Part of communal beach property proposed in development plan. Club house for Normandy Park residents. Photo in sales brochure.

Key to Categories Above (if field is empty, the other fields move up in each column)

Historic Property Survey Number; Neighborhood; Thomas Map Page Number; Other Historic Archives: WA State, King County; Development & Owner; Date of Windshield Survey; Codes: Architecture & History (see below) — *Original Site Name; Date of Construction; Architect or Builder, if known; References; 1994 Condition of Site; * Asterisk designates Map Number — 1994 Site Name, if known; 1994 Owner, if Recorded; Street Address; City and Zip Code — Short Statement of Significance; History Codes: A: Important, B: Rare Building, C: Common, U: Unknown; Architecture Codes: A: Special Style, B: Common, C: Minor Alteration of "A" or "B", D: Larger Alteration, E: Remodel or Demolition

214

Historic Properties Survey: City of Normandy Park

5

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
N30-04 Five Corners 654 None None [illegible] B U	**Dalseg House (temp)** 1932 Assessor 94 Good Condition but needs verification of no alterations	Unknown Jeffey & Alicia Dalseg 16403 3 Ave SW Normandy Park 98166	One story, side gable, wood house.
N30-05 Normandy Park 684 None None [illegible] C U	**Delich House (Temp)** 1933 KC Assessor Excellent condition. Probably added 2-story turret on southwest corner.	Delich House Gerry & Sharon Delich 18222 Terrace Court SW Normandy Park 98166	Part of Original Normandy Park Development in Normandy Style.
N30-06 Marine View 684 None nra3 [illegible] B B	* **Stone Beach House (temp)** 1934 Assessor 94 Fair condition.	Stone Beach House Geraldine Stone 222 219 Street South Normandy Park 98166	Large two story, wooden beach house. In the 1920-30s, vacationing in small beach houses was very popular, but today very few remain.
N30-07 Five Corners 654 None None [illegible] A U	* **Beko House (temp)** 1935 Assessor 94 Original from street, but limited view.	Beko House Victoria Beko 230 164 Street SW Normandy Park 98166	Romantic, 1930's log cabin house. Only house in this style in Normandy Park.
N30-08 Manhattan 684 None None [illegible] B U	**Fogelberg House (temp)** 1935 Assessor 94 Excellent. Unaltered.	Unknown James Fogelberg 18819 2 Ave SW Normandy Park 98166	One story, side gable wooden house with fieldstone chimney.
N30-09 Five Corners 654 None None [illegible] B U	**Kobela House (temp)** 1935 Assessor 94 Excellent. Unaltered.	Unknown Joyce Kobela 112 168 Street SW Normandy Park 98166	One story, pyramid roof with front gable, wooden house.
N30-10 Five Corners 654 None None [illegible] B U	**Leon House (temp)** 1935 Assessor 94 Good Original condition.	Leon House David Leon 111 166 Street SW Normandy Park 98166	One story, side gable, wooden house.
N30-11 Manhattan 654 None None	**Lingwood House (temp)** 1935 Not Surveyed	Lingwood House Lewis Lingwood 17623 First Ave South Normandy Park 98166	

Key to Categories Above (if field is empty, the other fields move up in each column)

Historic Property Survey Number; Neighborhood; Thomas Map Page Number; Other Historic Archives: WA State, King County; Development & Owner; Date of Windshield Survey; Codes: Architecture & History (see below) — *Original Site Name; Date of Construction; Architect or Builder, if known; References; 1994 Condition of Site; * Asterisk designates Map Number — 1994 Site Name, if known; 1994 Owner, if Recorded; Street Address; City and Zip Code — Short Statement of Significance; History Codes: A: Important, B: Rare Building, C: Common, U: Unknown; Architecture Codes: A: Special Style, B: Common, C: Minor Alteration of "A" or "B", D: Larger Alteration, E: Remodel or Demolition

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
N20-10 Normandy Park 684 KC 0339 None [illegible] A B	*Hughett House 1929 KC Survey 78, Kludt 91 Excellent Condition. Imitation Shake roof in metal.	Eichey House Larry Weidkamp 17999 Normandy Terrace SW Normandy Park 98166	One of three houses completed as part of orginal Normandy Park development plan. Included in sales brochure. Normandy Style. According to an interview with Ms. Eichey in 1998, Mr. Hughett sold the house to Mildred Hill, daughter of Sam Hill (RR & Maryhill Museum). She sold to the Eichey's in 1947. Ralph Eichey was an officer with Washington Hardware.
N20-11 Normandy Park 654 None None [illegible] A A	*Normandy Park Site Plan 1929 Bebb & Gould Kludt 91, Elyer 78 Road & Plat intact. Only a minority of buildings in Normandy style of 1920-30.	Normandy Park City of Normandy Park From Shorebrook to Normandy Pk. Dr. Normandy Park 98166	Designed by Bebb and Gould with landscape by Butler Sturtevant. Original Developers were Russell Phinney (Phinney Ridge in Seattle) and Alvon Alvensleben under the name Seattle-Tacoma Land Company. Planned as exclusive residential community with yacht basin, golf course, country club and community beach front.
N30-01 Normandy Park 684 None None [illegible] A C	*Barricklow House 1931 Weiss 94 Excellent condition. Probably completely original.	Hayes House Jack Hayes 18135 Brittany Drive SW Normandy Park 98166	Part of Original Normandy Park Development. Normandy style cottage. Mrs. Hayes recalls the house built as a model home by the developers. F.A. and Mary Barricklow may have been original owners.
N30-02 Normandy Park 684 KC 0341 None [illegible] A B	*Gustin House 1931 Paul Gustin, Designer KC Survey 78, Kludt 91, Kludt 94 Can not see from street in 94.	Gustin House Ina Gustin 17985 Normandy Terrace SW Normandy Park 98166	One of three large houses completed as part of orginal Normandy Park development plan. The building was design by artist Paul Gustin based on his time studying art in France. Gustin was a respected artist and taught at the Univ. of Wash. 1922-23 & 1926-27. Born 1886 and died in 1974. Paul's widow, Ina Gustin, lives at 18711 3rd Ave South. 244-8898.
N30-03 Normandy Park 684 None None [illegible] D B	Prudence Penny Home #2 1931 William Bain & Lionel Pries Kludt 94, Seattle P-I 30 Remodeled in 50s?. Bay window added to front gable. Wooden porch columns changed to decorative metal. Large garage in Back.	Thompson House Thompson 17954 Brittany Drive SW Normandy Park 98166	Part of budget model home proposals by builders and Seattle P-I. Prudence Penny was a fictious writer (Bernice Redington of Normandy Park) for the Seattle P-I. Designed by Bain & Pries with landscape by Butler Sturtevant.

Key to Categories Above (If field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives: WA State, King County Link to See: None, HBA (...) Development & Owner Date of Windshield Survey / Codes: Architecture & History (see inside)	*Original Site Name Date of Construction Architect or Builder, if known References 1994 Condition of Site * Asterisk designates Map Number	1994 Site Name, if known 1994 Owner, if Recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A: Important, B: Rare Building, C: Common, U: Unknown Architecture Codes: A: Special Style, B: Common, C: Minor Alteration of "A" or "B", D: Larger Alteration, F: Remodel or Demolition

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
N30-20 Normandy Park 684 None None [illegible] B U	Dibble House 1939 Assessor 94, Kludt 94 Good Condition and apparently unaltered from street view.	Ramel House Lemar Ramel 18915 Marine View Drive SW Normandy Park 98166	House. Original owner was Marge? Dibble, followed by Pete Cowles and currently Lois Ramel, spouse of Lemar ramel.
N30-21 Normandy Park 684 None None [illegible] B U	Williams House (temp) 1939 Assessor 94 Good Original condition.	Williams House T.S. Williams 17980 Brittany Dr SW Normandy Park 98166	House
N40-01 Normandy Park 654 None None [illegible] A A	*Hubbart House 1940 Paul H. Kirk, Arch. SAM Tour Brochure 63, Sunset Mag. in 1940s. Good Condition. Glass arcade replaced with garden sitting room.	Kludt House Helen Kludt 17424 13 Ave SW Normandy Park 98166	Designed by prominate architect Paul H. Kirk. House included on Seattle Art Museum Tour of 1963. Built for Frank and Colleen Hubbart. Pre-modern Kirk house in Normandy farmhouse style. The Kludt's are active citizens with Helen Kludt on the City Council and the Kludt vs Port of Seattle case established on-site water retension systems.
N40-02 Normandy Park 654 None None [illegible] A C	*Latimer House 1940 Paul H. Kirk, Arch. Kludt 94 Excellent Original condition.	Rosser House Paul & Jeanine Rosser 1229 174 Street SW Normandy Park 98166	Designed by prominate architect Paul H. Kirk for the development partnership of Latimer and Walker. Pre-modern Kirk in rustic farmhouse style. First owners Allan & Alice Latimer. Other owners Gerry Martin and Frank & Barbara Trunkey.
N40-03 Five Corners 654 None None [illegible] B U	Martin House 1940 Assessor 94 Not Surveyed. Date unclear.	LePenski House Maxine LePenski Powell 16884 2nd Ave SW Normandy Park 98166	Originally built by Terne and Lou Martin and purchased by Col. Fred and Maxine LePenski in 1956.
N40-04 Manhattan 684 None None [illegible] F A	*NIKE Missile Base 1940 Kludt 94 Site converted to park and swimming pool. Only two small buildings remain in 1994.	Civic Center Park City of Normandy Park 19900 4 Ave SW Normandy Park 98198	NIKE missile bases were anti-aircraft and anti-missile bases protecting the US from attach during WWII and after in the Cold War. The base was closed in the early 1950s and sold to Normandy Park in 1959. One building served as the first City Hall from 1959-80.

Key to Categories Above (If field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives: WA State, King County Link to See: None, HBA (...) Development & Owner Date of Windshield Survey / Codes: Architecture & History (see inside)	*Original Site Name Date of Construction Architect or Builder, if known References 1994 Condition of Site * Asterisk designates Map Number	1994 Site Name, if known 1994 Owner, if Recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A: Important, B: Rare Building, C: Common, U: Unknown Architecture Codes: A: Special Style, B: Common, C: Minor Alteration of "A" or "B", D: Larger Alteration, F: Remodel or Demolition

214

Historic Properties Survey: City of Normandy Park

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
N30-12 Manhattan 684 None None 9/13/94 B U	**Fichtner House (temp)** 1936 Assessor 94 Good, original condition.	Fichtner House Henry Fichtner 19205 First Ave South Normandy Park 98166	Original, brick, steep roofed house.
N30-13 Five Corners 654 None None 9/13/94 B U	**Hixson House (temp)** 1936 Assessor 94 Excellent Condition.	Hixson House Douglas & Jean Hixson 132 166 Street SW Normandy Park 98166	One story, front-side gable, steep roof, wooden house.
N30-14 Normandy Park 684 None None 9/28/94 A C	*Dobszinsky (Anderson) House 1937 Kraft 94 Excellent exterior in original conditoin.	Evans House Gerald Evans 18107 Normandy Terrace SW Normandy Park 98166	In original Normandy style.
N30-15 Manhattan 684 None None 9/28/94 B A	*Mayer House 1937 Kraft 94 Good, unaltered condition.	Riddling House William Riddling 18841 4 Ave SW Normandy Park 98166	First owners Ralph and Marcelle Mayer. Second owners (1956-64?) was Victor Meyers, Jr., state representative and son of Lt. Governor of Washington State, Victor Meyers.
N30-16 Manhattan 684 None None 9/30/94 C A	*Raymond House #1 1937 Kraft 91 Main house in excellent condition. Large three car garage built on property to south in 1980s.	Holmes House? Charles Holmes 204 Normandy Road SW Normandy Park 98166	Home of Judge Charles Raymond, the first judge of Normandy Park Muncipal Court in 1953. Excellent example of small, Normandy style, 1930's house.
N30-17 Marine View 684 None None 9/13/94 B U	**Stoneman House (temp)** 1937 Assessor 94 Original condition.	Unknown John & Mark Stoneman 635 207 Street SW Normandy Park 98166	One Story, Front-side gable, wooden house.
N30-18 Normandy Park 684 None None 9/30/94 F C	**Moore House** 1938 Kraft 94 Daughter believes house unchanged. Surveyor believes complete remodel in 1980s.	Moore House Robert Moore Trust 18521 Brittany Drive SW Normandy Park 98166	Milo and Monica Moore, owners of Classic Yachts Company, are caring for the house in 1994.
N30-19 Marine View 684 None None 9/13/94 B U	**Pedersen House** 1938 Assessor 94 Excellent Condition.	Pedersen House K A Pedersen 609 207 Street SW Normandy Park 98166	One story, front-side gable, wooden house.

Key to Categories Above (if field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives: WA State, King County Ref. to Site, Hyre, HRA (rpt), Development & Owner Date of Windshield Survey Codes, Architecture & History (see inside)	*Original Site Name Date of Construction Architect or Builder, if known References 1994 Condition of Site * Asterisk designates Map Number	1994 Site Name, if Known 1994 Owner, if Recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A: Important, B: Rare Building, C: Common, U: Unknown Architecture Codes: A: Special Style, B: Common, C: Minor Alteration of "A" or "B", D: Larger Alteration, F: Remodel or Demolition.

214

Historic Properties Survey: City of Normandy Park

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
N40-13 Normandy Park 684 None None 9/13/94 B U	**Parks House** 1941 Assessor 94 Good Original condition.	Labenz House Mary Labenz 18529 Normandy Terrace SW Normandy Park 98166	House. Original owners the Parks. Other owners include Dr. Herb and Marge Clausing and Phillip and Millie Hamlin. Hamlin invented the TV channel converter box for cable television.
N40-14 Normandy Park 654 None None 9/13/94 B U	**Pearce House (temp)** 1941 Assessor 94 Good Condition. Unaltered.	Pearce House Robert & Olivia Pearce 1221 174 Street SW Normandy Park 98166	House
N40-15 Normandy Park 684 None None 9/13/94 B U	**Pirogoff House (temp)** 1941 Assessor 94 Excellent Condition.	Pirogoff House Kirk Pirogoff 18721 Edgecliff Dr SW Normandy Park 98166	House
N40-16 Manhattan 654 None None 9/13/94 B U	*Powell House (temp) 1941 Assessor 94 Excellent condition.	Powell House Brooks & Heather Powell 17121 2 Ave SW Normandy Park 98166	Best remaining "modest home". A one story, front-side gable, wooden house.
N40-17 Marine View 684 None None 9/13/94 B U	**Westby House (temp)** 1941 Assessor 94 Good Condition, but unclear if original.	Westby House Dorothy Westby 20647 6 Ave SW Normandy Park 98166	Unusual romantic cottage in ranch shape, one story, side gable, wooden house.
N40-18 Normandy Park 684 None None 9/13/94 B U	**Colin House (temp)** 1942 Assessor 94 Good Condition.	Colin House Craig Colin 18911 Edgecliff Dr SW Normandy Park 98166	House
N40-19 Normandy Park 654 None None 9/13/94 B U	**Ettel House (temp)** 1942 Assessor 94 Excellent Condition.	Ettel House Robert & Wendy Ettel 17942 Riviera Place SW Normandy Park 98166	House
N40-20 Five Corners 654 None None 9/13/94 C A	*Fish House 1942 Assessor 94 Original with covered walkways added.	Fish House Byron Fish 801 168 Street South Normandy Park 98166	Bryon Fish was a columist for the Seattle Times in the 1950s & 60?

Key to Categories Above (if field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives: WA State, King County Ref. to Site, Hyre, HRA (rpt), Development & Owner Date of Windshield Survey Codes, Architecture & History (see inside)	*Original Site Name Date of Construction Architect or Builder, if known References 1994 Condition of Site * Asterisk designates Map Number	1994 Site Name, if Known 1994 Owner, if Recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A: Important, B: Rare Building, C: Common, U: Unknown Architecture Codes: A: Special Style, B: Common, C: Minor Alteration of "A" or "B", D: Larger Alteration, F: Remodel or Demolition.

214

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
N40-05 Gregory Heights 654 None None 9/13/94 B U	**Randall House (temp)** 1940 Assessor 94 Good Condition and apparently unaltered from street view.	Randall House Gerald Randall 1627 168 Street SW Normandy Park 98166	One story, front-side gable wooden house.
N40-06 Normandy Park 654 None None [illegible] A U	*Reitze House 1940 Young & Richardson (TRA) TRA Libraries, Kludt 91 Unaltered. Excellent landscape.	Martin House Dr. Kenneth Martin 18541 Normandy Terrace SW Normandy Park 98166	Designed by the prominent firm of Young and Richardson, now the firm of TRA. Reitze formed the water company for Normandy Park.
N40-07 Normandy Park 654 None None 9/13/94 B U	**Rova House (temp)** 1940 Assessor 94 Good Condition.	Unknown Donald Rova 16105 Brittany Dr SW Normandy Park 98166	House
N40-08 Normandy Park 654 None Owner [illegible] D C	**Walker House** 1940 Paul H. Kirk, Arch. Kludt 94 Significant Alterations. Including exterior siding, new garage and kitchen expansion.	Carl Hansen House Carl Hansen 17424 13 Ave SW Normandy Park 98166	Designed by prominate architect Paul H. Kirk for the development partnership of Latimer and Walker. Pre-modern Kirk in Normandy farmhouse style.
N40-09 Normandy Park 654 None None 9/13/94 B U	**Caddock House (temp)** 1941 Assessor 94 Good Condition	Caddock House Robert Caddock 19951 Marine View Drive SW Normandy Park 98166	House
N40-10 Normandy Park 654 None None 9/13/94 B U	**Davis House** 1941 Assessor 94 Good Condition	Davis House Enid Davis 18135 Normandy Terrace SW Normandy Park 98166	House
N40-11 Normandy Park 654 None None [illegible] B C	**Fleener House (Temp)** 1941 Kludt 94 Excellent Condition.	Wendal & Phyllis Fleener House Wendell Fleener 18177 Normandy Terrace SW Normandy Park 98166	Good condition, one story, brick house. Part of early 1940's brick, construction style that abandoned tudor style in Normandy Park, but not the modern, ranch.
N40-12 Marine View 654 None None 9/13/94 B U	**Mulvihill House (temp)** 1941 Assessor 94 Good Condition with new metal chimney.	Unknown Kevin Muvihill 20829 2 Place SW Normandy Park 98166	One story, side gable, wooden house.

Key to Categories Above (If field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives: WA State, King County Add'l Site Plans, NRA, [illegible] Development & Owner Date of Windshield Survey / Codes: Architecture & History (see below)	*Original Site Name Date of Construction Architect or Builder, if known References 1994 Condition of Site *Asterisk designates Map Number	1994 Site Name, if known 1994 Owner, if Recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A: Important, B: Rare Building, C: Common, U: Unknown Architecture Codes: A: Special Style, B: Common, C: Minor Alteration of "A" or "B", D: Larger Alteration, F: Remodel or Demolition

214

Historic Properties Survey: City of Normandy Park 11

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
N40-29 Manhattan 654 None None 9/13/94 B U	**Riebe House (temp)** 1942 Assessor 94 Good Original condition.	Riebe House David & Scarlett Riebe 235 171 Street SW Normandy Park 98166	House.
N40-30 Normandy Park 654 None None 9/13/94 B U	**Sargent House** 1942 Assessor 94 Excellent. Unaltered.	Sargent House Margaret Sargent 17941 Riviera Place SW Normandy Park 98166	House
N40-31 Normandy Park 654 None None 9/13/94 B U	**Slaker House (tamp)** 1942 Assessor 94 Original.	Slaker House Kenneth Slaker 18645 8 Ave SW Normandy Park 98166	House.
N40-32 Manhattan 654 None None 9/13/94 B U	**Steele House (temp)** 1942 Assessor 94 Good condition.	Steele House Grant Steele 131 171 Street SW Normandy Park 98166	One story house with brick facing.
N40-33 Five Corners 654 None None 9/13/94 B U	**Trainer House (temp)** 1942 Assessor 94 Original Condition.	Tranier House Darl & Murial Trainer 133 168 Street SW Normandy Park 98166	Large home with extensive gardens. Former home of Brig. General A.W. Breman, Ret.
N40-34 Five Corners 654 None None 9/13/94 B U	**Hanson House (temp)** 1943 Assessor 94 Good, original condition.	Unknown Kris & Ellen Hanson 129 164 Street SW Normandy Park 98166	One story, side gable, wooden house.
N40-35 Normandy Park 654 None None [illegible] A U	*Pevosky House 1947 Paul H. Kirk, Arch. Kludt 94 Good Original condition.	Bolles House Robert & Jessie Bolles 17622 12 Ave SW Normandy Park 98166	Designed by Prominate architect Paul H. Kirk. Transitional modern house in Kirk's career.
N50-01 Normandy Park 654 None None 9/13/94 B C	*Alverson House 1950 Art Leonard, Bld. Assessor 94 Original condition	Alverson House Dayton Lee & Ruby Alverson 17916 Brittany Dr SW Normandy Park 98166	Art Leonard was a prominate builder of pattern book ranch homes in Normandy Park during the 1950s.

Key to Categories Above (If field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives: WA State, King County Add'l Site Plans, NRA, [illegible] Development & Owner Date of Windshield Survey / Codes: Architecture & History (see below)	*Original Site Name Date of Construction Architect or Builder, if known References 1994 Condition of Site *Asterisk designates Map Number	1994 Site Name, if known 1994 Owner, if Recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A: Important, B: Rare Building, C: Common, U: Unknown Architecture Codes: A: Special Style, B: Common, C: Minor Alteration of "A" or "B", D: Larger Alteration, F: Remodel or Demolition

214

Historic Properties Survey: City of Normandy Park

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
N40-21 Manhattan 654 None None 8/19/94 B U	**Hardy House (temp)** 1942 Assessor 94 Original condition.	Hardy House Leland & Virginia Hardy 226 171 Street SW Normandy Park 98166	House
N40-22 Normandy Park 684 None None 8/19/94 B U	**Helland House (temp)** 1942 Assessor 94 Good Condition	Helland House James & Barbara Helland 18901 Edgecliff Dr SW Normandy Park 98166	House
N40-23 Normandy Park 684 None None 9/15/94 B U	**Johnson House (temp)** 1942 Assessor 94 Good Condition. Added family with garage underneath.	Johnson House F.L. Johnson 18514 Marine View Drive SW Normandy Park 98166	Built by Joe Griffin, owner of the Griffin Oil Company. Second owners Ford & Nell Johnson.
N40-24 Marine View 684 None nra3 8/19/94 B U	**Keeble House (temp)** 1942 Assessor 94 Good Unaltered condition.	Unknown Lillian Keeble 420 218 Street South Normandy Park 98166	One story, side gable wooden house.
N40-25 Gregory Heights 654 None None 9/15/94 B U	**Kimmel House (temp)** 1942 Assessor 94 Good condition.	Kimmel House Todd & Heide House 1635 166 Street SW Normandy Park 98166	One story, side gable, wooden house.
N40-26 Normandy Park 684 None None	**LePenske House (temp)** 1942 none Not Surveyed	LePenske House Ed & Betty LePenske 18410 8 Ave SW Normandy Park 98166	
N40-27 Marine View 684 None None 9/15/94 B U	**Pelger House (temp)** 1942 Assessor 94 Original, but fair condition.	Pelger House Fred Pelger 20938 Marine View Drive SW Normandy Park 98166	House
N40-28 Gregory Heights 654 None None 9/15/94 B U	**Provo House (temp)** 1942 Assessor 94 Original Condition.	Provo House Edwin Provo 1607 166 Street SW Normandy Park 98166	One story, front-side gable with porch.

Key to Categories Above (if field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives: WA State, King County Risk to Site: None, NRA, nra3, Development & Owner Date of Windshield Survey Codes: Architecture & History (see left side)	*Original Site Name Date of Construction Architect or Builder, if known References 1994 Condition of Site * Asterisk designates Map Number	1994 Site Name, if Known 1994 Owner, if Recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A: Important, B: Rare Building, C: Common, U: Unknown Architecture Codes: A: Special Style, B: Common, C: Minor Alteration of "A" or "B", D: Larger Alteration, F: Remodel or Demolition

214

Historic Properties Survey: City of Normandy Park

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
N50-09 Normandy Park 654 None Owner 8/10/94 C A	***Normandy Park Elementary School** 1954 Waldron & Dietz, Arch. Arch Rec 54, Kludt 91 Good Condition. Classroom wing facade and main coorldor altered	Normandy Park City Hall City of Normandy Park 801 174 Street SW Normandy Park 98166	Published nationally in Architectural Record. Noted in 1954 for simplicity and economy of modern design with laminated wood griders and central skylights. First elementary school in Normandy Park.
N50-10 Normandy Park 684 None None 8/30/94 C U	**Brown House** 1955 Jack Byrant, Arch. ? Weiss 94 Good condition. Carport may have been enclosed for work shop.	Unknown Unknown 19254 Edgecliff SW Normandy Park 98166	Well designed, modern contemporary house. Wood, glass and stone walls.
N50-11 Normandy Park 654 None None 9/15/94 A C	***Cordell House** 1955 A.O. Bumgardner, Arch. Assessor 94 No changes.	Cordell House John Cordell 645 174 Street SW Normandy Park 98166	Designed by significant NW school architect Al Bumgardner.
N50-12 Normandy Park 654 None None 8/30/94 B A	**Normandy Park Swim Club** 1956 Ralph Burkhard, Arch. Kludt 91 Original Condition	Normandy Park Swim Club Normandy Park Swim Club 17655 12 Ave SW Normandy Park 98166	First community facility since privatization of Normandy Park Club House in 1934. Designed by Normandy Park resident Ralph Burkhard.
N50-13 Normandy Park 684 None Owner 8/26/94 A U	**Storey House** 1956 Weiss 94 Good original condition, but disliked by owners.	Unknown Unknown 18705 Edgecliff SW Normandy Park 98166	Good condition modern, contemporary house in wood with shallow butterfly roof.
N50-14 Normandy Park 684 None None 8/26/94 A U	**Tracy House** 1956 Frank Lloyd Wright SAM Tour Brochure, Kludt 91 Good condition. Unaltered.	Tracy House William Tracy 18971 Edgecliff Dr. SW Normandy Park 98166	Designed by Frank Lloyd Wright as a Usonian House. Seattle Art Museum Tour of 1983. Original Owner was William Tracy.
N50-15 Normandy Park 684 None None 8/29/94 B A	**Mavista Elementary School** 1957 Kludt 91 Original	Mavista Elementary School Highline School District 19800 Marine View Dr SW Normandy Park 98166	Second Elementary School in Normandy Park area. Operating from 1957 to present.
N50-16 Normandy Park 684 None None 8/26/94 A U	**McInturff House** 1957 Weiss 94 Perfect original condition.	McInturff House John McInturff 18958 Edgecliff Drive SW Normandy Park 98166	Beautiful, small pitched roof, modern structure.

Key to Categories Above (if field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives: WA State, King County Risk to Site: None, NRA, nra3, Development & Owner Date of Windshield Survey Codes: Architecture & History (see left side)	*Original Site Name Date of Construction Architect or Builder, if known References 1994 Condition of Site * Asterisk designates Map Number	1994 Site Name, if Known 1994 Owner, if Recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A: Important, B: Rare Building, C: Common, U: Unknown Architecture Codes: A: Special Style, B: Common, C: Minor Alteration of "A" or "B", D: Larger Alteration, F: Remodel or Demolition

214

Historic Properties Survey: City of Normandy Park

12

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
N50-02 Normandy Park 684 None None [illegible] A U	*Dodd House 1950 Fred Bassetti, Arch. Weiss 94 Excellent Condition.	Dodd House Lloyd Dodd 19203 Edgecliff Drive SW Normandy Park 98166	Early house designed by prominate Seattle architect, Fred Bassetti. One of the Seattle area's earliest modern homes.
N50-03 Manhattan 684 None None [illegible] D A	*Northwest Archery Museum 1950 Assessor 94 Several additions in 1950s and 1960s.	Northwest Archery Museum Glen St. Charles 19807 First Ave South Normandy Park 98166	The finest museum of archery in the northwest United States and one of the best private ones in the country. Museum started by Glen St. Charles. Although the exterior has been altered, the interior "hunting lodge" space of the museum could be considered significant.
N50-04 Normandy Park 684 None None [illegible] A C	*Skoog House 1950 J. Skoog, Arch. Kudl 94 Excellent, unaltered.	David House David & Catherine David 16191 Brittany Drive SW Normandy Park	Home of and design by Normandy Park architect J. Skoog. Wood, ranch style modern house.
N50-05 Normandy Park 684 None None [illegible] C A	*Dawson House 1952 Kudl	Dawson House John Dawson 18902 Marine View Drive SW Normandy Park 98166	Tom Dawson was mayor of Normandy Park for twelve years.
N50-06 Normandy Park 654 None None [illegible] B C	*Raymond House #2 1952 Kudl 94 Original	Duff House Gail Duff 17925 Normandy Terrace SW Normandy Park 98166	Second house built by Judge Raymond in Normandy Park. Modern, ranch style.
N50-07 Normandy Park 684 None None [illegible] C C	Cooper House 1954 Jack Byrani, Arch. Weiss 94 Good Condition. Carport enclosed as shop.	Cooper House Jackie Cooper 18961 Edgecliff Drive SW Normandy Park 98166	Small, flat roofed, modern house. Typical of early 50s architectural design.
N50-08 Manhattan 684 None None [illegible] A A	*John Knox Presbyterian Church 1954 Steinhart, Theriault & Anderson Kudl 91 Not Surveyed	John Knox Presbyterian Church Presbyterian Church 109 Normandy Road SW Normandy Park 98166	Designed by Normandy Park resident Robert Theriault. First church built in Normandy Park.

Key to Categories Above (if field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives: WA State, King County Date of Windshield Survey	*Original Site Name Date of Construction Architect or Builder, if known References 1994 Condition of Site *Asterisk designates Map Number	1994 Site Name, if Known 1994 Owner, if Recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A Important, B Rare Building, C Common, U Unknown Architecture Codes: A Special Style, B Common, C Minor Alteration of "A" or "B", D Larger Alteration, F Remodel or Demolition

214

Historic Properties Survey: City of Normandy Park

15

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
N60-04 Normandy Park 684 None None [illegible] A U	Bramel House 1963 A.O. Bumgardner SAM Tour 63, Seattle Times 6/21/64 & 6/28/64 Excellent. Unaltered.	Bramel House William Bramel 19273 Edgecliff Dr. SW Normandy Park 98166	Designed by A.O. Bumgardner with landscape by Robert Chittock. Seattle Art Museum Tour of 1963. Original Owner was William Bramel. Dynamic modern house.
N60-05 Normandy Park 684 None None [illegible] A U	Forland House 1963 Elizabeth Ayer SAM Tour 63 Excellent condition. For sale in August, 94.	Unknown For Sale in Sept/94 16939 Edgecliff Dr. SW Normandy Park 98166	Designed by Elizabeth Ayer with interiors by Jean Jongeward. Seattle Art Museum Tour of 1963. Original Owner was William Forland. Colonial style, suburban house.
N60-06 Marine View 684 None None [illegible] A U	Larsen House 1964 Robert Theriault, Arch. Assessor 94 Excellent condition	Larsen House Roger Larsen 20600 6 Ave SW Normandy Park 98166	Excellent example of early 1960's house design in Northwest with Japanese influence. From Normandy Park, Robert Theriault designed "The Cove" and John Knox Presbyterian Church Sanctuary.
N70-01 Normandy Park 684 None None [illegible] A U	Bergman House 1973 Ralph Anderson, Arch. Kudl 94	Alder House Alder 17966 Normandy Terrace SW Normandy Park 98166	Early, shed/craftsman modern Ralph Anderson designed house. Before he developed his signature style.

Key to Categories Above (if field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives: WA State, King County Date of Windshield Survey	*Original Site Name Date of Construction Architect or Builder, if known References 1994 Condition of Site *Asterisk designates Map Number	1994 Site Name, if Known 1994 Owner, if Recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A Important, B Rare Building, C Common, U Unknown Architecture Codes: A Special Style, B Common, C Minor Alteration of "A" or "B", D Larger Alteration, F Remodel or Demolition

Historic Properties Survey: City of Normandy Park

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
N50-17 Normandy Park 684 None Owner [illegible] A U	**Bauner House** 1959 Paul Thiry SAM Tour 63 Good Condition. Detached garage added.	P. Walters House P. Walters 18175 Normandy Terrace SW Normandy Park 98166	Designed by Paul Thiry. Seattle Art Museum Tour of 1963. Bold, modern contemporary style. Two story, covered in Shingles.
N50-18 Normandy Park 654 None None [illegible] A A	**Normandy Park Community Club** 1959 Robert Therieult Kludt 91, SAM Tour Brochure 63. Exterior Unaltered, with some interior changes	The Cove Normandy Park Community Club 1500 Shorebrook Dr. SW Normandy Park 98166	Replacement for the community facility since privatization of Normandy Park Club House in 1934. Must live at an "a" residence in Normandy Park to belong. Designed by Normandy Park resident Robert Therieult. Included on Seattle Art Museum Architecture Tour of 1963.
N50-20 Normandy Park 684 None None [illegible] B U	*__Christie House (temp)__ 1951 Assessor 94 Unaltered.	Christie House David & Stephanie Christie 17941 Brittany Drive SW Normandy Park 98166	An excellent example of early pattern book ranch house.
N50-21 Normandy Park 684 None None B C	*__Cole House__ 1951 Kludt 94 Unaltered	Cole House C.J. Cole 18125 Brittany Drive SW Normandy Park 98166	Excellent example of pattern book, 1950's house.
N60-01 Normandy Park 684 None None [illegible] A U	**Cosgrove House** 1961 Bissell & Sasanoff SAM Tour 63 Good Condition and apparently unaltered from street view.	Unknown Virginia Cosgrove 18602 Brittany Dr. SW Normandy Park 98166	Seattle Art Museum Tour of 1963. Original Owner was Benjamin Cosgrove. Strong Japanese house design influence to modern structure.
N60-02 Manhatten 684 None None [illegible] B A	**Olympic View Swim Club** 1961 Bissell and Sasanoff, Arch Kludt 91 Unaltered.	Olympic View Swim Club Olympic View Swim Club 19800 4th Ave SW Normandy Park 98166	One of two community swim clubs built for families in Normandy Park. The pool was constructed of the NIKE missile base.
N60-03 Gregory Heights 654 None None [illegible] A U	**Kane House** 1962 Howard Kenney SAM Tour 63, Seattle Times Nov. 62 Excellent. One carport bay is enclosed.	Kane House William Kane 1923 170 Street SW Normandy Park 98166	Seattle Art Museum Tour of 1963. Unique Modern Design. Original Owner was William Kane.

Key to Categories Above (if field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives: WA State, King County Public Site: None, NRA, etc.; Development & Owner Date of Windshield Survey; Codes: Architecture & History (see below)	*__Original Site Name__ Date of Construction Architect or Builder, if known References 1994 Condition of Site * Asterisk designates Map Number	1994 Site Name, if known 1994 Owner, if Recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A: Important, B: Rare Building, C: Common, U: Unknown Architecture Codes: A: Special Style, B: Common, C: Minor Alteration of "A" or "B", D: Larger Alteration, F: Remodel or Demolition

1994

Historic Properties Survey

A Survey of Historic Properties within the Boundaries of the A.C.C. Cities

City of Tukwila

Prepared by Glenn Weiss
for the
Airport Communities Coalition
Robert Olander, Executive Director

Airport Communities Coalition

City of Burien
City of Des Moines
City of Normandy Park
City of Tukwila

1994 Historic Properties Survey:

Introduction

The 1994 Historic Properties Survey was developed for the Airport Communities Coalition and was conducted by Glenn Weiss, Planning Intern for the Coalition and supervised by Steve Bennett, Assistant City Planner, from the City of Normandy Park. The survey was intended to be as broad as possible and to identify all potentially valuable historic properties in the cities of Burien, Des Moines, Normandy Park and Tukwila. Significant properties in the City of SeaTac and nearby unincorporated King County were also surveyed to a lesser extent.

Except in unusual circumstances, a structure should be at least 50 years old to be eligible for listing in the National Register of Historic Places. In light of this criteria, all pre-1945 buildings were surveyed in August and September, 1994. Pre-1955 buildings of significance were also surveyed for a local landmarks designation program with a 40 year old eligibility requirement. Due to time constraints, Burien and Tukwila were comprehensively surveyed only between First Ave South and Fifty-first Ave South. Although, previously published historic sites were surveyed in the remainder of these two cities. To the extent possible, the survey also reflects whether potentially significant properties have been alter from their original form. Although some property have undergone substantial alterations, they may constitute a unique and important resource that is eligible for listing in the National Register or local landmark status.

The survey produced prioritized lists of properties for listing in the National Register of Historic Places and local landmark designation programs. The prioritized list was identified by the surveyor after consultation with Julie Koler, King County Landmarks Preservation Officer, on the application of national and local standards during a tour of Normandy Park and Des Moines. The list is summarized in the report contained in this document and is indicated geographically on the accompanying maps.

The results of the survey includes a report document on the historic resources for each city, one comprehensive report, the master database file (in Paradox for Windows) and hanging files with the surveyor's notes and photocopied research. The survey hanging files include 1994 King County Assessor Lists, for each city, of buildings constructed before 1945 and 1955. The pre-1945 list is arranged by street address and the pre-1955 list is arranged by year, and then address.

1994 Historic Properties Survey:

Contents

Historic Properties in the City of Tukwila

Prioritized Sites Report Date: January 25, 1995

The Windshield Survey

West of 51st Ave South

Based on a "windshield survey" of all buildings constructed before 1945, I can report the following summary of existing buildings in original condition. Each of the buildings in the columns below is based upon a preliminary assessment that requires further research to verify the history and integrity of each building. The first column contains sites with the potential to join the National Register of Historic Places. The second column includes special architectural examples that might (or do) qualify for designation in a future local landmarks designation program. The third column includes all existing buildings with no readily apparent alterations. Three other groups exist in the survey, but are not displayed in the chart: existing buildings with minor changes; existing buildings with significant alterations; and completely remodeled or demolished buildings.

Potential Landmark Buildings from Each Major Historic Period

West of 51st Ave South

Period of Construction	National Register	Local Landmark	Existing as Original
Pre-1910	2	5	14
1910-19	3	5	39
1920-29	0	4	51
1930-39	1	2	68
1940-44*	1	2	72
1945-54	Survey Incomplete	2	Survey Incomplete
Total*	7	20	244

Note: All figures are cumulative; figures for the local and existing columns include previous columns.
*One site in all columns includes 42 buildings in original condition in Subdivision '44, Casade View.

A Few Conclusion Based in the Survey

West of 51st Ave South

- Native American Sites Tukwila was inhabited by the Duwamish people for centuries. Of the myth sites, the *ku-LAH-hahd* or Northwind Fishing Weir, is in original condition. Archeological sites have been found along the Duwamish and Green Rivers in Tukwila.
- Pioneer Tukwila Foster's maple tree and the Duwamish Church are the only remaining elements of the pioneer period in Tukwila.
- Farming The farming history of Tukwila is preserved in several structures from the large dairy farms of Codiga and Nelsen, to smaller farms of Ray and Lincoln and the later Italian immigrant families of Carrossino and Torre. These structures are endangered by neglect and commercial development.
- Interurban Communities The towns of Allentown, Foster, Riverton and Tukwila were primarily created as a result of construction of the Interurban Trolley Line in 1902. By 1912, the entire area had been subdivided and platted for homes and businesses. Many small homes exist from this period in all styles: the one story pyramid house, simple & elaborate craftsman style homes, and very simple front & side gable houses. Allentown Acres Addition of 1906 is the subdivision most easily understood by the visitor, and contains 90 years of inexpensive homes.
- Interurban Community Historic Districts The communities of Allentown and Riverton include sufficient properties for nomination as a historic district from the Interurban period (1902-29). Riverton today has 19 original condition homes and the OC Thompson store. Many other homes exists with minor alterations.
- Community Facilities: 1920s From the 1920s, community facilities were built for the maturing Interurban suburbs. Some facilities still exist include the Tukwila Grade School (A National Landmark) and the Tukwila Community Club Hall, the Riverton Hospital (Dr. Nichols House), the Duwamish and Allentown Bridges, and the Rainier View Community Club.

1994 Historic Properties Survey: **Survey Methodology**

Between August 1 and September 30, 1994, Airport Communities Coalition Planning Intern, Glenn Weiss, researched and surveyed potential historic properties in the cities of Burien, Des Moines, Normandy Park and Tukwila. The research involved reading all available histories of those cities completed since 1972 (see Sources List in appendix) and recording a list of sites discussed in those texts. Other potential sites were identified through the King County Landmarks Commission's 1979 Survey of King County Historic Properties, through private discussions with local historians, and by contacting prominent architects regarding past work in the study area.

A windshield survey of these properties was conducted. For this study, "windshield survey" means a visual inspection of the front elevation from the street or driveway. Each building was judged to fall in one of five categories based on the front elevation only and without checking any photographic records. (see Database Codes in appendix) Therefore, buildings were judged to be altered or unaltered based on the surveyor's judgment of appropriateness of materials and design related to the researched construction date of the property. For example, if horizontal windows were present in a dated 1910 structure, then the surveyor presumed the windows were a later change to the building, since vertical windows were typical for 1910.

The surveyor is aware of some inconsistencies in the survey especially related to siding materials and addresses, such that structures may be judged "unaltered" when newer siding materials existed and some addresses may have caused the wrong building to be judged. Finally, due to lack of time, the surveyor always presumed the correctness of the researched date of construction and therefore declared buildings demolished or remodeled if the structures appeared totally constructed at a later date. The surveyor estimates errors related to siding to be less than 3%, and errors related to address and date of construction to be less than 1%.

After surveying all buildings referenced in historic writings, the surveyor acquired lists of all properties developed before 1945 and 1955. The lists were generated by the King County Assessor by searching tax records for the date of construction. The surveyor conducted a "windshield survey" of all pre-1945 buildings in Normandy Park and Des Moines, all pre-1945 buildings east of First Avenue South in Burien and all pre-1945 buildings west of 51st Avenue South in Tukwila. Additionally, Subdivision 44', Chelsea Park and several other pre-1955 subdivisions were surveyed in Burien. The subdivisions were found by analysis of the King County Assessor lists to locate series of buildings constructed in the same year on the same street.

With a survey of over 3000 structures completed, a database of over 700 records was created of all historically referenced buildings that were presumed extant in 1994 and any unaltered buildings surveyed from the assessor's records. The database is accurate for use in identifying and locating historically valuable properties and as a list of properties to re-survey buildings to determine scarcity of buildings and comparative quality. Since no verification techniques were used, the list is not recommended as a sole source for establishing landmark designation status.

Historic Properties in the City of Tukwila
Prioritized Sites Report Date: January 25, 1995

Local Landmark

West of 51st Ave South

A future Tukwila landmarks program might recognize landmark status for the following structures pending further research into the precise scarcity and integrity of the buildings. Sites qualifying as local landmarks should be important to the history of Tukwila and retain their architectural integrity. In reference to common buildings, complete architectural integrity is usually essential. Buildings increase in historic importance with the scarcity of that building type during a given historic period. Any nomination for designation would include a list of other similar buildings remaining from the same period. (All buildings and sites in the two National categories above should be considered for local landmark status.)

Allentown Acres Addition, 1906, Interurban Plat, 42-50 Aves S. between 122 & 125 St. S.
Best Intact Subdivision in Tukwila
Allentown Bridge, 1927, Pratt Truss Bridge, 12600 42nd Ave S.
One of only ten steel bridges left in King County
Cavanaugh House (temp), 1901, Subdivision Pyramid House, 4026 130th Street S.
Earliest remaining house in this popular pre-craftsman style
Duwamish 99 Bridge, 1927, Pratt Truss Bridge, 11600 Pacific Highway S.
One of only ten steel bridges left in King County
Fetters House (temp), 1919, Single Family House, 14019 37th Ave S.
Only brick, craftsman style house in Tukwila study area
Foster High School Stadium, 1952, High School Football & Track Stadium, 4242 144th St. S.
Excellent example of cantilever stadium engineering
Jorgensen Forge, 1943, Steel Fabrication Plant, 8531 E. Marginal Way S.
Original metal sheds of Duwamish industry from WWII
Lincoln House, 1908, Early Valley Farmhouse, 13243 40th Ave S.
One of six remaining farmhouses in a unique style
Northwest House(temp), 1929, Single family house, 3730 142nd St. S.
Unique, late 1920s, steep-roofed, shingled house
Pacific Highway Signs, 1934-42, Three Electric Signs (Ben Carol, Southcity and Trudy's)
14110, 14242, & 15001 Pacific Highway South
Excellent designs & last remnant of Pacific Highway's trucking past
Southgate Elementary School, 1950, First Post-WWII School, 4101 131 Street S.
Exceptional modern design by Ralph Burkhard, Architect
Thompson, O.C., House, 1914, Riverton Businessman's House, 4049 128th Street S.
Exceptional craftsman style house of important citizen
Thompson Store, 1928, Furniture Store, 4010 130th Street S.
Last intact commercial building at Riverton Crossroads

Historic Properties in the City of Tukwila

Prioritized Sites Report Date: January 25, 1995

- <u>WWII Defense Industry</u> During WWII, northern Tukwila was an important part of WWII defense industries through Boeing and related companies. The original Boeing Building 105 exists from 1909, but no WWII Boeing buildings remain in Tukwila., Jorgensen Forge is the largest WWII industry building extant.
- <u>WWII Defense Industry Housing</u> During WWII, at least three developments were constructed to house defense industry workers in the Duwamish Boeing factories. *Chelsea Park* in Burien is the largest, followed by *Subdivision '44, Casade View* in Tukwila with 169 houses and then *Subdivision '44, 7th Ave South* in Burien which is in the best original condition.
- <u>School Facilities: 1939-54</u> School structures from the 1939-54 reflect the history of post-WWII Tukwila and its continued growth as a residential community. The South Central School District constructed buildings of exceptional modern design including the Showalter School, Southgate Elementary School and the demolished Foster High School.
- <u>Missing and Endangered History</u> Several attributes of Tukwila history have not survived over time. No structures remain from Native American villages, pioneer/homestead buildings and logging camps. Although buildings remain, the history of farming in Tukwila north of SR 518 is difficult to sense. Only the endangered Miyao greenhouse remains of Asian American history, the African American history in Tukwila needs further research, and the endangered Ray and Torre buildings remain from Italian American history. The most endangered building type is commercial with less than 10 buildings remaining in any condition from pre-1945.

Legal Designation

Potential historic properties are divided into several categories below. These categories are determined by the criteria established for the National Register of Historic Places and the King County Landmark Commission program. The properties in each category are based on limited research and will most likely be reduced in number with further research that discovers physical changes to the structures. All pre-1945 buildings West of Fifty-First Avenue South were examined to establish the list.

National Historic Places Nomination

West of 51st Ave South

The following building appears in excellent physical condition with an intact architectural integrity from the date of construction. The building responds to a significant national, regional or community historic movement.

Riverton Hospital (Dr. Nichols House), 1919, Community Hospital, 13041 E. Marginal Way S.
Exceptional Architectural Quality and Community Significance

National Historic Places Nomination: Verification Required

West of 51st Ave South

The following sites appears in excellent physical condition but require further research to verify architectural integrity from the date of construction. Additional research should be conducted into the human history of the site.

Codiga House, 1919, Farming House and Landscape, 12523 50th Place South
Architectural Integrity and Community Significance
Haggard House (temp), 1903, Exceptional Folk Design & Craftsmanship, 11532 40th Ave S.
Excellent Architectural Integrity and Quality
ku-LAH-hahd, (Northwind Fishing Weir), No date, Native American Cultural Site, 2800 112th Street South. Physical Integrity and Native American Cultural Significance
Riverton Park United Methodist Church, 1910, Community Church, 13001 37th Ave S.
Architectural Integrity and Community Significance
Showalter School, 1939, Early School Site & Rare Concrete Building, 4628 144th Street S.
Exceptional Architectural Uniqueness & Community Significance
Subdivision '44, Casade View, 1944, WWII Defense Industry Housing, 37th Ave, etc.
National Housing & Political Movements

Historic Properties in the City of Tukwila

Prioritized Sites Report Date: January 25, 1995

The Windshield Survey

East of 51st Ave South

Most of the historic sites visited in the "windshield survey" east of 51st Avenue South in Tukwila were identified through historic references. No complete survey of all existing pre-1945 buildings has been conducted. Most likely, additional local landmarks would be identified with complete research.

Potential Landmark Sites from Each Major Historic Period

East of 51st Ave South

Period of Construction	National Register	Local Landmark	Existing as Original
Pre-1910	1	3	Survey Incomplete
1910-19	0	1	Survey Incomplete
1920-29	2	2	Survey Incomplete
1930-39	0	0	Survey Incomplete
1940-44	0	0	Survey Incomplete
1945-54	Survey Incomplete	0	Survey Incomplete
Total	3	6	NA

Note: All figures are cumulative; figures for the local and existing columns include previous columns.

National Historic Places Nomination

East of 51st Ave South

The following buildings and sites appear in excellent physical condition with an intact architectural integrity from the date of construction. Each building or site responds to a significant national, regional or community historic movement.

Nelsen House, 1905, Victorian Farmhouse, (State Historic Registry), 15643 West Valley Rd. S.
Excellent Architectural Quality and Community Significance
Tukwila Grade School, 1920, First Community School (National Register), 14475 59th Ave S.
Architectural Integrity and Community Significance

National Historic Places Nomination: Verification Required

East of 51st Ave South

The following site appears in excellent physical condition but require further research to verify architectural integrity from the date of construction. Additional research should be conducted into the human history of the site.

Bergquist House, 1924, Craftsman Style House, 14455 58 Ave South
Architectural Integrity and Community Significance

Historic Properties in the City of Tukwila
Prioritized Sites Report Date: January 25, 1995

Significant Buildings which may have Compromised Integrity

West of 51st Ave South

The following structures have had a significant role in Tukwila history, but their architectural integrity may have been compromised additions or renovations. Restoration of several buildings is possible.

Boeing Building 105, 1909, Wooden Commercial Building, 9404 E. Marginal Way S.
Christian Science Church, 1933, Small Community Church, 13045 42nd Ave S.
Codiga Dairy Barn, 1928, Large Dairy Barn, 12523 50th Place S.
Delta Masonic Lodge, 1927, Two Story Brick Meeting Hall, 13034 41st Ave S.
Duwamish Church, 1870, Oldest Structure in Tukwila, 11814 42nd Ave S.
Merkle House, 1908, Wooden Pyramid Roof House, 12244 42nd Ave S.
Delia "Grandma" Merkle was maker of home remedies in Allentown
Miyao Greenhouse, 1930, Wooden Greenhouse Structures, 11600 39th Ave S.
Japanese American business in Quarry/Allentown
Monroe House, 1929, House by Skilled Craftsman Paul Monroe, 11616 42nd Ave S.
Rainier View Community Club, 1928, Simple Wooden Meeting Hall, 10915 51st Ave S.
Ray House, 1900, Farmhouse, 11269 E. Marginal Way S.
Early Duwamish farmhouse and later home to Carrossino Family
Riverton Heights Presbyterian Church, 1930, Important Community Church, 3728 160th Ave S.
Torre House, 1908, Early Allentown House, 3914 115th Street S.
Early Allentown house and later home to Torre Family

Index by Historic Name in Each City

Friday, October 14, 1994

M.	Historic Name	Common Name	File #	City	St. #	Site Street Name	Date	Pg.
	Hubbard House #2 (temp)	Unknown	B40-09	Burien	13825	Des Moines Way South	1941	655
	Hubbard House (temp)	Hubbard House	B20-08	Burien	13811	Des Moines Way South	1926	655
	Hungerford House (Temp)	Anderson House	B20-11	Burien	17306	21 Ave SW	1928	654
	Ingraham House (temp)	Ingraham House	B30-26	Burien	13002	2 Ave South	1939	655
	Jenks House	Cedar Crest	B10-10	Burien	14403	24 Ave SW	1911	654
	Johannesen House (temp)	Johannesen House	B30-37	Burien	16466	Ambaum Blvd South	1939	654
	Judkins House (temp)	Unknown	B30-38	Burien	1426	134 Street South	1939	655
	Keenan House (temp)	Keenan House	B40-19	Burien	13007	Occidental Ave South	1942	654
	Kennedy House (temp).	Kennedy House	B40-38	Burien	812	132 Street South	1943	655
	Kormasoff House	Unknown	B10-02	Burien	122	168 Street South	1910	654
	Kretzschmar House (temp)	Kretzschmar House	B30-16	Burien	1243	136 Street South	1936	655
	Kuehl House (temp)	Kuehl House	B40-39	Burien	835	136 Street South	1943	655
	Laurencio House (temp)	Laurencio House	B40-20	Burien	13442	6 Ave South	1942	655
	Lawter House (temp)	Unknown	B30-39	Burien	812	136 Street South	1939	655
	Lee House (temp)	Lee House	B30-17	Burien	422	156 Street South	1936	655
	Lehman House (temp)	Lehman House	B30-02	Burien	1019	146 Street South	1930	655
	Linder House (temp)	Linder House	B30-40	Burien	12855	Occidental Ave South	1939	654
	Lohman House (temp)	Unknown	B40-40	Burien	13207	6 Ave South	1943	655
	Lombard House (temp)	Lombard House	B40-21	Burien	13012	3 Ave South	1942	655
	Lopez House (temp)	Lopez House	B40-22	Burien	13045	2 Ave South	1942	655
	MacKenzie House (temp)	MacKenzie House	B30-41	Burien	16920	Ambaum Blvd South	1939	654
	Magnuson House (temp)	Magnuson House	B40-23	Burien	13424	2nd Ave South	1942	655
	Marian House (temp)	Unknown	B30-04	Burien	14636	4 Place South	1930	655
	McCamish House (temp)	McCamish House	B30-42	Burien	853	148 Street South	1939	655
	McCann House (temp)	McCann House	B20-09	Burien	1219	140 Street South	1926	655
	McEvoy House (temp)	McEvoy House	B40-10	Burien	12833	First Ave South	1941	654
	McInerny House (temp)	Unknown	B20-12	Burien	148	152 Street South	1928	655
	Merz House (temp)	Merz House	B30-33	Burien	17002	Ambaum Blvd South	1938	654
	Miller House (temp)	Miller House	B30-18	Burien	1220	136 Street South	1936	655
	Moe House (temp)	Unknown	B20-13	Burien	1225	129 Street South	1928	655
	Monroe House (temp)	Unknown	B40-11	Burien	16830	Des Moines Way South	1941	655
	Moore Family House (temp)	Unknown	B40-24	Burien	12833	Occidental Ave South	1942	654
	More House (temp)	More House	B40-04	Burien	1415	129 Street South	1940	655
	Naud House (temp)	Unknown	B30-24	Burien	1050	140 Street South	1937	655
	Olson House (temp)	Olson House	B30-07	Burien	13433	12 Ave South	1933	655
•	Osterman House #1	Aasness House	B20-18	Burien	17204	Hillcrest Terrace SW	1929	654
	Osterman House #2	McShane House	B20-14	Burien	17210	Hillcrest Terrace	1928	654
	Osterman House #3	Crawford House	B30-25	Burien	17225	Hillcrest Terrace SW	1937	654
•	Pacific Telephone Building	US West Building	B40-52	Burien	14605	8th Ave South	1948	655
	Palmer House (temp)	Palmer House	B30-26	Burien	13413	2 Ave South	1937	655
•	Pollock House (temp)	Pollock Building	B30-34	Burien	654	152 Street South	1938	655
	Quesnell House (temp)	Quesnell House	B40-49	Burien	13700	8 Ave South	1944	655
	Radenbaugh House (temp)	Radenbaugh House	B40-12	Burien	13231	Occidental Ave South	1941	654
	Regan House (temp)	Unknown	B30-19	Burien	13030	Occidental Ave South	1936	654
	Rein House (temp)	Unknown	B30-43	Burien	13028	First Ave South	1939	654
	Rosler House (temp)	Rosler House	B30-05	Burien	13425	6 Ave South	1930	655
	Ross House (temp)	Ross House	B40-25	Burien	13015	Des Moines Way South	1942	655
	S-he-lahb	Three Tree Point	B00-01	Burien		NA		654
•	Schoening House	Perry Residence	B00-16	Burien	15407	11 Ave. SW	1909	654
•	Seahurst Park Development	Seahurst	B99-02	Burien		152 SW to 144 SW east of 16 Ave SW		654
	Seahurst Village	Seahurst Village Apartme	B40-56	Burien	13608	12 Ave SW	1948	654
	Shaw House (temp)	Unknown	B30-20	Burien	643	150 Street South	1936	655
	Sofie House (temp)	Unknown	B20-04	Burien	16615	Ambaum Blvd South	1923	654
	Soper House (temp)	Soper House	B40-41	Burien	13431	7 Ave South	1943	655
•	Southgate Masonic Temple	Southgate Masonic Templ	B20-01	Burien	1004	152 Street SW	1920	654
•	St. Elizabeth Episcopal Chur	St. Elizabeth	B50-11	Burien	1005	152 Street SW	1955	654
•	St. Francis Church	St. Francis Church	B20-19	Burien	15236	21 Ave SW	1929	654
	Stackhouse House (temp)	Unknown	B30-21	Burien	623	160 Street South	1936	655
	Stokes House (temp)	Stokes House	B40-42	Burien	12823	Occidental Ave South	1943	654
	Subdivision '42, First & 2nd	Chelsea Park Northeast	B40-27	Burien	13204	First Ave SW	1942	654
	Subdivision '42, First Ave S	First Ave South	B40-28	Burien	13217	First Ave Soul	1942	654
•	Subdivision '43 - Chelsea P	Chelsea Park	B40-43	Burien		2 Ave to Ambaum south of 136	1943	654
	Subdivision '43, 128th South	128 Street South	B40-44	Burien	1423	128 Street South	1943	654

214

Index by Historic Name in Each City

Friday, October 14, 1994

Index Page 1

M.	Historic Name	Common Name	File #	City	St. #	Site Street Name	Date	Pg.
•	Albee Estate	Ruth Dykeman Children's	B10-06	Burien	1033	152 Street SW	1916	654
	Anderson House (temp)	Anderson House	B40-33	Burien	12912	8 Ave South	1943	655
	Anderson House (temp)	Unknown	B30-35	Burien	14811	Des Moines Way South	1939	655
	Archeological Sites	Shell Middens	B00-00	Burien		Not Publicly Accessible		654
	Bakken House (temp)	Bakken House	B30-31	Burien	826	136 Street South	1938	655
	Bartholomew House	Bartholomew House	B60-01	Burien	16258	25 Ave. SW	1960	654
	Baxter House (temp)	Baxter House	B40-34	Burien	1047	136 Street South	1943	655
•	Belknap House	Klopfenstein House	B20-03	Burien	3750	Three Tree Point SW	1923	654
	Benson Houses (temp)	Unknown	B20-05	Burien	1239	136 Street South	1924	655
	Betz House (temp)	Betz House	B40-01	Burien	13806	8 Ave South	1940	655
•	Brick Commercial (temp)	Unknown	B99-01	Burien	658	152 Street South		655
	Brunette House (temp)	Brunette House	B40-02	Burien	13458	4 Ave South	1940	655
	Bryan House	Leetch House	B00-13	Burien	1029	146 Street South	1908	655
	Buckles House (temp)	Unknown	B20-06	Burien	828	176 Street South	1925	655
	Burch House (temp)	Burch House	B30-22	Burien	1236	134 Street South	1937	655
•	Burien Business District	Burien Historic Business	B10-07	Burien		152 Street SW, Ambaum-10th	1918	654
	Burien Gardens (temp)	Burien Gardens	B40-55	Burien	13601	Ambaum Blvd. SW	1948	654
	Burien Seventh Day Adventi	7th Day Adventist Church	B60-02	Burien	14237	Des Moines Way South	1960	655
	Campbell House (temp)	Campbell House	B40-35	Burien	13443	7 Ave South	1943	655
•	Carpenter House	Unknown	B10-05	Burien	14508	25 Ave SW	1914	654
	Carr House (temp)	Unknown	B30-12	Burien	13218	8 Ave South	1936	655
•	Cedarhurst Elementary	Cedarhurst Elementary S	B50-07	Burien	611	132 Street South	1954	655
•	Chelsea Park Elementary	Unknown	B50-08	Burien	417	142 Street SW	1954	654
	Church of Latter-day Saints	Morman Church	B60-03	Burien	14200	Ambaum Way SW	1960	654
	Clark House	Unknown	B60-05	Burien	2205	170 Street SW	1962	654
	Coates House (temp)	Unknown	B40-08	Burien	13421	4 Ave South	1941	655
	Colson House(temp)	Unknown	B40-14	Burien	12907	10 Ave South	1942	655
•	Community Family (temp)	Community Family Practic	B50-01	Burien	13624	First Ave South	1950	654
•	Crosby House	Brown Home	B00-06	Burien	14628	8 Ave. South	1900	655
	Cummings House (temp)	Unknown	B50-12	Burien	16759	Marine View Drive SW	1959	654
•	Dashley Home	Coury House	B10-03	Burien	1235	152 Street SW	1912	654
	Davis House (temp)	Davis House	B40-15	Burien	13025	12 Ave South	1942	655
	Dean House (temp)	Dean House	B30-06	Burien	14835	6 Ave South	1931	655
•	Dearborn House	Unknown	B50-03	Burien	16765	Maplewild Drive SW	1951	654
	Dempsey House (temp)	Dempsey House	B40-16	Burien	13416	12 Ave South	1942	655
•	Deroin House	Deroin House	B50-02	Burien	505	150 Street South	1950	655
•	Des Moines Memorial Way	Des Moines Memorial Wa	B20-02	Burien		Memorial Way, 96 to 231 S.	1922	655
•	Dodd Homestead	Sutton Farm	B00-04	Burien	606	140 Street South	1888	655
	Droz House (temp)	Droz House	B30-32	Burien	13248	10 Ave South	1938	655
•	Duffy Estate	Duffy Estate	B30-09	Burien	2727	156 Street SW	1934	654
	Eakins House (temp)	Eakins House	B30-14	Burien	14061	Des Moines Way South	1936	655
	Edmonds House (temp)	Edmonds/Walker House	B30-10	Burien	639	150 Ave South	1935	655
	Elkins House (temp)	Unknown	B40-17	Burien	12806	8 Ave South	1942	655
	Ernst House (temp)	Ernst Home	B40-18	Burien	13419	10 Ave South	1942	655
	Ferguson House (temp)	Ferguson House	B30-15	Burien	13127	12 Ave South	1936	655
	Fire District #2 Station	Burien Fire Station	B40-53	Burien	15100	8 Ave South	1949	655
	Fleming House (temp)	Unknown	B40-47	Burien	14404	5 Ave South	1944	655
	Flygare House (temp)	Flygare House	B30-23	Burien	13004	First Ave South	1937	654
	Genzale House (temp)	Genzale House	B20-17	Burien	651	150 Street South	1929	655
	Ghiglione House	Wintermute House	B00-10	Burien	3541	171 Street SW	1907	654
	Gilmore House (temp)	Unknown	B40-36	Burien	12922	15 Ave South	1943	655
•	Glendale Lutheran Church	Glendale Evangelical Luth	B40-54	Burien	13405	2nd Ave SW	1949	654
	Goodau House (temp)	Goodau House	B30-01	Burien	1261	132 Street South	1930	655
	Graham House	Unknown	B60-04	Burien	16222	25 Ave SW	1962	654
•	Gregory House	Bailey House	B10-01	Burien	3730	171 Street SW	1910	654
•	Gunther Building	Unknown	B00-07	Burien	16660	Marine View Dr. SW	1900	654
	Hagstrom House (temp)	Hagstrom House	B40-03	Burien	13035	6 Ave South	1940	655
	Hart House (temp)	Hart House	B40-48	Burien	839	140 Street South	1944	655
•	Haselton Home	Haseltown-Zwiefelhofer H	B00-11	Burien	12829	9 Ave. SW	1907	654
•	Hazel Valley Elementary	Hazel Valley Elementary	B40-51	Burien	402	132 Street SW	1947	654
	Higgins House	Unknown	B10-09	Burien	16220	Maple Wild SW	1919	654
•	Highline High School	Highline High School	B20-07	Burien	251	152 Street South	1925	655
•	Highline Men's Progressive	The Log Hall	B30-11	Burien	15403	Ambaum Blvd SW	1935	654

214

Index by Historic Name in Each City

Friday, October 14, 1994

Index Page 4

M.	Historic Name	Common Name	File #	City	St. #	Site Street Name	Date	Pg.
	Chamber Office (temp)	Greater Des Moines Cha	D20-12	Des Moine	22237	Cliff Ave South	1926	685
	Chapel of the Bells	Discovery World Day Car	D50-08	Des Moine	22038	9 Ave South	1958	685
•	Chesney House	Gracy House	D00-02	Des Moine	1255	216 Street South	1890	685
	Coffy House (temp)	Coffy House	D20-06	Des Moine	22220	11th Place South	1923	685
	Coil House (temp)	Coil House	D30-21	Des Moine	1218	216th Street South	1936	685
•	Commercial Club Hall	Des Moines Odd Fellows	D10-03	Des Moine	22342	7 Ave South	1912	685
	Commons House	Scott House	D00-14	Des Moine	23627	Marine View Drive South	1908	715
•	Corby House (temp)	Corby House	D10-12	Des Moine	24224	7th Ave South	1918	715
•	Covenant Beach Bible Cam	Des Moines Beach Park	D30-07	Des Moine	22000	Cliff Ave South	1934	684
•	Danish Colony	Seashore Club	D20-13	Des Moine	23641	7 Ave South	1926	715
•	Del's Service	Butler's Auto Repair	D30-11	Des Moine	22341	Marine View Drive South	1935	685
•	Des Moines Field House	Des Moines Field House	D30-30	Des Moine	1000	220 Street South	1939	685
	Des Moines Library	Grace Day Care	D60-10	Des Moine	22815	24 Ave South	1964	685
•	Des Moines Masonic Lodge	Brate House	D30-02	Des Moine	22202	8 Ave South	1930	685
	Des Moines Masonic Templ	Des Moines Masonic Tem	D60-12	Des Moine	2208	223 Street South	1968	685
	Des Moines Methodist Chur	Des Moines Methodist Ch	D60-02	Des Moine	22225	9 Ave South	1960	685
•	Des Moines Public School	Des Moines Elementary	D20-11	Des Moine	22001	9 Ave South	1925	685
•	Des Moines Theater	AAA Liquidating & Auction	D40-22	Des Moine	22325	Marine View Drive South	1947	685
•	Dickensen House (temp)	Dickensen House	D30-22	Des Moine	24305	7th Ave South	1936	715
•	Dooley House (temp)	Dooley House	D10-09	Des Moine	24218	7th Ave South	1917	715
•	Draper Print Shop	Langston House	D00-05	Des Moine	600	220 Street South	1900	685
	Eemisse House (temp)	Unknown	D30-12	Des Moine	833	223 Street South	1935	685
	Eemissee House (temp)	Unknown	D40-06	Des Moine	22215	8th Ave South	1942	685
•	Ellington House	Sherman House	D20-01	Des Moine	22530	8th Ave South	1920	685
•	Elsey House	Laukaitis House	D10-01	Des Moine	921	223 Street South	1911	685
	Elsey House (temp)	Elsey House	D30-03	Des Moine	22006	11th Ave South	1932	685
	Elsner Greenhouses	Zenith Holland Nursery	D00-12	Des Moine	23269	Marine View Drive S	1907	685
	Elsner House	Unknown	D00-15	Des Moine	1217	240 Ave South	1908	715
•	Elsner House #2	Draper House	D20-16	Des Moine	23258	Marine View Drive South	1927	685
•	Engeset Home	Hartfield House	D00-08	Des Moine	21434	13 Ave South	1904	685
	Erickson House (temp)	Unknown	D30-14	Des Moine	22327	16th Ave South	1935	685
	Evanson House (temp)	Evanson House	D30-15	Des Moine	1615	Kent-Des Moines Road	1935	685
	Finnell / Dickerson House	**Demolished or Moved**	D00-10	Des Moine	22514	8 Ave South	1906	685
	Fire District #26 Station	Des Moines Fire Station	D50-12	Des Moine	2238	223 Street South	1958	685
	Fire District #26 Station	Quality Auto Electric	D50-01	Des Moine	22231	Marine View Drive South	1952	685
•	Fisher Compound	Fisher Compound	D20-07	Des Moine	23435	Marine View Drive South	1923	685
	Goedde House (temp)	Unknown	D40-07	Des Moine	615	225 Street South	1942	685
	Gokey House (temp)	Unknown	D40-18	Des Moine	22808	24th Place South	1944	685
	Goldsbery House (temp)	Goldsbery House	D40-14	Des Moine	23457	14th Ave South	1943	685
	Gould House (temp)	Gould House	D20-08	Des Moine	1242	Kent-Des Moines Road	1923	685
	Grace Lutheran Church	Grace Lutheran Church	D50-10	Des Moine	22975	24 Ave South	1957	685
•	Haines House (Temp)	Haines House	D20-05	Des Moine	601	240 Street South	1922	715
•	Halfway House	Foam Rubber City	D20-20	Des Moine	22613	Pacific Highway South	1928	685
	Hanson House (temp)	Hanson House	D10-15	Des Moine	22502	10th Ave South	1919	685
	Hartman House (temp)	Hartman House	D40-08	Des Moine	22604	16th Ave South	1942	685
	Hemenway House (temp)	Unknown	D40-01	Des Moine	21612	24th Ave South	1940	685
	Hickman House (temp)	Hickman House	D40-09	Des Moine	24433	Marine View Drive South	1942	715
	Highline Community College	Highline Community Colle	D60-11	Des Moine	2400	240 Street South	1964	715
•	Hill Farm (temp)	5H Ranch	D20-02	Des Moine	21815	24th Ave South	1920	685
	Janssen House (temp)	Janssen House	D40-03	Des Moine	22752	10th Ave South	1941	685
•	Jorgenson House	Simkus House	D10-01	Des Moine	24011	Marine View Drive South	1914	715
	Jory House (temp)	Unknown	D30-16	Des Moine	21904	Marine View Drive South	1935	715
	Judson Park Retirement Co	Judson Park Retirement	D60-07	Des Moine	23600	Marine View Drive South	1962	685
	Lamp House (temp)	Lamp House .	D20-03	Des Moine	1251	230 Street South	1920	685
•	Latimer House	Old Gay House	D00-04	Des Moine	21616	7 Place South	1890	685
•	Lindahl House	McConnaughey House	D10-02	Des Moine	304	216 Street South	1911	684
•	Lute House (temp)	Lute House	D30-25	Des Moine	23235	Marine View Drive South	1937	685
	Lutheran Church of the Res	Highline Reformed Presby	D50-09	Des Moine	106	206 Street South	1956	684
	M.V.D. Unknown House	Unknown	D99-01	Des Moine	32220	Marine View Drive South		715
	Maher House (temp)	Unknown	D20-19	Des Moine	22017	28th Ave South	1928	685
	Marcus Whitman Presbyterl	Marcus Whitman Presbyt	D60-08	Des Moine	2130	248 Street South	1962	715
•	Masonic Home of Washingt	Masonic Home	D20-17	Des Moine	23660	Marine View Dr. South	1927	715
•	Midway Intermediate School	Midway Elementary Scho	D50-06	Des Moine	22447	24 Ave South	1955	685
	Motteler House (temp)	Motteler House	D20-04	Des Moine	22702	10th Ave South	1921	685

Index by Historic Name in Each City

Friday, October 14, 1994

214

Index by Historic Name in Each City

Friday, October 14, 1994

Index by Historic Name in Each City

Friday, October 14, 1994

M.	Historic Name	Common Name	File #	City	St. #	Site Street Name	Date	Pg.
	Mt. Rainier High School	Mt. Rainier High School	D50-13	Des Moine	22450	19 Ave South	1958	685
•	North Hill Community Club	North Hill Community Clu	D30-23	Des Moine	20827	3 Ave South	1936	684
•	Northhill Subdivision '53	Unknown	D50-02	Des Moine	20801	7th Place South	1953	685
	Nunner House (temp)	Unknown	D40-19	Des Moine	22436	30th Ave South	1944	685
•	Olympic Elementary School	Olympic Elementary Scho	D50-04	Des Moine	615	200 Street South	1954	685
•	Osterhoudt House	Osterhoudt House	D50-03	Des Moine	2037	222 Street South	1953	685
	Owen House (temp)	Owen House	D10-06	Des Moine	22335	6th Ave South	1914	685
	Owen House (temp)	Unknown	D30-31	Des Moine	21645	24th Ave South	1939	685
	Pacific Middle School	Pacific Middle School	D60-05	Des Moine	22705	24 Place South	1961	685
	Pacific Telephone & Telegra	US West	D40-04	Des Moine	802	223 Street South	1941	685
	Pacific Telephone Station	US West Switching Statio	D40-15	Des Moine	22600	28th Ave South	1943	685
	Parker House (temp)	Parker House	D30-17	Des Moine	21228	4th Ave South	1935	684
	Parkside Primary School	Parkside Primary School	D60-03	Des Moine	2104	247 Street South	1960	715
	Petersen House (temp)	Unknown	D20-09	Des Moine	1816	220 Street South	1923	685
•	Qah-wells	Glistening Rock	D00-01	Des Moine	421	227 Street South		684
•	Rayback House	Foote House	D10-07	Des Moine	22018	11 Ave South	1916	685
	Roehr House	Miller Estate	D60-04	Des Moine	1622	216 Street South	1960	685
	Schuch House (temp)	Schuch House	D30-32	Des Moine	1228	216 Street South	1939	685
	Sharp House (temp)	Sharp House	D30-04	Des Moine	917	249 Street South	1933	715
	Simmerer House (temp)	Unknown	D30-24	Des Moine	1223	230 Street South	1936	685
	Simms House (temp)	Unknown	D40-10	Des Moine	1136	220 Street South	1942	685
	Sleeman House (temp)	Unknown	D40-02	Des Moine	22843	30th Ave South	1940	685
•	Smith House	Pool House	D00-06	Des Moine	22204	9 Ave South	1900	685
	Somers Cottage (temp)	Somers House	D20-14	Des Moine	23525	7th Ave South	1926	685
	Somers House (temp)	Somers House	D20-15	Des Moine	23525	7th Ave South	1926	685
	Sonju Cottage (temp)	Unknown	D20-10	Des Moine	24800	16th Ave South	1924	685
	Sonju House (temp)	Sonju House	D40-11	Des Moine	24728	16th Ave South	1942	685
•	St. Philomena Catholic Chur	St. Philomena Catholic Ch	D50-07	Des Moine	1790	222 Street South	1955	685
	Strickler Hardware	Blais of Des Moines	D40-23	Des Moine	22607	Marine View Drive South	1947	685
•	Sturdy House (temp)	Sturdy House	D40-24	Des Moine	825	222 Street South	1947	685
	Ursino House (temp)	Ursino House	D40-16	Des Moine	2458	220 Street South	1943	685
•	Van Gasken House	Bray House	D00-02	Des Moine	402	222 Street South	1889	684
	Van Laak House (temp)	Van Laak House	D30-33	Des Moine	1915	222 Street South	1939	685
•	Vassar's Blacksmith Shop	Inglet House	D00-07	Des Moine	21216	Des Moines Memorial Dr. S.	1900	685
	Victory Baptist Church	Victory Baptist Church	D60-09	Des Moine	1807	223 Street South	1963	685
•	Walsworth House	Schaeffer House	D10-08	Des Moine	1104	223 Street South	1916	685
	Wamsley House (temp)	Unknown	D20-18	Des Moine	22525	6th Ave South	1927	685
	Weaver House (temp)	Weaver House	D30-27	Des Moine	21815	31st Ave South	1938	685
•	Wesley Homes - The Garde	Wesley Gardens	D50-05	Des Moine	815	216 Street South	1954	685
	Wesley Homes - The Terrac	Wesley Gardens	D60-06	Des Moine	816	216 Street South	1961	685
	Widell House (Temp)	Manz House	D00-09	Des Moine	1105	240 Ave South	1905	715
•	Wilson Hotel	Granberg House	D00-16	Des Moine	603	240 Street South	1908	715
	Wilson House (temp)	Unknown	D30-34	Des Moine	22238	Cliff Ave South	1939	685
	Witter House (temp)	Witter House	D30-18	Des Moine	24036	24th Ave South	1935	715
•	Zenith Grocery Store	Zenith Grocery Store	D10-13	Des Moine	23659	Marine View Dr South	1918	715
	Harvey's Skin Dive Suits	Harvey's Skin Dive Suits	W50-1	King Count	2505	252 Street South	1957	715
	North Hill Elementary	North Hill Elementary	H50-01	King Count	19835	8 Ave South		685
	Rose's Highway Inn	Rose's Highway Inn	W30-0	King Count	26915	Pacific Highway South	1939	715
•	Salt Water State Park	Salt Water State Park	W30-0	King Count	25201	Marine View Drive S	1934	715
	Southminister Presbyterian	Southminister Presbyteria	H50-02	King Count	19834	8 Ave South	1957	685
	Woodside School	Woodside School	H50-03	King Count	18367	8 Ave South	1958	685
•	Alverson House	Alverson House	N50-01	Normandy	17916	Brittany Dr SW	1950	654
	Anderson House (temp)	Anderson/Shea House	N20-01	Normandy	18317	2 Ave SW	1920	684
•	Andrews Log Cabin (temp)	Andrews Log Cabin	N10-02	Normandy	104	214 Street SW	1913	684
	Archeological Sites	Shell Middens	N00-00	Normandy		Not Publicly Accessible		684
•	Barricklow House	Hayes House	N30-01	Normandy	18135	Brittany Drive SW	1931	684
	Bauner House	P. Walters House	N50-17	Normandy	18175	Normandy Terrace SW	1959	684
•	Beko House (temp)	Beko House	N30-07	Normandy	230	164 Street SW	1935	654
	Benson House	Johnson House	N20-05	Normandy	20803	Marine View Drive SW	1927	684
	Bergman House	Alder House	N70-01	Normandy	17968	Normandy Terrace SW	1973	684
	Blesener House (temp)	Blesener House	N10-05	Normandy	21608	6 Ave South	1916	684
	Bramel House	Bramel House	N60-04	Normandy	19273	Edgecliff Dr. SW	1963	684
	Brown House	Unknown	N50-10	Normandy	19254	Edgecliff SW	1955	684
•	Bush Beach House (temp)	Bush Beach House	N10-06	Normandy	220	219 Street South	1918	684

Index by Historic Name in Each City

Friday, October 14, 1994

M.	Historic Name	Common Name	File #	City	St. #	Site Street Name	Date	Pg.
	Benson House (temp)	Benson House	T40-12	Tukwila	3720	142 Street South	1941	655
•	Bergquist House	Marks House	T20-31	Tukwila	14455	58 Ave South	1924	655
	Berkman House (temp)	Unknown	T20-51	Tukwila	11914	Interurban South	1928	625
	Bigelow House	McCarton House	T00-09	Tukwila	11728	40 Ave South	1902	625
	Boardman House (temp)	Boardman House	T20-37	Tukwila	11926	Interurban South	1925	625
	Boardwalk House (temp)	Unknown	T10-23	Tukwila	13042	Pacific Highway South	1917	655
•	Boeing Company Building 1	The Red Barn	T00-27	Tukwila	9404	East Marginal Way South	1909	625
	Bohall House (temp)	Bohall House	T10-42	Tukwila	12840	35 Ave South	1919	655
	Bohleen House (temp)	Unknown	T40-50	Tukwila	12218	46 Ave South	1943	625
	Bosshart House (temp)	Bosshart House	T20-38	Tukwila	14220	Military Road South	1925	655
	Botham House (temp)	Unknown	T00-18	Tukwila	14702	51 Ave South	1906	655
	Bowen House (temp)	Unknown	T30-28	Tukwila	13311	37 Ave South	1934	655
	Brandeberry House (temp)	Unknown	T40-02	Tukwila	13908	45 Ave South	1940	655
	Braucher House (temp)	Braucher House	T30-13	Tukwila	12223	43 Ave South	1931	625
	Bretthauer House (temp)	Bretthauer House	T30-62	Tukwila	14065	33 Ave South	1939	655
	Brown House (temp)	Brown House	T10-26	Tukwila	3832	130 Street South	1918	655
	Burkey House (temp)	Burkey House	T40-51	Tukwila	3928	113 Street South	1943	625
	Buss House (temp)	Unknown	T40-03	Tukwila	11811	44 Ave South	1940	625
	Caldwell House (temp)	Caldwell House	T10-06	Tukwila	15650	42 Ave South	1912	655
	Calibuso House (temp)	Unknown	T30-64	Tukwila	15843	47 Ave South	1939	655
	Cantonwine House (temp)	Cantonwine House	T10-24	Tukwila	14454	51 Ave South	1917	655
	Capellaro House (temp)	Capellaro House	T10-27	Tukwila	4061	128 Street South	1918	655
	Capellaro House (temp)	Unknown	T20-32	Tukwila	4603	124 Street South	1924	655
	Carlson House (temp)	Unknown	T20-04	Tukwila	3818	116 Street South	1920	625
	Carlson House (temp)	Unknown	T40-25	Tukwila	12248	43 Ave South	1942	625
	Case House (temp)	Unknown	T40-52	Tukwila	12040	44 Ave South	1943	625
•	Cavanaugh House (temp)	Cavanaugh House	T00-07	Tukwila	4026	130 Street South	1901	655
	Chittenden House (temp)	Chittenden House	T40-04	Tukwila	13057	34 Ave South	1940	655
•	Christian Science Church	Primera Iglesia Bautista C	T30-22	Tukwila	13045	42 Ave South	1933	655
	Clark House	"Demolished 80s"	T00-10	Tukwila	13532	52 Ave South	1902	655
	Clark House (temp)	Clark House	T40-53	Tukwila	12217	46 Ave South	1943	625
	Cloutier House (temp)	Cloutier House	T20-39	Tukwila	4058	128 Street South	1925	655
	Codd House (temp)	Codd House	T30-23	Tukwila	4240	158 Street South	1933	655
•	Codiga Farm: Dairy Barn	Codiga Farm	T20-52	Tukwila	12523	50 Place South	1928	655
•	Codiga House	Codiga House	T10-43	Tukwila	12523	50 Place South	1919	655
	Codiga House #2 (temp)	Unknown	T20-33	Tukwila	12523	50 Place South	1924	655
	Cohen House (temp)	Unknown	T30-65	Tukwila	13738	45 Ave South	1939	655
	Coleman House (temp)	Coleman House	T40-13	Tukwila	12223	48 Ave South	1941	625
	Conner House (temp)	Conner House	T40-26	Tukwila	4616	146 Street South	1942	655
	Coon House (temp)	Coon House	T40-14	Tukwila	13018	41 Ave South	1941	655
	Dahl House (temp)	Dahl House	T10-28	Tukwila	11714	40 Ave South	1918	655
	Davidson House (temp)	Davidson House (temp)	T30-01	Tukwila	4020	128 Street South	1930	655
	Davidson House (temp)	Unknown	T40-54	Tukwila	4058	148 Street South	1943	655
	Davis House (temp)	Davis House	T40-55	Tukwila	4705	122 Street South	1943	625
	Dawe House (temp)	Dawe House	T40-56	Tukwila	2929	133 Street South	1943	655
•	Delta Masonic Lodge	Delta Masonic Lodge	T20-45	Tukwila	13034	41 Ave South	1927	655
	Dennis House (temp)	Unknown	T10-29	Tukwila	3906	113 Street South	1918	625
	Derosier House (temp)	Unknown	T40-27	Tukwila	12214	42 Ave South	1942	625
	Desjardin House (temp)	Desjardin House	T20-53	Tukwila	3826	116 Street South	1928	625
	Dietsch House (temp)	Unknown	T30-66	Tukwila	4635	144 Street South	1939	655
	Dillon House (temp)	Unknown	T20-05	Tukwila	4210	115 Street South	1920	625
	Dingle House (temp)	Dingle House	T30-02	Tukwila	4115	114 Street South	1930	625
	Doty House	Unknown	T00-15	Tukwila	14711	57 Ave South	1905	655
	Doubleday House	"Demolished or Moved"	T00-11	Tukwila	14951	57 Ave South	1903	655
	Driscoll House (temp)	Driscoll House	T30-14	Tukwila	3944	113 Street South	1931	625
	Dukich House (temp)	Dukich House	T10-07	Tukwila	5001	114 Street South	1912	625
	Duncan House (temp)	Unknown	T30-03	Tukwila	11664	44 Ave South	1930	625
	Dunne House (temp)	Unknown	T30-44	Tukwila	12812	37 Ave South	1936	655
•	Duwamish 99 Bridge	Duwamish 99 Bridge	T20-46	Tukwila	11600	Pacific Highway South	1927	625
•	Duwamish Church	Duwamish Community Pr	T00-03	Tukwila	11814	42 Ave South	1870	625
	Easter House (temp)	Easter House	T10-20	Tukwila	4820	150 Street South	1915	655
	Eberhardt House (temp)	Eberhardt House	T30-36	Tukwila	12816	34 Ave South	1935	655
	Elliott House (temp)		T99-01	Tukwila				655
	Eng House (temp)	Eng House	T30-52	Tukwila	4836	150 Street South	1937	655

214

Index by Historic Name in Each City

Friday, October 14, 1994

M.	Historic Name	Common Name	File #	City	St. #	Site Street Name	Date	Pg.
*	Pevosky House	Bolles House	N40-35	Normandy	17622	12 Ave SW	1947	654
	Pirogoff House (temp)	Pirogoff House	N40-15	Normandy	18721	Edgecliff Dr SW	1941	684
	Pollard House	Pollard House	N10-04	Normandy	6167	187 or 189 Street SW	1913	684
*	Powell House (temp)	Powell House	N40-16	Normandy	17121	2 Ave SW	1941	654
	Provo House (temp)	Provo House	N40-28	Normandy	1607	168 Street SW	1942	654
*	Prudence Penny Home #1	Osborne House	N20-08	Normandy	17970	Brittany Drive SW	1928	684
	Prudence Penny Home #2	Thompson House	N30-03	Normandy	17954	Brittany Drive SW	1931	684
	Randall House (temp)	Randall House	N40-05	Normandy	1627	168 Street SW	1940	654
*	Raymond House #1	Holmes House?	N30-16	Normandy	204	Normandy Road SW	1937	684
*	Raymond House #2	Duff House	N50-06	Normandy	17925	Normandy Terrace SW	1952	654
*	Reitze House	Martin House	N40-06	Normandy	18541	Normandy Terrace SW	1940	684
	Riebe House (temp)	Riebe House	N40-29	Normandy	235	171 Street SW	1942	654
	Ringdahl House (Temp)	Ringdahl House	N20-04	Normandy	406	Normandy Road SW	1926	684
	Rova House (temp)	Unknown	N40-07	Normandy	18105	Brittany Dr SW	1940	684
	Sargent House	Sargent House	N40-30	Normandy	17941	Riviera Place SW	1942	654
*	Skoog House	David House	N50-04	Normandy	18191	Brittany Drive SW	1950	684
	Slaker House (temp)	Slaker House	N40-31	Normandy	18645	8 Ave SW	1942	684
*	Sprenger Beach House	Sprenger Beach House	N20-06	Normandy	232	218 Street South	1927	684
	Steele House (temp)	Steele House	N40-32	Normandy	131	171 Street SW	1942	654
*	Stone Beach House (temp)	Stone Beach House	N30-06	Normandy	222	219 Street South	1934	684
	Stoneman House (temp)	Unknown	N30-17	Normandy	635	207 Street SW	1937	684
	Storey House	Unknown	N50-13	Normandy	18705	Edgecliff SW	1956	684
	Tracy House	Tracy House	N50-14	Normandy	18971	Edgecliff Dr. SW	1956	684
	Trainer House (temp)	Tranler House	N40-33	Normandy	133	168 Street SW	1942	654
	Treaty Tree	Treaty Tree	N00-01	Normandy	17107	2 Ave SW		654
	Walker House	Carl Hansen House	N40-08	Normandy	17424	13 Ave SW	1940	654
	Westby House (temp)	Westby House	N40-17	Normandy	20647	8 Ave SW	1941	684
	Williams House (temp)	Williams House	N30-21	Normandy	17980	Brittany Dr SW	1939	684
	Angle Lake Elementary Sch	SeaTac City Hall	S50-01	SeaTac			1953	685
	Fire District #24 Station	SeaTac Fire Station	S50-04	SeaTac	2929	200 Ave South	1959	685
*	Hillgrove Cemetery	Hillgrove Cemetery	S00-03	SeaTac	1551	200 Street South	1900	685
	Marywood Elementary Scho	Port of Seattle Marywood	S50-03	SeaTac		200 Street South	1958	685
	Mayer House	Unknown	S30-01	SeaTac	15025	Military Road South	1935	655
*	Military Road	Military Road	S00-01	SeaTac		Military Road South	1860	655
	Pancake Chef Shopping Ce	Pancake Chef	S50-02	SeaTac	15201	Military Road South	1955	655
*	Paul House	Unknown	S00-02	SeaTac	839	157 Street South	1885	655
	Prince of Peace Lutheran C	Prince of Peace Lutheran	S50-05	SeaTac	19030	8 Ave South	1959	685
*	Vacca Farm	Vacca Farm, Pumpkin Pat	S20-01	SeaTac	15208	Des Moines Mem. Way South	1927	655
*	Allentown Acres Addition	Allentown Acres Addition	T00-17	Tukwila		42-50 Ave S Between 122 & 124	1906	625
*	Allentown Bridge	Allentown Bridge	T20-44	Tukwila	12600	42 Ave South	1927	655
	Anderson House (temp)	Anderson House	T30-16	Tukwila	4908	114 Street South	1932	625
	Anderson House (temp)	Anderson House	T40-69	Tukwila	13703	42 Ave South	1944	655
	Anderson House (temp)	Unknown	T40-44	Tukwila	12054	44 Place South	1943	625
	Anderson House (temp)	Unknown	T40-45	Tukwila	12533	51 Place South	1943	655
	Angle House (temp)	Angle House	T40-46	Tukwila	4831	146 Street South	1943	655
	Archeological Sites	Shell Middens, Burial Gro	T00-00	Tukwila		Not Publicly Accessible		655
	Atkins House (temp)	Atkins House	T30-43	Tukwila	4321	140 Street South	1936	655
	Auto Cabins	Alva Pease Property	T20-01	Tukwila	11540	East Marginal Way South	1920	625
	Axelson House (temp)	Unknown	T40-47	Tukwila	4602	164 Street South	1943	655
	Babcock House (temp)	Babcock House	T10-41	Tukwila	4027	128 Street South	1919	655
	Bailey House (temp)	Unknown	T40-48	Tukwila	12227	44 Ave South	1943	625
	Baker House (temp)	Baker House	T40-01	Tukwila	11662	42 Ave South	1940	625
	Baker's Kitchen	Unknown	T20-02	Tukwila	11650	East Marginal Way South	1920	625
	Bales House	Bales House	T20-03	Tukwila	14100	42 Ave South	1920	655
	Baney House (temp)	Baney House	T20-42	Tukwila	4511	136 Street South	1928	655
	Barber House (temp)	Barber House	T30-17	Tukwila	4231	148 Street South	1932	655
	Barene House (temp)	Barene House	T40-23	Tukwila	13423	48 Ave South	1942	655
	Barnes House (temp)	Unknown	T40-49	Tukwila	12222	47 Ave South	1943	625
	Barrett House (temp)	Unknown	T30-11	Tukwila	12250	46 Ave South	1931	625
	Baugart House (temp)	Baumgart House	T30-12	Tukwila	3241	135 Street South	1931	655
*	Ben Carol Motel Sign	Ben Carol Motel Sign	T40-24	Tukwila	14110	Pacific Highway South	1942	655

214

Index by Historic Name in Each City

Friday, October 14, 1994

M.	Historic Name	Common Name	File #	City	St. #	Site Street Name	Date	Pg.
	Josie House (temp)	Josie House	T20-60	Tukwila	10035	East Marginal Way South	1929	625
	Judd House (temp)	Judd House	T20-12	Tukwila	4044	128 Street South	1920	655
	Kaiser #1 House	Violin House	T10-13	Tukwila	4128	130 Street South	1913	655
	Kaiser #2 House	Dealry House	T10-14	Tukwila	4136	130 Street South	1913	655
*	Kassner House	Unknown	T00-14	Tukwila	14406	59 Ave South	1904	655
	King County House (temp)	Unknown	T30-61	Tukwila	4029	144 Street South	1938	655
	Kirkland Building (temp)	Used Trucks and Equipm	T20-54	Tukwila	13500	Pacific Highway South	1928	655
	Knaus House (temp)	Knaus House	T40-60	Tukwila	16445	51 Ave South	1943	655
	Kolsky House (temp)	Kolsky House	T00-24	Tukwila	13001	41 Ave South	1908	655
	Lacava House	**Wrong Address**	T20-13	Tukwila	13012	40 Ave South	1920	655
	Larson House (temp)	Larson House	T40-32	Tukwila	12524	51 Place South	1942	655
	Lawrence House (temp)	Lawrence House	T30-46	Tukwila	4461	144 Street South	1936	655
	Lee House (temp)	Unknown	T20-61	Tukwila	4240	146 Street South	1929	655
	Lehmbeck House (temp)	Lehmbeck House	T20-34	Tukwila	13011	33 Ave South	1924	655
	Lewis House (temp)	Lewis House	T10-22	Tukwila	3403	132 Street South	1916	655
	Light Residence	Unknown	T00-13	Tukwila	14688	53 Ave (Macadam Rd) South	1903	655
	Liljestrand House (temp)	Liljestrand House	T10-33	Tukwila	13111	42 Ave South	1918	655
*	Lincoln House	Lautenschlager House	T00-25	Tukwila	13243	40 Ave South	1908	655
	Little Church by the Side of t	Little Church...	T30-24	Tukwila	14800	Pacific Highway South	1933	655
	Looney House (temp)	Looney House	T30-19	Tukwila	12218	49 Ave South	1932	625
	Lovell House (temp)	Unknown	T30-25	Tukwila	3235	135 Street South	1933	655
	Lucero House (temp)	Lucero House	T10-35	Tukwila	13219	East Marginal Way South	1918	655
	Marleau Building (temp)	Unknown	T30-05	Tukwila	12601	East Marginal Way South	1930	655
	Martin House (temp)	Unknown	T30-30	Tukwila	11682	44 Ave South	1934	625
	Mason House (temp)	Mason House	T40-19	Tukwila	13021	33 Ave South	1941	655
	Mathias House (temp)	Mathias House	T40-61	Tukwila	12056	44 Ave South	1943	625
	Matson House (temp)	Matson House	T30-06	Tukwila	12204	43 Ave South	1930	625
	Mauzeralle House (temp)	Mauzeraulle House	T30-56	Tukwila	4806	148 Street South	1937	655
	McCall House (temp)	Unknown	T10-36	Tukwila	13734	42 Ave South	1918	655
	McHugh House (temp)	McHugh House	T30-31	Tukwila	15222	42 Ave South	1934	655
	McNicholas House (temp)	McNicholas House	T10-37	Tukwila	10342	Beacon Ave South	1918	625
	Mechling House (temp)	Mechling House	T20-14	Tukwila	14011	Macadam Road South	1920	655
	Merkle House (temp)	Merkel House	T40-62	Tukwila	4602	122 Street South	1943	625
*	Merkle, Grandma, House	Kolstad House	T00-26	Tukwila	12244	42 Ave South	1908	625
	Merriam House (temp)	Unknown	T10-04	Tukwila	4939	114 Street South	1911	625
*	Mess Pioneer Family Ceme	Mess Cementary	T00-06	Tukwila	19200	Frager Ave South	1900	685
	Methodist House #1 (temp)	Unknown	T40-33	Tukwila	13842	Military Road South	1942	655
	Methodist House #2 (temp)	Unknown	T40-34	Tukwila	13848	Military Road South	1942	655
	Miller House (temp)	Miller House	T20-21	Tukwila	4629	144 Street South	1921	655
*	Miyao Greenhouse	Miyao House	T30-07	Tukwila	11600	39 Ave South	1930	625
	Miyao House (temp)	Miyao House	T10-38	Tukwila	12054	42 Ave South	1918	625
	Moltane House(temp)	Unknown	T30-32	Tukwila	12205	44 Ave South	1934	625
*	Monroe House	Ritch House	T20-62	Tukwila	11616	42 Ave South	1929	625
	Morgan House (temp)	Unknown	T40-20	Tukwila	16446	51 Ave South	1941	655
	Moriwaki House (temp)	Moriwaki House	T10-05	Tukwila	4033	128 Street South	1911	655
	Morrison House (temp)	Morrison House	T40-07	Tukwila	12562	50 Place South	1940	655
	Mosier House (temp)	Mosier House	T40-35	Tukwila	4411	146 Street South	1942	655
	NW Realty House (temp)	Unknown	T40-36	Tukwila	3224	135 Street South	1942	655
	Nash House	Cripe House	T10-15	Tukwila	4106	130 Street South	1913	655
	Nealy House (temp)	Nealy House	T40-63	Tukwila	4408	122 Street South	1943	625
*	Nelsen House	Nelsen House	T00-16	Tukwila	15643	West Valley Road South	1905	655
*	Nelson, Fred, Farm	Nelson Dairy	T00-08	Tukwila	7107	Grady Road South	1901	655
	Ness House (temp)	Unknown	T10-16	Tukwila	12607	East Marginal Way South	1913	655
	Newporter Motel	Newporter Apartments	T40-37	Tukwila	14848	Pacific Highway South	1942	655
	Nienaber House (temp)	Unknown	T30-37	Tukwila	16228	42 Ave South	1935	655
	Nistor House (temp)	Nistor House	T40-64	Tukwila	12253	44 Ave South	1943	625
	Norris House (temp)	Unknown	T20-22	Tukwila	11609	39 Ave South	1921	655
*	Northwest House (temp)	Unknown	T20-63	Tukwila	3730	142 Street South	1929	655
	O'Brien House (temp)	Unknown	T40-38	Tukwila	3429	144 Street South	1942	655
	O'Brien House (temp)	Unknown	T40-21	Tukwila	3468	148 Street South	1941	655

214

Index by Historic Name in Each City

Friday, October 14, 1994

M.	Historic Name	Common Name	File #	City	St. #	Site Street Name	Date	Pg.
	Fackrell House (temp)	Unknown	T00-28	Tukwila	13027	37 Ave South	1909	655
	Fencl House (temp)	Fencl House	T30-53	Tukwila	12840	33 Place South	1937	655
	Ferrell House (temp)	Ferrell House	T00-23	Tukwila	14025	44 Ave South	1908	655
•	Fetters House (temp)	Unknown	T10-30	Tukwila	14019	37 Ave South	1918	655
	Fokkema House (temp)	Fokkema House	T30-18	Tukwila	4440	160 Street South	1932	655
•	Foster Golf Course	Foster Golf Links	T20-40	Tukwila	13900	Interurban Ave South	1925	655
•	Foster High School Stadium	Werner Neudorf Memorial	T50-02	Tukwila	4242	144 Street South	1952	655
	Foster Library	Foster Library	T50-04	Tukwila	4205	142 Street South	1959	655
•	Foster Maple Tree	Large Maple Tree	T00-02	Tukwila	Northe	Foster Golf Links	1865	655
	Foster Senior High School	**Demolished**	T50-03	Tukwila	4242	144 Street South	1952	655
	Foster-Tukwila Presbyterian	Tukwila Presbyterian Chu	T00-29	Tukwila	14401	56 Ave South	1909	655
	Fowler House (temp)	Fowler House	T00-30	Tukwila	3517	130 Street South	1909	655
	Fox House (temp)	Fox House	T40-28	Tukwila	11863	44 Ave South	1942	625
	Fredericks Store	Unknown	T20-06	Tukwila	11602	42 Ave South	1920	625
	Frymier House (temp)	Fymier House	T30-29	Tukwila	13650	Military Road South	1934	655
	Fuller House	Painter House	T20-07	Tukwila	13526	53 Ave South	1920	655
	Gaviglio House (temp)	Gaviglio House	T40-29	Tukwila	4008	114 Street South	1942	625
	Geehan House (temp)	Unknown	T10-08	Tukwila	14281	Macadam Road South	1912	655
	Glenn House (temp)	Glenn House	T40-15	Tukwila	10333	51 Ave South	1941	625
	Glessner House (temp)	Glessner House	T30-67	Tukwila	12092	44 Place South	1939	625
	Gomez House (temp)	Unknown	T30-45	Tukwila	4518	124 Street South	1936	655
	Gonzalez Buildings (temp)	Unknown	T20-24	Tukwila	3827	130 Street South	1922	655
	Gonzalez House (temp)	Unknown	T20-08	Tukwila	13027	40 Ave South	1920	655
	Goodale House (temp)	Goodale House	T30-15	Tukwila	3726	128 Street South	1931	655
	Gradzuk House (temp)	Gradzuk House	T10-31	Tukwila	13041	38 Ave South	1918	655
	Greene House (temp)	Unknown	T40-30	Tukwila	11867	44 Ave South	1942	625
	Greeno House (temp)	Unknown	T40-16	Tukwila	13722	44 Ave South	1941	655
	Grotem House (temp)	Grotem House	T30-68	Tukwila	4802	150 Street South	1939	655
	Guess House (temp)	Unknown	T20-32	Tukwila	13319	42 Ave South	1918	655
	Gulla House (temp)	Gulla House	T30-04	Tukwila	11659	44 Ave South	1930	625
	Gustafson House #2 (temp)	Unknown	T40-05	Tukwila	3915	117 Street South	1940	625
	Gustafson House (temp)	Gustafson House	T40-17	Tukwila	14650	46 Ave South	1941	655
	Gustofson Buildings (temp)	Unknown	T20-47	Tukwila	11640	East Marginal Way South	1927	625
•	Haggard House (temp)	Haggard House	T00-12	Tukwila	11532	40 Ave South	1903	625
	Hale House	Most Likely "Demolished"	T20-09	Tukwila	12550	51 Place South?	1920	655
	Harty House (temp)	Harty House	T10-11	Tukwila	13119	42 Ave South	1913	655
	Hellstrom House (temp)	Unknown	T10-33	Tukwila	4208	115 Street South	1918	625
	Henderson House		T20-25	Tukwila	4815	124 Street South	1922	655
•	Henke House	Moore House	T10-34	Tukwila	14222	58 Ave South	1918	655
	Henry House (temp)	Unknown	T00-19	Tukwila	14424	51 Ave South	1906	655
	Hibbs House (temp)	Hibbs House	T30-54	Tukwila	12633	37 Ave South	1937	655
	Hildner House (temp)	Hildner House	T20-26	Tukwila	3901	117 Street South	1922	625
	Hilmes House (temp)	Unknown	T20-27	Tukwila	3709	126 Street South	1922	655
	Hingorani House (temp)	Unknown	T20-58	Tukwila	15608	47 Ave South	1929	655
	Holdaas House (temp)	Holdaas House	T40-06	Tukwila	4432	148 Street South	1940	655
	Houle House (temp)	Houle House	T10-12	Tukwila	12910	East Marginal Way South	1913	655
	Hughes House (temp)	Hughes House	T20-10	Tukwila	13739	41 Ave South	1920	655
	Hunter House (temp)	Hunter House	T40-57	Tukwila	13442	34 Ave South	1943	655
	Ingersoll House (temp)	Ingersoll House	T40-31	Tukwila	13455	48 Ave South	1942	655
	Interurban Bridge	**Demolished 88**	T10-21	Tukwila	11500	East Marginal Way South	1915	625
	Iverson House (temp)	Unknown	T40-58	Tukwila	16226	51 Ave South	1943	655
	Jacobson House (temp)	Jacobson House	T20-11	Tukwila	12202	42 Ave South	1920	625
	Jenson Dairy	Basich House	T00-20	Tukwila	11854	42 Ave South	1906	625
	Jenson House (temp)	Jenson House	T40-70	Tukwila	14647	42 Ave South	1944	655
	Johnson House (temp)	Johnson House	T40-18	Tukwila	13048	34 Ave South	1941	655
	Johnson House (temp)	Johnson House	T20-59	Tukwila	14406	42 Ave South	1929	655
	Johnson Residence	Johnson House	T10-01	Tukwila	13136	42 Ave South	1910	655
	Jones House (temp)	Jones House	T30-55	Tukwila	10415	47 Ave South	1937	625
	Jordon House (temp)	Jordon House	T30-60	Tukwila	10918	49 Ave South	1938	625
	Jorgensen Forge	Jorgenson Forge	T40-59	Tukwila	8531	East Marginal Way South	1943	625
	Jorgensen House (temp)	Jorgensen House	T10-18	Tukwila	13025	41 Ave South	1914	655

214

Index by Historic Name in Each City

Friday, October 14, 1994

M.	Historic Name	Common Name	File #	City	St. #	Site Street Name	Date	Pg.
	Thorndyke School	Thorndyke Community Cl	T10-45	Tukwila	15000	42 Ave South	1919	655
	Tinsley House (temp)	Unknown	T30-21	Tukwila	12219	49 Ave South	1932	625
	Tolland House (temp)	Tolland House	T30-50	Tukwila	13636	Military Road South	1936	655
	Tom House (temp)	Unknown	T30-73	Tukwila	13228	37 Ave South	1939	655
	Tomaso House (temp)	Unknown	T10-39	Tukwila	13751	41 Ave South	1918	655
	Tompkins House (temp)	Tompkins House	T20-28	Tukwila	4439	160 Street South	1922	655
•	Torre House	Unknown	T00-05	Tukwila	3914	115 Street South	1890	625
	Tractor House (temp)	Unknown	T40-42	Tukwila	4438	160 Street South	1942	655
	Tremana House (temp)	Unknown	T10-40	Tukwila	14211	37 Ave South	1918	655
	Trone House (temp)	Trone House	T30-09	Tukwila	14020	43 Ave South	1930	655
•	Trudy's Tavern Sign		T30-74	Tukwila	15001	Pacific Highway South	1939	655
•	Tukwila Community Club Ha	Tukwila Community Club	T20-30	Tukwila	14257	Interurban Ave South	1923	655
•	Tukwila Grade School	Tukwila City Hall	T20-19	Tukwila	14475	59 Ave South	1920	655
•	Tukwila Park	Tukwila Park	T30-42	Tukwila	15300	65 Ave South	1935	655
	Vanness House (temp)	Vanness House	T30-51	Tukwila	15210	42 Ave South	1936	655
	Vasilieff House (temp)	Vasillieff House	T40-68	Tukwila	13504	Military Road South	1943	655
	Verhoff Service Station	Vi's Tavern	T20-20	Tukwila	12539	East Marginal Way South	1920	655
	Walker House (temp)	Walker House	T20-36	Tukwila	4208	124 Street South	1924	625
	Walkley House (temp)	Walkley House	T30-35	Tukwila	13035	40 Ave South	1934	655
	Walkup House	Mayor Walkup House	T99-03	Tukwila	16001	65 Ave South		655
	Whitworth House (temp)	Unknown	T10-03	Tukwila	13749	45 Ave South	1910	655
	Wickstrom House (temp)	Wickstrom House	T40-43	Tukwila	12022	44 Ave South	1942	625
	Wood House (temp)	Unknown	T30-75	Tukwila	4926	107 Street South	1939	625
	Yellam House (temp)	Unknown	T40-10	Tukwila	12501	50 Place South	1940	655
	Zuvela House (temp)	Zuvela House	T30-10	Tukwila	15205	51 Ave South	1930	655
•	ku-LAH-hahd	Northwind Fishweir	T00-01	Tukwila	2800	112 Street South		625

214

Index by Historic Name in Each City

Friday, October 14, 1994

Index Page 11

M.	Historic Name	Common Name	File #	City	St. #	Site Street Name	Date	Pg.
	Orn House (Temp)	Orn House	T20-41	Tukwila	13415	48 Ave South	1925	655
	Patapoff House (temp)	Patapoff House	T20-23	Tukwila	3703	126 Street South	1921	655
	Patterson House (temp)	Patterson House	T30-69	Tukwila	3910	113 Street South	1939	625
	Pearce House (temp)	Unknown	T40-65	Tukwila	4627	125 Street South	1943	655
	Pearson House (temp)	Pearson House	T30-38	Tukwila	4221	148 Street South	1935	655
	Poirier House (temp)	Unknown	T10-09	Tukwila	13745	44 Ave South	1912	655
	Pollinger House (temp)	Unknown	T40-71	Tukwila	14910	51 Ave South	1944	655
	Presbyterian House (temp)	Unknown	T30-26	Tukwila	15820	Military Road South	1933	655
	Primacio House (temp)	Unknown	T40-72	Tukwila	12048	44 Place South	1944	625
	Radley House (temp)	Radley House	T20-48	Tukwila	13347	34 Ave South	1927	655
•	Rainier View Community Cl	Rainier View Community	T20-55	Tukwila	10915	51 Ave South	1928	625
	Ramsey House (temp)	Ramsey House	T40-08	Tukwila	14040	33 Ave South	1940	655
•	Ray House	Carrosino House	T00-04	Tukwila	11269	East Marginal Way South	1882	625
	Reed House (temp)	Reed House	T40-66	Tukwila	12202	44 Ave South	1943	625
	Regal House	Unknown	T99-02	Tukwila		56 Ave South?		655
	Reidl House (temp)	Unknown	T20-29	Tukwila	4653	150 Street South	1923	655
	Ristau House (temp)	Ristau House	T20-15	Tukwila	13642	Military Road South	1920	655
	Riverton Heights Post Office	Unknown	T99-04	Tukwila	35007	150 Street South		655
•	Riverton Heights Presbyterl	Riverton Heights Presbyte	T30-08	Tukwila	3728	160 Street South	1930	655
•	Riverton Hospital	Huls Apartments	T10-44	Tukwila	13041	East Marginal Way South	1919	655
	Riverton House #1 (temp)	Unknown	T20-16	Tukwila	13449	43 Ave South	1920	655
	Riverton House #2 (temp)	Unknown	T30-39	Tukwila	13517	43 Ave South	1935	655
•	Riverton Park United Metho	Beth Ha Shofar	T10-02	Tukwila	13001	37 Ave South	1910	655
	Roberson House (temp)	Roberson House	T20-17	Tukwila	14845	51 Ave South	1920	655
	Rochon House (temp)	Rochon House	T20-43	Tukwila	5136	151 Street South	1926	655
	Roland House (temp)	Roland House	T20-35	Tukwila	4633	160 Street South	1924	655
	Ruffino House (temp)	Unknown	T30-27	Tukwila	14862	Pacific Highway South	1933	655
	Ruggles House (temp)	Ruggles House	T40-39	Tukwila	12404	50 Place South	1942	655
	Ruja House (temp)	Ruja House	T30-47	Tukwila	3115	135 Street South	1936	655
	Runge House (temp)	Unknown	T40-22	Tukwila	3742	141 Street South	1941	655
	Rupp House (temp)	Rupp House	T30-57	Tukwila	4611	140 Street South	1937	655
	Rupp-Santora House (temp)	Unknown	T10-17	Tukwila	4647	140 Street South	1913	655
	Sampson House	Alva Pease Property	T30-58	Tukwila	11540	East Marginal Way South	1937	625
	Santora House (temp)	Santora House	T30-59	Tukwila	4617	140 Street South	1937	655
	Sarantos House (temp)	Unknown	T40-40	Tukwila	3725	126 Street South	1942	655
	Serifica House (temp)	Serifica House	T40-67	Tukwila	12542	50 Place South	1943	655
	Sherman House (temp)	Sherman House	T40-09	Tukwila	13715	42 Ave South	1940	655
•	Shoemaker House	Malone House	T00-21	Tukwila	14243	58 Ave South	1906	655
•	Showalter School	Showalter Intermediate S	T30-70	Tukwila	4628	144 Street South	1939	655
	Simkus House (temp)	Simkus House	T30-48	Tukwila	4320	150 Street South	1936	655
	Simpson House (temp)	Simpson House	T30-40	Tukwila	4615	148 Street South	1935	655
	Sims House (temp)	Unknown	T30-71	Tukwila	14118	37 Ave South	1939	655
	Smith House (temp)	Smith House	T00-22	Tukwila	4228	139 Street South	1906	655
•	Southcity Motel Sign	Southcity Motel	T30-33	Tukwila	14242	Pacific Highway South	1934	655
•	Southgate Elementary Scho	Tukwila Community Cente	T50-01	Tukwila	4101	131 Street South	1950	655
	St. Thomas Catholic Church	St. Thomas Church	T60-01	Tukwila	4415	140 Street South	1963	655
	Stanley House (temp)	Stanley House	T30-20	Tukwila	13029	41 Ave South	1932	655
	Steadman House (temp)	Steadman House	T40-41	Tukwila	3811	116 Street South	1942	625
	Steen House (temp)	Steen House	T20-49	Tukwila	14062	33 Ave South	1927	655
	Steffan House (temp)	Steffan House	T10-10	Tukwila	15207	40 Ave South	1912	655
	Strand House (temp)	Strand House	T30-72	Tukwila	13235	East Marginal Way South	1939	655
	Strayer House (temp)	Strayer House	T10-25	Tukwila	11830	42 Ave South	1917	625
•	Subdivision '44, Casade Vie	Casade View Homes	T40-73	Tukwila	13503	37 Ave South	1944	655
	Sundby 119th House	Schulhamer House	T20-50	Tukwila	4037	119 Street South	1927	625
	Sundby 40th House	**Wrong Address**	T20-56	Tukwila	11605	40 Ave South	1928	625
	Sundby Interurban House	Unknown	T30-34	Tukwila	11918	Interurban South	1934	625
	Swanberg House (temp)	Swanberg House	T30-49	Tukwila	14809	51 Ave South	1936	655
	Teays House (temp)	Teays House	T30-41	Tukwila	4633	150 Street South	1935	655
	Thompson House (temp)	Unknown	T20-18	Tukwila	4503	136 Street South	1920	655
	Thompson Store/ Riverton C	Jakes Antiques	T20-57	Tukwila	4010	130 Street South	1928	655
	Thompson, O.C., House	Bitzig House	T10-19	Tukwila	4049	128 Street South	1914	655

214

Historic Properties Survey: City of Tukwila

Created in August, September & October, 1994
Glenn Weiss, Surveyor & Planning Intern

Report Date: 10/14/94

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
T00-00 Not Publicly Accessible 655 WA Arch. U U U	Archeological Sites WA Arch. Not Publicly Accessible	Shell Middens, Burial Grounds, Villages NA Not Publicly Accessible Tukwila 98168	See Washington State Office of Archeology for information on Native American Sites.
T00-01 Boeing 625 KC G9 NRA 8/19/94 A A	*ku-LAH-hahd Buerge 89, KC NA Sites 92. Rocks visible at low tide and water level	Northwind Fishweir Boeing Company 2800 112 Street South Tukwila 98168	Location of Northwind's Fishing Weir that established Northwind's village in the Duwamish Valley. Stormwind destroyed the weir and thereby banishing Northwind from the valley for most of the year.
T00-02 Foster 655 Tukwila Plaque None B A	*Foster Maple Tree 1865 Foster, Planted Keinartz 91 Existed in 1990.	Large Maple Tree City of Tukwila Northend Foster Golf Links Tukwila 98168	Maple tree planted by original Tukwila pioneer Joseph Foster next to his first cabin.
T00-03 Allentown 625 None None 8/24/94 C A	*Duwamish Church 1870 Keinartz 91 Renovated & remodeled in 1962. Classroom added and entrance enclosed. Stained glass windows in front added in 82.	Duwamish Community Presbyterian Church Duwamish United Presbyterian 11814 42 Ave South Tukwila 98168	One of the oldest churches in King County. May have been built in 1850s. Simple, one room church/school house style wood construction.
T00-04 Allentown 625 None None 8/24/94 C A	*Ray House 1882 Keinartz 91 Good condition in 1990 & 94. Danger of demolition.	Carrosino House Rinaldo Carrosino 11269 East Marginal Way South Tukwila	Built by pioneer Thomas Ray, it is one of the oldest remaining farmhouses in King County. The Carrossinos were part of the Italian farming immigrants.
T00-05 Allentown 625 KC 0490 None 8/25/94 C A	*Torre House 1890 KC Survey 78 Original in fair condition except to removal of front porch in 78. New front door, decorative shutters on front windows and falling porch roof.	Unknown Thomas Wales 3914 115 Street South Tukwila 98168	Built in pioneer style. Since 1920, inhabited by Italiam immigrants who settled in the Duwamish Valley and worked in truck farming.
T00-06 South Tukwila 685 None None B A	*Mess Pioneer Family Cementary 1900 Keinartz 91, Morgan 94 Not surveyed. Date is an unverified estimate.	Mess Cementary Tukwila Historical Society 19200? Frager Ave South Tukwila 98188	Poineer family cementary located behind demolished farmhouse.

Key to Categories Above (If field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives: WA State, King County Risk to Site: None, NRA, nrs3, Development & Owner Codes: Architecture & History	*Original Site Name Date of Construction Architect or Builder, if known References 1994 Condition of Site	1994 Site Name, if Known 1994 Owner, if Recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A: Important, B: Rare Building, C: Common, U: Unknown Architecture Codes: A: Special Style, B: Common, C: Minor Alteration of "A" or "B"

Historic Properties in the City of Tukwila

Prioritized Sites Report Date: January 25, 1995

Local Landmark

East of 51st Ave South

A future Tukwila landmarks program might recognize landmark status for the following structures pending further research into the precise scarcity and integrity of the buildings. Sites qualifying as local landmarks should be important to the history of Tukwila and retain their architectural integrity. In reference to common buildings, complete architectural integrity is usually essential. Buildings increase in historic importance with the scarcity of that building type during a given historic period. Any nomination for designation would include a list of other similar buildings remaining from the same period. (All buildings and sites in the two National categories above should be considered for local landmark status.)

Foster Maple Tree, 1865, Northwest corner of Foster Golf Course
Tree Planted by Foster on original homestead.
Mess Pioneer Family Cemetery, 1900, Family Cemetery, 19200 Frager Ave S.
Only remaining family cemetery in Tukwila
Henke House, 1918, Tukwila Leaders' House, 14222 58th Ave S.
Excellent craftsman style house of two important citizens
Regal House, 197?, Tukwila Leader's House (Not Located on Map)

Significant Buildings which may have Compromised Integrity

East of 51st Ave South

The following structures have had a significant role in Tukwila history, but their architectural integrity may have been compromised additions or renovations. Restoration of several buildings is possible.

Kassner House, 1904, 14406 59th Ave South
Nelsen, Fred, Farm, 1901, 7107 Grady Road S.
Large Dairy Barn and Farmhouse
Shoemaker House, 1906, Two Story House, 14243 58th Ave South
Home of Tukwila's founder, Joel Shoemaker
Tukwila Community Club Hall, 1923, Simple Wooden Meeting Hall, 14257 Interurban Ave S.
Tukwila Park, 1935, Conservation Core Park, 15300 65th Ave S.

Historic Properties Survey: City of Tukwila

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
T00-14 Old Tukwila 655 KC 0666 None 8/24/94 C A	*Kassner House 1904 KC Survey 85, Keinartz 91 Good Condition with minor alterations in 85. West 2nd story window became french doors with balcony by '94.	Unknown Helen Ives 14406 59 Ave South Tukwila 98168	One of the first families of Tukwila. Bernard Kassner served on the Tukwila City Council and his wife Mary is listed as a trustee on the Tukwila incorporation papers. Kassner owned a blacksmithing business in Renton.
T00-15 Old Tukwila 655 None None 8/24/94 D C	Doty House 1905 Keinartz 91 Shape and windows original. New front porch. Building coverred with board & batten, plywood porch and cross lath foundation skirt.	Unknown Ronald Leighton 14711 57 Ave South Tukwila 98168	According to Keinartz, the building built by Edwin and Emma Doty was considered the community's model "modern home" in 1906. Four square one-story, wooden stucture with high centrally peaked roof.
T00-16 Old Tukwila 655 SR 05/25/90 None 8/24/94 A A	*Nelsen House 1905 KC Survey 78, State Registry, Keinartz 91 Excellent but moved from original site.	Nelsen House Helen Nelsen 15643 West Valley Road South Tukwila 98168	Home of successful Dairy farmer James Nelsen in the Victorian farmhouse style.
T00-17 Allentown 625 None None 8/24/94 C A	*Allentown Acres Addition 1906 Keinartz 91 Roads, plats and house scale consistent with original plans. Plat includes cheap homes from each era including 1990's manufactured homes.	Allentown Acres Addition City of Tukwila 42-50 Ave S Between 122 & 124 Tukwila 98168	Part of platted subdivisions in Tukwila between 1902 & 1912 caused by rising Seattle land prices, the interurban train and better roads. Platted by Joseph & Flora Allen. Due to isolation, the subdivision is in original condition. Only lower Duwamish town still connected to river.
T00-18 Thorndyke 655 None None 8/18/94 B U	Botham House (temp) 1906 Assessor 94 Unaltered	Unknown Richard Botham 14702 51 Ave South Tukwila 98168	Very nice, one story, pyramid roof, wooden house.
T00-19 Foster 655 None None 8/18/94 B U	Henry House (temp) 1906 Assessor 94 Unaltered	Unknown Henry Joint Revocable Trust 14424 51 Ave South Tukwila 98168	One story, pyramid roof, wooden house.

Key to Categories Above (If field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives: WA State, King County Bult to Site, None, NRA ... Development & Owner Codes, Architecture & History	*Original Site Name Date of Construction Architect or Builder, if known References 1994 Condition of Site	1994 Site Name, if Known 1994 Owner, if Recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A: Important, B: Rare Building, C: Common, U: Unknown Architecture Codes. A: Special Style, B: Common, C: Minor Alteration of "A" or "B"

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
T00-07 Riverton 655 None None 8/15/94 B U	*Cavanaugh House (temp) 1901 Assessor 94 Unaltered	Cavanaugh House William Cavanaugh 4026 130 Street South Tukwila 98168	One story, pyramid roof, wooden house.
T00-08 Old Tukwila 655 None None 8/24/94 C A	*Nelson, Fred, Farm 1901 Kelnartz 91, Morgan 94 Deteriorating condition. House victorian detailing removed and cover with asphalt siding. Scheduled to be demolished and converted to Park & Ride.	Nelson Dairy Raymond Nielsen 7107 Grady Road South Tukwila 98168	One of early successful dairy farms. Fred Nelson was prominate in the Grange. He was a founder of Group Health and served in the state legislature. Fred Nelson Junior High is named after him in Renton. Other address could be 15031 Monster Road.
T00-09 Allentown 625 KC 0660 None 8/25/94 C C	Bigelow House 1902 KC Survey 85 Good Condition in '85 with two one story additions to the rear. Same condition with new decorative shutters in '94	McCarton House Kathleen McCarton 11728 40 Ave South Tukwila 98168	Part of Riverside Interurban Tracts in early 1900's. Lew Bigelow worked at the nearby Shingle Mill.
T00-10 Foster 655 KC 0442 None 8/24/94 F A	Clark House 1902 KC Survey 78, Kelnartz 91 Demolished in early 1980s. Enlarged in 1907, but unaltered through '78 survey.	**Demolished 80s** Unknown 13532 52 Ave South Tukwila 98168	Thomas and Nellie Clark were very active foster citizens as teachers and farmers. Thomas served as notary, constable, school director and justice of the peace for 30 years. The house is a good example of turn of the cqntury, rural architecture.
T00-11 Old Tukwila 655 KC 0490 None 8/24/94 F U	Doubleday House 1903 KC Survey 78, Kelnartz 91 Fair condition, front door moved in 1978. Presumed demolished as new building on site in '94.	**Demolished or Moved** Unknown 14951 57 Ave South Tukwila 98168	
T00-12 Allentown 625 None None 8/24/94 A U	*Haggard House (temp) 1903 Weiss '94 Beautifully, restored craftsman house.	Haggard House William Haggard 11532 40 Ave South Tukwila 98168	Extremely well constructed and restored craftsman style house. Two story, square plan with pyramid roof.
T00-13 Old Tukwila 655 KC 0672 None [illegible] B C	Light Residence 1903 KC Survey 85 Good Condition in 78. Addition added to south facade. In '94, building being restored.	Unknown City of Tukwila 14688 53 Ave (Macadam Rd) South Tukwila 98168	Part of South Seattle Land Company's Five Acre Tract in 1907. No information of original owner. Della Light owned the house in 1937.

Key to Categories Above (if field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives: WA State, King County [illegible]	*Original Site Name Date of Construction Architect or Builder, If known Development & Owner References 1994 Condition of Site	1994 Site Name, If Known 1994 Owner, If Recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A. Important, B. Rare Building, C. Common, U. Unknown Architecture Codes: A. Special Style, B. Common, C. [illegible]

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
T00-26 Allentown 625 None None 8/15/94 C A	*Merkle, Grandma, House 1906 Kelnartz 91 New siding and windows.	Kolstad House Bennie Kolstad 12244 42 Ave South Tukwila 98168	Ernst & Della Merkle were early homebuilder in the Allentown Acres subdivision. Della Merkle was an active citizen and known as Grandma Merkle for her home remedies. Detailed info. in Kelnartz, page 183. Assessor list shows date of 1926, rather than 1906. Also, 12250 next door is owned by a Baker, her decendents last name.
T00-27 Boeing 625 KC 0115 None 8/24/94 A A	*Boeing Company Building 105 1909 KC Survey 78, Kelnartz 91 Excellent, but moved from original site. New part of museum complex.	The Red Barn Museum of Flight 9404 East Marginal Way South Tukwila 98168	The historic seat of the beginings of the Boeing Airplane Company, an internationally important aircraft manufacturer. William Boeing purchased the building in 1910 and began to manfacture aicraft in 1916. The building was denied standing on the National Register of Historic Places.
T00-28 Riverton 655 None None 8/15/94 C B	Fackrell House (temp) 1909 Assessor 94 Replacement windows.	Unknown Curtis & Shelly Fackrell 13027 37 Ave South Tukwila 98168	Unusual design. Four square, two story, wooden house. Similar to Smith House in early Des Moines.
T00-29 Foster 655 None None 8/24/94 D A	Foster-Tukwila Presbyterian Church 1909 Kelnartz 91 Enlarged in 1930, Major alteration in 1942 and '69 Moved in 1969. Good original condition to '69 remodel.	Tukwila Presbyterian Church Presbyterian Church 14401 56 Ave South Tukwila 98168	Community church organization since 1909. Church moved to avoid demolition by the I-5 Construction. Interesting merging of 60's modernism and 30's simplicity. 60's gabled side entrance and remodeld aspe with orginal 30's sancutary.
T00-30 Riverton Heights 655 None None 8/15/94 B U	Fowler House (temp) 1909 Assessor 94 Unaltered	Fowler House Michael & Elizabeth Fowler 3517 130 Street South Tukwila 98168	One story, hipped roof, wooden, small house. Very nice.
T10-01 Riverton 655 KC 0682 None 8/25/94 C C	Johnson Residence 1910 KC Survey 85, Fair condition and unchanged between 1940 & 85. Same fair & unchanged condition in '94.	Johnson House Frank Johnson 13136 42 Ave South Tukwila 98168	Property is within Riverton Interurban Tracts developed after the construction of the Interurban Electronic trolleys. Wooden, front gable house.

Key to Categories Above (if field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives: WA State, King County [illegible]	*Original Site Name Date of Construction Architect or Builder, If known References 1994 Condition of Site	1994 Site Name, If Known 1994 Owner, If Recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A. Important, B. Rare Building, C. Common, U. Unknown Architecture Codes: A. Special Style, B. Common, C. Minor Alteration of "A" or "B".

214

Historic Properties Survey: City of Tukwila

4

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
T00-20 Allentown 625 None None [illegible] C C	**Jenson Dairy** 1906 Keinertz 91 Original shape existing in 1994 but with aluminum siding, metal windows and decorative shutters.	Basich House Tony Basich 11854 42 Ave South Tukwila 98168	Local business in early Allentown.
T00-21 Old Tukwila 655 KC 0491 None [illegible] D A	*__Shoemaker House__ 1906 Kc Survey 78, Keinertz 91 Porch removed and aluminum siding and windows added in 78. By 94, decorative metal shutters applied to all windows. Shape is original.	Malone House James & Deborah Malone 14243 58 Ave South Tukwila 98168	Joel Shoemaker was the first mayor of Tukwila and responsible for the selection of the town name. He is considered the founder of the city of Tukwila.
T00-22 Foster 655 None None [illegible] B U	**Smith House (temp)** 1906 Assessor 94 Unaltered	Smith House Curtis Smith 4226 139 Street South Tukwila 98168	Simple craftsman style. One story, side gable, wooden house.
T00-23 Foster 655 None None [illegible] B U	**Ferrell House (temp)** 1909 Assessor 94 Unaltered	Ferrell House Jack Ferrel 14025 44 Ave South Tukwila 98168	Simple, craftsman style. One story, side gable, wooden house.
T00-24 Riverton 655 None None [illegible] B U	**Kolsky House (temp)** 1906 Assessor 94 Unaltered	Kolsky House Everett Kolsky 13001 41 Ave South Tukwila 98168	One and one-half story, pyramid roof, wooden house.
T00-25 Riverton 655 None None [illegible] B B	*__Lincoln House__ 1906 Keinertz 91 Best preserved in 1991.	Lautenschlager House Lautenschlager 13243 40 Ave South Tukwila 98168	Home of Charles and Maude Lincoln is one of the best preserved examples of the country farmhouse style in the upper Duwamish Valley.

Key to Categories Above (if field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives: WA State, King County Built to Site: Name, HRA, org), Development & Owner	*Original Site Name Date of Construction Architect or Builder, if known References 1994 Condition of Site	1994 Site Name, If Known 1994 Owner, If Recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A: Important, B: Rare Building, C: Common, U: Unknown Architecture Codes: A: Special Style, B: Common,

214

Historic Properties Survey: City of Tukwila

7

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
T10-10 Thorndyke 655 None None [illegible] B U	**Steffan House (temp)** 1912 Assessor 94 Unaltered	Steffan House Elsa Steffan 15207 40 Ave South Tukwila 98198	Craftsman style, one story, front gable, wooden house.
T10-11 Riverton 655 None None [illegible] B U	**Harty House (temp)** 1913 Assessor 94 Unaltered	Harty House Lauren Harty 13119 42 Ave South Tukwila 98168	Craftsman style, one story, front gable, wooden house.
T10-12 Riverton 655 None None [illegible] B U	**Houle House (temp)** 1913 Assessor 94 Unaltered	Houle House Richard Houle 12910 East Marginal Way South Tukwila 98168	Craftsman Style. One story, side gable, wooden house with porch.
T10-13 Riverton 655 None None [illegible] B U	**Kaiser #1 House** 1913 Ben Kaiser, Bld. Keinertz 91 Existing in 1990.	Violin House Alma Violin 4128 130 Street South Tukwila 98168	Ben Kaiser was a respected carpenter/builder in the 1910s in the Seattle area. This is one of three Tukwila Kaiser houses. One story, front gable, wooden house in craftsman style.
T10-14 Riverton 655 None None [illegible] C C	**Kaiser #2 House** 1913 Ben Kaiser, Bld. Keinertz 91 Existing in 1994 in good condition with alterations of plate glass windows, decorative shutters and large car port to east.	Destry House Darrel & Christina Destry 4136 130 Street South Tukwila 98168	Ben Kaiser was a respected carpenter/builder in the 1910s in the Seattle area. This is one of three Tukwila Kaiser houses.
T10-15 Riverton 655 KC 0498 None [illegible] B C	**Nash House** 1913 KC Survey 78, Keinertz 91 Unaltered in 1978 and in fair condition in '94. Wheelchair ramp added to eastside.	Cripe House Rusty & Denise Cripe 4106 130 Street South Tukwila 98168	Classic Bungalow style and one of the largest houses built in Riverton during the Interurban Electronic Trolley days.
T10-16 Riverton 655 None None [illegible] B U	**Ness House (temp)** 1913 Assessor 94 Unaltered	Unknown Constance Ness 12607 East Marginal Way South Tukwila 98168	Craftsman style. One story, front gable, wooden house with porch.

Key to Categories Above (if field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives: WA State, King County Built to Site: Name, HRA, org), Development & Owner	*Original Site Name Date of Construction Architect or Builder, if known References 1994 Condition of Site	1994 Site Name, If Known 1994 Owner, If Recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A: Important, B: Rare Building, C: Common, U: Unknown Architecture Codes: A: Special Style, B: Common,

214

Historic Properties Survey: City of Tukwila

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
T10-02 Riverton Heights 655 KC 0497 None [illegible] B B	*Riverton Park United Methodist Church 1910 KC Survey 79, Reinartz 91 Excellent in 1978 except for removal of bell and new foundation. Small office building in backyard by '94.	Beth Ha Shofar Beth Ha Shofar 13001 37 Ave South Tukwila 98168	Architecturally, a significant example of a small rural religious structure in King County. Used between 1968 and 1994 by the Beth Ha Shofar Messianic Congregation.
T10-03 Foster 655 None None [illegible] B U	Whitworth House (temp) 1910 Assessor 94 Unaltered	Unknown Robert Whitworth 13749 45 Ave South Tukwila 98168	Simple craftsman style. One story, front gable, wooden house.
T10-04 Rainier View 625 None None [illegible] B U	Merriam House (temp) 1911 Assessor 94 Unaltered, but check historic photos.	Unknown John Merriam 4939 114 Street South Tukwila 98168	One and one-half story, side gable, wooden house with porch.
T10-05 Riverton 655 None None [illegible] B U	Moriwaki House (temp) 1911 Assessor 94 Unaltered	Moriwaki House C. Moriwaki & J. Dempere 4033 128 Street South Tukwila 98168	Craftsman style. One story, side gable, wooden house with porch.
T10-06 McMicken Heights 655 None None [illegible] B U	Caldwell House (temp) 1912 Assessor 94 Under-restoration in 1994	Caldwell House Roger & Tricia Caldwell 15650 42 Ave South Tukwila 98188	Pioneer house style, one story, front gable, wooden house with porch.
T10-07 Rainier View 625 None None [illegible] B U	Dukich House (temp) 1912 Assessor 94 Unaltered	Dukich House Milan & Janet Dukich 5001 114 Street South Tukwila 98168	One story, pyramid roof, wooden house.
T10-08 Foster 655 None None [illegible] B U	Geehan House (temp) 1912 Assessor 94 Unaltered (Porch may have been enclosed in 1920s)	Unknown Richard Geehan 14261 Macadam Road South Tukwila 98168	Craftsman style. One story, side gable, wooden house with enclosed porch.
T10-09 Foster 656 None None [illegible] C U	Poirier House (temp) 1912 Assessor 94 Asphalt Siding and in poor condition.	Unknown Konrad & Joanne Poirier 13745 44 Ave South Tukwila 98168	Very nice building design. Craftsman style, one story, front gable, wooden house.

Key to Categories Above (If field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives: WA State, King County Path to Site: Hang, NRA, etc. | Development & Owner Date of Windshield Survey | Codes: Architecture & History	*Original Site Name Date of Construction Architect or Builder, if known References 1994 Condition of Site [illegible]	1994 Site Name, if Known 1994 Owner, if Recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A: Important, B: Rare Building, C: Common, U: Unknown Architecture Codes: A: Special Style, B: Common, C: Minor Alteration of "A" or "B".

214

Historic Properties Survey: City of Tukwila

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
T10-24 Foster 655 None None [illegible] B U	Cantonwine House (temp) 1917 Assessor 94 Unaltered	Cantonwine House Cal Cantonwine 14454 51 Ave South Tukwila 98168	One story, side gable, wooden house.
T10-25 Allentown 625 None None [illegible] B U	Strayer House (temp) 1917 Assessor 94 Unaltered	Strayer House William Strayer 11630 42 Ave South Tukwila 98168	One story, front gable, wooden house.
T10-26 Riverton 655 None None [illegible] B U	Brown House (temp) 1918 Assessor 94 Unaltered	Brown House James Brown 3832 130 Street South Tukwila 98168	One story, side gable, wooden house.
T10-27 Riverton 655 None None [illegible] B U	Capellaro House (temp) 1918 Assessor 94 Unaltered, but may have newer porch.	Capellaro House Larry & Terri Capellaro 4061 128 Street South Tukwila 98168	One story, pyramid roof, wooden house.
T10-28 Allentown 655 None None [illegible] B U	Dahl House (temp) 1918 Assessor 94 Unaltered	Dahl House John Dahl 11714 40 Ave South Tukwila 98168	Craftsman style, one story, front gable, wooden house.
T10-29 Allentown 625 None None [illegible] B U	Dennis House (temp) 1918 Assessor 94 Unaltered	Unknown Duane Dennis 3606 113 Street South Tukwila 98168	One story, side gable, wooden house.
T10-30 Riverton Heights 655 None None [illegible] B B	*Fetters House (temp) 1918 Assessor 94 Unaltered	Unknown Terry Fetters 14019 37 Ave South Tukwila 98168	Brick, craftsman style bungalow. One story with front gable.
T10-31 Riverton 656 None None [illegible] B U	Gradzuk House (temp) 1918 Assessor 94 Unaltered	Gradzuk House Brian Gradzuk 13041 38 Ave South Tukwila 98168	One story, pyramid bugalow.

Key to Categories Above (If field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives: WA State, King County Path to Site: Hang, NRA, etc. | Development & Owner	*Original Site Name Date of Construction Architect or Builder, if known References 1994 Condition of Site	1994 Site Name, if Known 1994 Owner, if Recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A: Important, B: Rare Building, C: Common, U: Unknown Architecture Codes: A: Special Style, B: Common, [illegible]

214

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
T10-17 Foster 655 None None 8/18/94 B U	**Rupp-Santora House (temp)** 1913 Assessor 94 Unaltered	Unknown E. Rupp & E Santora 4647 140 Street South Tukwila 98168	Craftsman style. One story, front side gable, wooden house.
T10-18 Riverton 655 None None 8/18/94 B U	**Jorgensen House (temp)** 1914 Assessor 94 Unaltered	Jorgensen House Gail Jorgensen 13025 41 Ave South Tukwila 98168	One story, pyramid roof, wooden house.
T10-19 Riverton 655 None None 8/30/94 A A	***Thompson, O.C., House** 1914 Ben Kaiser, Bld. Kelnartz 91 Exterior restoration complete in 1994. Being restored in 1990.	Bitzig House Christian & Terry Bitzig 4049 128 Street South Tukwila 98168	O.C. Thompson was a successful community business man that owned the Thompson building at Riverton Crossroads. Ben Kaiser was a respected carpenter/builder in the 1910s in the Seattle area. This is one of three Tukwila Kaiser houses.
T10-20 Thorndyke 655 None None 8/18/94 B U	**Easter House (temp)** 1915 Assessor 94 Unaltered	Easter House John & Christl Easter 4620 150 Street South Tukwila 98168	Craftsman style. One story, front gable, wooden house.
T10-21 Allentown 626 KC 0629, WA Bridge Owner 8/23/94 F A	**Interurban Bridge** 1915 Pratt Truss Bridge KC Survey 95, Kelnartz 91. Moved and reconstructed to accommodate automobiles. Demolished in 1988	**Demolished 88** None 11500 East Marginal Way South Tukwila 98168	Interurban bridge for train, but rebuilt to automobile in 1934.
T10-22 Riverton Heights 655 None None 8/18/94 B U	**Lewis House (temp)** 1918 Assessor 94 Unaltered	Lewis House Craig Lewis 3403 132 Street South Tukwila 98168	Craftsman bungalow. One story, side gable, wooden house with porch and fieldstone chimney.
T10-23 Riverton Heights 655 None None 8/18/94 D U	**Boardwalk House (temp)** 1917 Assessor 94 Unaltered	Unknown Boardwalk Investments 13042 Pacific Highway South Tukwila 98168	Simple craftsman style. One story, front gable, wooden house.

Key to Categories Above (if field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives: WA State, King County Risk to Site: None, NRA (rpt), Development & Owner	*Original Site Name Date of Construction Architect or Builder, if known References 1994 Condition of Site	1994 Site Name, if known 1994 Owner, if Recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A Important, B Rare Building, C Common, U Unknown Architecture Codes: A Special Style, B Common,

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
T10-39 Foster 655 None None 8/18/94 B U	**Tomaso House (temp)** 1918 Assessor 94 Unaltered	Unknown Donna Tomaso 13751 41 Ave South Tukwila 98168	Craftsman style, one story, front gable, wooden house with porch.
T10-40 Riverton Heights 655 None None 8/18/94 B U	**Tremana House (temp)** 1918 Assessor 94 Unaltered & under restoration. Site has been subdivided for development.	Unknown Tremana, Inc. 14211 37 Ave South Tukwila 98168	Two story, farmhouse with porch.
T10-41 Riverton 655 None None 8/18/94 B U	**Babcock House (temp)** 1919 Assessor 94 Unaltered	Babcock House D. R. Babcock 4027 128 Street South Tukwila 98168	One story, front gable, stucco house.
T10-42 Riverton 655 None None 8/18/94 B U	**Bohall House (temp)** 1919 Assessor 94 Unaltered	Bohall House Janeice Bohall 12840 35 Ave South Tukwila 98168	Craftsman style, one and one-half story, side gable, wooden house.
T10-43 Allentown 655 KC 0493 None 8/23/94 B A	***Codiga House** 1919 KC Survey 78, Kelnartz 91 Excellent & Unaltered in 1978. Since in good unaltered condition in '94.	Codiga House James Codiga 12523 50 Place South Tukwila 98168	Part of the farming history of the Duwamish Valley. Archie Codiga was a swiss immigrant that eventually compiled 130 acre dairy farm.
T10-44 Riverton 665 None None A A	***Riverton Hospital** 1919 Frederick Nichols, Arch. Kelnartz 91 Currently used as low income housing.	Huls Apartments Richard & Paula Huls 13041 East Marginal Way South Tukwila 98168	Dr. Frederick Nichols was the only community doctor for over 40 years. He designed the building and his wife maintained it. Excellent design. Two story craftsman style house with fieldstone first floor.
T10-45 Thorndyke 655 None SA	**Thorndyke School** 1919 Kelnartz 91 Moved a little. Never found in 1994.	Thorndyke Community Club Unknown 15000? 42 Ave South Tukwila 98196	One of first schools in area and maintained for years as community facility by volunteers.

Key to Categories Above (if field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives: WA State, King County Risk to Site: None, NRA (rpt), Development & Owner	*Original Site Name Date of Construction Architect or Builder, if known References	1994 Site Name, if known 1994 Owner, if Recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A Important, B Rare Building, C Common, U Unknown Architecture Codes: A Special Style, B Common,

214

Historic Properties Survey: City of Tukwila

10

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
T10-33 Allentown 625 None None [illegible] B U	**Hellstrom House (temp)** 1918 Assessor 94 Unaltered	Unknown Hellstrom and Dillon 4208 115 Street South Tukwila 98168	Craftsman style. One story, side gable, wooden house.
T10-33 Riverton 655 None None [illegible] B U	**Liljestrand House (temp)** 1918 Assessor 94 Unaltered	Liljestrand House James & Diane Liljestrand 13111 42 Ave South Tukwila 98168	Craftsman style, one story, front gable, wooden house.
T10-34 Old Tukwila 655 KC 0486 None [illegible] B A	***Henke House** 1918 KC Survey 78, Keinartz 91 Unaltered bungalow in 1978 and '94. Small deck added to north facade.	Moore House Kurt & Karin Moore 14222 58 Ave South Tukwila 98168	Franz Henke was marshall/sheriff of Tukwila for twenty years. Tessie Henke was very involved in community affairs, especially around the Tukwila Community Club Hall.
T10-35 Riverton 655 None None [illegible] B U	**Lucero House (temp)** 1918 Assessor 94 Unaltered	Lucero House Edward Lucero 13219 East Marginal Way South Tukwila 98168	Craftsman style. One story, front gable, wooden house.
T10-36 Foster 655 None None [illegible] B U	**McCall House (temp)** 1918 Assessor 94 Unaltered	Unknown George McCall 13734 42 Ave South Tukwila 98168	Craftsman style, one story, side gable, wooden house.
T10-37 Rainier View 625 None None [illegible] B U	**McNicholas House (temp)** 1918 Assessor 94 Unaltered	McNicholas House Paul McNicholas 10342 Beacon Ave South Tukwila 98168	One story, side gable, wooden house.
T10-38 Allentown 625 None None [illegible] B U	**Miyao House (temp)** 1918 Assessor 94 Unaltered	Miyao House William Miyao 12054 42 Ave South Tukwila 98168	Craftsman style, two story, front gable, wooden house. Unusual house.

Key to Categories Above (if field is empty, the other fields move up in each column)

Historic Property Survey Number ... *Original Site Name ... History Codes: A: Important, B: Rare Building, C: Common, U: Unknown. Architecture Codes: A: Special Style, B: Common, C: Minor Alteration of "A" or "B".

214

Historic Properties Survey: City of Tukwila

13

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
T20-08 Riverton 655 None None [illegible] B U	**Gonzalez House (temp)** 1920 Assessor 94 Unaltered	Unknown Edward & Carolyn Gonzalez 13027 40 Ave South Tukwila 98168	One story, front gable, wooden house.
T20-09 Allentown 655 None None 8/24/94 F A	**Hale House** 1920 Keinartz 91 Unclear of existance in 1990. No building in area designated on Keinartz map. Date is an estimate.	Most Likely "Demolished" Unknown 125507 51 Place South? Tukwila 98168	Mrs. E.M. Hale was an African-American who moved to Allentown from the deep South. She was a mid-wife in the local community.
T20-10 Foster 655 None None [illegible] B U	**Hughes House (temp)** 1920 Assessor 94 Unaltered	Hughes House Cliff and Lea Hughes 13739 41 Ave South Tukwila 98168	Craftsman style, one story, front gable, wooden house.
T20-11 Allentown 625 None None [illegible] B U	**Jacobson House (temp)** 1920 Assessor 94 Unaltered	Jacobson House James Jacobson 12202 42 Ave South Tukwila 98168	Craftsman style, one story, side gable, wooden structure with porch.
T20-12 Riverton 655 None None [illegible] B U	**Judd House (temp)** 1920 Assessor 94 Unaltered	Judd House Terry House 4044 128 Street South Tukwila 98168	Craftsman style. One story, front gable, wooden house.
T20-13 Riverton 655 None None 8/24/94 U U	**Lacava House** 1920 Keinartz 91 Existed in 1990. Could not find address in 1994 and no changes in the immediate area. Small craftsman house at 13212 40 Ave South.	**Wrong Address** Unknown 13012 40 Ave South Tukwila 98168	Lacava was part of the wave of Italian immigrants and owned a shoe repair business in a building next door to his home.
T20-14 Foster 655 None None [illegible] B U	**Mechling House (temp)** 1920 Assessor 94 Unaltered	Mechling House Martin Mechling 14011 Macadam Road South Tukwila 98168	Craftsman style. One story, side gable, wooden house with porch.
T20-15 Riverton Heights 655 None None [illegible] B U	**Ristau House (temp)** 1920 Assessor 94 Unaltered, but in poor condition	Ristau House Evelyn Ristau 13642 Military Road South Tukwila 98168	One story, side gable, wooden house.

Key to Categories Above (if field is empty, the other fields move up in each column)

Historic Property Survey Number ... *Original Site Name ... History Codes: A: Important, B: Rare Building, C: Common, U: Unknown. Architecture Codes: A: Special Style, B: Common, C: Minor Alteration of "A" or "B".

Historic Properties Survey: City of Tukwila

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
T20-01 Allentown 625 KC 0869 Owner [illegible] B B	**Auto Cabins** 1920 KC Survey 86 Fair Condition. Two of four cabins removed in 1985. Cabins very deteriorated in '94.	Alva Pease Property Alva Pease Estate 11540 East Marginal Way South Tukwila 98168	Early motel constructed with service station (since demolished).
T20-02 Allentown 625 None None B A	**Baker's Kitchen** 1920 Kelnertz 91 Unclear if exists. Could be Gustafson Buildings (temp). Date is estimate	Unknown Unknown 116507 East Marginal Way South Tukwila 98168	George "Bearcat" Baker, son of the resturant's African-American owners, was the 1926 Northwest Heavyweight champion.
T20-03 Foster 655 None None 9/15/94 B U	**Bales House** 1920 Assessor 94 Unaltered	Bales House Floyd Bales 14100 42 Ave South Tukwila 98168	Simple craftsman style, one story, front-side gable, wooden house.
T20-04 Allentown 625 None None 9/15/94 B U	**Carlson House (temp)** 1920 Assessor 94 Unaltered	Unknown E.J. Carlson 3818 116 Street South Tukwila 98168	One story, side gable, wooden house. Very Small.
T20-05 Allentown 625 None None 9/15/94 B U	**Dillon House (temp)** 1920 Assessor 94 Unaltered	Unknown Hellstrom & Dillon 4210 115 Street South Tukwila 98168	Craftsman style. One story, front gable,wooden house.
T20-06 Allentown 625 None Owner 9/24/94 F A	**Fredericks Store** 1920 Kelnertz 91 1920 date unclear. In 1994, building used as apartment house with first floor continous shed addition on all sides. Stucco two story original.	Unknown Unknown 11602 42 Ave South Tukwila 98168	General store and important community dance hall in 1920's and 1930s.
T20-07 Foster 655 KC Files None 9/24/94 B U	**Fuller House** 1920 KC Survey 77, Good condition in '94	Painter House Leon Painter 13526 53 Ave South Tukwila 98168	Called the Frank Fuller House in undated King County Survey Record with no file number. No statement of significant in document.

Key to Categories Above (If field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives: WA State, King County Risk to Site: None, HRA, HRA, Development & Owner	*Original Site Name Date of Construction Architect or Builder, if known References 1994 Condition of Site	1994 Site Name, if Known 1994 Owner, if Recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A Important, B Rare Building, C Common, U Unknown Architecture Codes: A Special Style, B Common

Historic Properties Survey: City of Tukwila

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
T20-23 Riverton 655 None None 9/15/94 B U	**Patapoff House (temp)** 1921 Assessor 94 Unaltered	Patapoff House Wilma Patapoff 3703 128 Street South Tukwila 98168	Craftsman style. One story, side gable, wooden house with porch.
T20-24 Riverton 655 None None 9/15/94 B U	**Gonzalez Buildings (temp)** 1922 Assessor 94 3 of 5 buildings unaltered.	Unknown Edward & Carolyn Gonzalez 3827 130 Street South Tukwila 98168	One craftsman style, front gable, 1922. One side gable, 1924. One commercial flat roof building, 1934.
T20-25 Allentown 655 None None 9/15/94 F A	**Henderson House** 1922 Kelnertz 91 Existing in 1990. Could not find the address in '94 and not in the Assessors pre-1945 list.	Unknown 4815 124 Street South Tukwila 98168	Roy Henderson was a very active Allentown citizen and served as the first King County Fire Commissioner.
T20-26 Allentown 625 None None 9/15/94 B U	**Hildner House (temp)** 1922 Assessor 94 Unaltered	Hildner House Tamara Hildner 3901 117 Street South Tukwila 98168	Craftsman style. One story, side gable, wooden house.
T20-27 Riverton 655 None None 9/15/94 B U	**Hilmes House (temp)** 1922 Assessor 94 Unaltered	Unknown Linda Hilmes 3709 128 Street South Tukwila 98168	Craftsman bungalow style. One story, side gable, wooden house with porch.
T20-28 McMicken Heights 655 None None 9/15/94 B U	**Tompkins House (temp)** 1922 Assessor 94 Unaltered	Tompkins House James Tompkins 4439 160 Street South Tukwila 98188	Simple craftsman style. One story, front gable, wooden house.
T20-29 Thorndyke 655 None None 9/15/94 B U	**Reidl House (temp)** 1923 Assessor 94 Unaltered	Unknown Lance Reidl 4653 150 Street South Tukwila 98198	Simple craftsman style. One story, front gable, wooden house.
T20-30 Old Tukwila 655 KC 0489 None 9/24/94 C A	***Tukwila Community Club Hall** 1923 KC Survey 78, Kelnertz 91 Good Condition with Porch removed in 78. Roof in deterioration in '94.	Tukwila Community Club Ebenezer Church of God 14257 Interurban Ave South Tukwila 98198	Served for over 50 years as the focal point of Tukwila's community activities including church groups, teen groups, senior groups and dance groups among others.

Key to Categories Above (If field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives: WA State, King County Risk to Site: None, HRA, HRA, Development & Owner	*Original Site Name Date of Construction Architect or Builder, if known References	1994 Site Name, if Known 1994 Owner, if Recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A Important, B Rare Building, C Common, U Unknown Architecture Codes: A Special Style, B Common

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
T20-16 Riverton 655 None None [illegible] B U	**Riverton House #1 (temp)** 1920 Weiss 94 Unaltered. Date is approximate.	Unknown Unknown 13449 43 Ave South Tukwila 98168	Craftsman style, one story, side gable, wooden house.
T20-17 Thorndyke 655 None None [illegible] B U	**Roberson House (temp)** 1920 Assessor 94 Unaltered	Roberson House Melvin & Myrtle Roberson 14845 51 Ave South Tukwila 98168	Farmhouse style. One and one-half story, front-side gable, woodenhouse.
T20-18 Riverton 655 None None [illegible] B U	**Thompson House (temp)** 1920 Assessor 94 Unaltered	Unknown John Thompson & Carol Ward 4503 136 Street South Tukwila 98168	Craftsman style. One story, side gable, wooden house.
T20-19 Old Tukwila 655 NR 11/29/79 None [illegible] A A	* **Tukwila Grade School** 1920 National Registry, KC Survey 76, Kelnarts 91 Good Condition. Some decorative elements removed.	Tukwila City Hall City of Tukwila 14475 59 Ave South Tukwila 98168	Grade school between 1920 and 1930's. Tukwila City Hall between 1930's and 1978. Combination of simple classic and tudor styles reflects schoolhouse architecture of the 1920s.
T20-20 Riverton 655 None None [illegible] D A	**Verhoff Service Station** 1920 Kelnarts 91 Only tavern part remained. Service station demolished.	Vi's Tavern Lorraine Carosino 12539 East Marginal Way South Tukwila 98168	Important automobile service station in business area of Riverton.
T20-21 Foster 655 None None [illegible] B U	**Miller House (temp)** 1921 Assessor 94 Unaltered	Miller House Lucille Miller 4629 144 Street South Tukwila 98168	Simple craftsman style. One story, side gable, wooden house.
T20-22 Allentown 655 None None [illegible] B U	**Norris House (temp)** 1921 Assessor 94 Unaltered	Unknown James Norris 11609 39 Ave South Tukwila 98168	Craftsman style, stucco house.

Key to Categories Above [illegible]

Original Site Name

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
T20-38 Riverton Heights 655 None None [illegible] B U	**Bosshart House (temp)** 1925 Assessor 94 Unaltered	Bosshart House Mary Bosshart 14220 Military Road South Tukwila 98168	One story, side gable, wooden house.
T20-39 Riverton 655 None None [illegible] B U	**Cloutier House (temp)** 1925 Assessor 94 Unaltered	Cloutier House Charlotte Cloutier 4058 128 Street South Tukwila 98168	Simple craftsman style. One story, side gable, wooden house.
T20-40 Foster 655 None None B A	* **Foster Golf Course** 1925 Kelnarts 91, Morgan 94 1940s Club house in original condition	Foster Golf Links City of Tukwila 13900 Interurban Ave South Tukwila 98168	Built by George Eddy as a community golf course. Wood and painted brick two story club house.
T20-41 Foster 655 None None [illegible] B U	**Orn House (Temp)** 1925 Assessor 94 Unaltered	Orn House Eleanor Orn 13415 46 Ave South Tukwila 98168	Unusual farmhouse style in Tukwila. One and one-half story, front side gable wooden house with porch.
T20-42 Riverton 655 None None [illegible] B U	**Baney House (temp)** 1926 Assessor 94 Unaltered, but in poor condition	Baney House Roy Baney 4511 136 Street South Tukwila 98168	Simple craftsman style. One story, side gable, wooden house.
T20-43 Thorndyke 655 None None [illegible] B U	**Rochon House (temp)** 1926 Assessor 94 Unaltered	Rochon House D. Rochon & R. Haywe 5136 151 Street South Tukwila 98168	One story, side gable, wooden house.
T20-44 Allentown 655 None None [illegible] A A	* **Allentown Bridge** 1927 Kelnarts 91 Good Condition	Allentown Bridge City of Tukwila 12600 42 Ave South Tukwila 98168	One of few Pratt Truss bridges built before 1945 still in use in King County. Pratt Truss bridges were once very common in the northwest.
T20-45 Riverton 655 KC 0499 None [illegible] C A	* **Delta Masonic Lodge** 1927 KC Survey 76, Kelnarts 91 Good condition. Some windows bricked-in and many interior changes. Same in '94.	Delta Masonic Lodge Delta Masonic Lodge 13034 41 Ave South Tukwila 98168	Extremely active community organization (since 1909) and facility (since 1927) for Riverton and Tukwila.

Key to Categories Above (if field is empty, the other fields move up in each column)

Original Site Name

T20-48 Riverton 655 KC 0499 None [illegible] C A	*Delta Masonic Lodge 1927 KC Survey 79, Kelnarts 91 Good condition. Some windows bricked in and many interior changes. Same in '94.	Delta Masonic Lodge Delta Masonic Lodge 13034 41 Ave South Tukwila 98168	Extremely active community organization (since 1908) and locally (since 1927) for Riverton and Tukwila.

214

Historic Properties Survey: City of Tukwila 18

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
T20-31 Old Tukwila 655 KC 0667 None [illegible] A A	*Bergquist House 1924 KC Survey, Kelnarts 91 Original 1900 house, expanded and enlarged in 1924-26. Excellent condition with very minor alterations of metal stair railing.	Marks House Robert Marks 14465 58 Ave South Tukwila 98168	George Bergquist was Mayor between 1925-27. Very nice craftsman bungalow, side gable with porch.
T20-32 Allentown 655 None None [illegible] B U	Capellaro House (temp) 1924 Assessor 94 Unaltered	Unknown Wanda Capellaro 4603 124 Street South Tukwila 98168	One story, hipped roof, wooden house.
T20-32 Riverton 655 None None [illegible] B U	Guess House (temp) 1916 Assessor 94 Unaltered	Unknown James & Barbara Guess 13319 42 Ave South Tukwila 98168	Craftsman style, One story, side gable, wooden house.
T20-33 Allentown 655 None None [illegible] B U	Codiga House #2 (temp) 1924 Assessor 94 Unaltered	Unknown James Codiga 12523 50 Place South Tukwila 98168	One story, hipped roof, wooden building. Next door to main Codiga Farmhouse.
T20-34 Riverton Heights 655 None Owner [illegible] B U	Lehmbeck House (temp) 1924 Assessor 94 Unaltered in very poor condition	Lehmbeck House William Lehmbeck 13011 33 Ave South Tukwila 98168	One story, front gable, wooden house.
T20-35 McMicken Heights 655 None None [illegible] B U	Roland House (temp) 1924 Assessor 94 Unaltered	Roland House Joseph Roland 4633 160 Street South Tukwila 98168	Small craftsman style house.
T20-36 Allentown 625 None None [illegible] B U	Walker House (temp) 1924 Assessor 94 Unaltered	Walker House Frederick Walker 4208 124 Street South Tukwila 98168	Craftsman style. One story, side gable, wooden house.
T20-37 Allentown 625 None None [illegible] B U	Boardman House (temp) 1925 Assessor 94 Unaltered. Date is estimate.	Boardman House Thomas Boardman 11928 Interurban South Tukwila 98168	Craftsman Mission style house.

Key to Categories Above (If field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives: WA State, King County ...	*Original Site Name Date of Construction Architect or Builder, If known References	1994 Site Name, If Known 1994 Owner, If Recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A: Important, B: Rare Building, C: Common, U: Unknown

214

Historic Properties Survey: City of Tukwila 19

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
T20-53 Allentown 625 None None [illegible] B U	Desjardin House (temp) 1926 Assessor 94 Unaltered	Desjardin House Will and Cath. Desjardin 3826 116 Street South Tukwila 98168	Craftsman style house.
T20-54 Riverton Heights 655 None None [illegible] B U	Kirkland Building (temp) 1928 Assessor 94 Unaltered	Used Trucks and Equipment William Kirkland 13500 Pacific Highway South Tukwila 98168	One story, flat roof, commercial building.
T20-55 Rainier View 625 None None [illegible] C A	*Rainier View Community Club 1928 Assessor 94 New entrance and metal replacement windows.	Rainier View Community Club Rainier View Community Club 10915 51 Ave South Tukwila 98168	Simple, side gable wooden meeting hall building. Similar structure to Tukwila Community Club building on Interurban South and Northhill Community Club building on 3rd Ave South in Des Moines.
T20-56 Allentown 625 None None B U	Sundby 40th House 1928 Bernhard Sundby, Bld. Kelnarts 91 Could not find address in 1994.	"Wrong Address" Unknown 11605 40 Ave South Tukwila 98168	Bernhard Sundby was a Quarry resident since 1918. He was respected throughout Seattle as a fine carpenter and shipwright. This building was of his construction between 1920 & 1940.
T20-57 Riverton 655 KC 0662 None [illegible] B A	*Thompson Store/ Riverton Crossroads 1928 OC Thompson, Bld. KC Survey 65, Kelnarts 91 Only OC Thompson building (now Jake's Antiques) remains in good condition. Knapp motors partially destroyed and will collapse soon. Riverton Foods completely remodeled and lost character..	Jakes Antiques Jacob Sturgeon 4010 130 Street South Tukwila 98168	Business district for Riverton area that started around 1900 and grew until the 1930s. Area included Douglas Blacksmith Shop, Stutz's Mercantile, OC Thompson, Knapp's Garage and Gus's Shoe Repair. Thompson building in consistent uses of furniture selling and barbershop for 70 years. OC Thompson home in excellent condition on hill above.
T20-58 Thorndyke 655 None None [illegible] B U	Hingorani House (temp) 1929 Assessor 94 Unaltered	Unknown D. Hingorani & M. Patel 15608 47 Ave South Tukwila 98188	Nice house design.

Key to Categories Above (If field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives: WA State, King County Link to Site: None, HRA, ... Development & Owner	*Original Site Name Date of Construction Architect or Builder, If known References	1994 Site Name, If Known 1994 Owner, If Recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A: Important, B: Rare Building, C: Common, U: Unknown Architecture Codes: A: Special Style, B: Common, ...

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
T20-46 Allentown 625 KC 0823, WA Bridge None [illegible] A A	*Duwamish 99 Bridge 1927 Pratt Truss Bridge KC Survey 85, Reinartz 91 Excellent condition with repairs in 1971 & 81. Still in good use in '94.	Duwamish 99 Bridge City of Tukwila 11600 Pacific Highway South Tukwila 98168	One of few Pratt Truss bridges built before 1945 still in use in King County and only Parker variation "camel back" steel, riveted design in the region. Pratt Truss bridges were once very common in the northwest.
T20-47 Allentown 625 None None 9/15/94 B U	Gustofson Buildings (temp) 1927 Assessor 94 Unaltered	Unknown Theodore Gustofson 11640 East Marginal Way South Tukwila 98168	Three buildings all in stucco. Assesser's records how dates of 1927, 1931 and 1941. May have been motel or apartments. May be the "Baker's Kitchen." (See entry)
T20-48 Riverton Heights 656 None None 9/15/94 B U	Radley House (temp) 1927 Assessor 94 Unaltered	Radley House D.D.Radley 13347 34 Ave South Tukwila 98168	One story, side gable, wooden house.
T20-49 Riverton Heights 655 None None 9/15/94 B U	Steen House (temp) 1927 Assessor 94 Unaltered	Steen House Ruth Steen 14062 33 Ave South Tukwila 98168	Simple, craftsman house.
T20-50 Allentown 625 None None 8/24/94 C C	Sundby 119th House 1927 Barnhard Sundby, Bld. Keinartz 91 Original condition with new porch and deck extending to rivers edge to east.	Schulhamer House Robert Schulhamer 4037 119 Street South Tukwila 98168	Barnhard Sundby was a Quarry resident since 1918. He was respected through out Seattle as a fine carpenter and shipwright. This building was of his construction between 1920 & 1940.
T20-51 Allentown 625 None None 9/15/94 B U	Berkman House (temp) 1928 Assessor 94 Unaltered	Unknown Edward Berkman 11914 Interurban South Tukwila 98168	One story, front gable, wooden house.
T20-52 Allentown 655 KC 0661 None [illegible] C A	*Codiga Farm: Dairy Barn 1926 KC Survey 85, Reinartz 91 Lost a silo and cupola due to deterioration in 85. Lost second silo by 94. Deterioration very serious.	Codiga Farm City of Tukwila 12523 50 Place South Tukwila 98168	Part of the farming history of the Duwamish Valley. Archie Codiga was a swiss immigrant that eventually compiled 130 acre dairy farm.

Key to Categories Above (If field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives: WA State, King County Sub to Sta: None, HRA, ...	*Original Site Name Date of Construction Architect or Builder, if known References 1994 Condition of Site	1994 Site Name, if known 1994 Owner, if Recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A. Important, B. Rare Building, C. Common, U. Unknown Architecture Codes: A. Special Style, B. Common, C. Minor Alteration of "A" or "B".

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
T30-03 Allentown 625 None None 9/15/94 B U	Duncan House (temp) 1930 Assessor 94 Unaltered	Unknown Helen Duncan 11664 44 Ave South Tukwila 98168	One story, side gable, wooden house.
T30-04 Allentown 625 None None 9/15/94 B U	Gulla House (temp) 1930 Assessor 94 Unaltered, but poor condition.	Gulla House Juan Gulla 11659 44 Ave South Tukwila 98168	House.
T30-05 Riverton 655 None None 9/15/94 B U	Marleau Building (temp) 1930 Assessor 94 Unaltered	Unknown Joseph Marleau 12601 East Marginal Way South Tukwila 98168	Simple wooden, flat roof, commercial building.
T30-06 Allentown 625 None None 9/15/94 B U	Matson House (temp) 1930 Assessor 94 Unaltered	Matson House Jim Matson 12204 43 Ave South Tukwila 98188	One Story, front gable, wooden house.
T30-07 Allentown 625 None Owner 8/24/94 C A	*Miyao Greenhouse 1930 Keinartz 91 Frame is intact with missing glass. Blackberriess bushes have growth throughout in 1994. New windows & siding on house.	Miyao House Ume Miyao 11600 39 Ave South Tukwila 98168	Kaijro and Ume Miyao purchased the existing greenhouse in 1947 after returning from the internment camps. The Miyao family raised chrysanthemum, tulips, hyaciths & Easter lilies. Date of greenhouse unclear, 1930 is date of house. Also, Ume Miyao owns 1940 house to east at 1316 117th South.
T30-08 McMicken Heights 655 None None " C A	*Riverton Heights Presbyterian Church 1930 Keinartz 91 Large attached wing to back of orginal condition santuary.	Riverton Heights Presbyterian Riverton Heights Presbyterian 3728 160 Street South Tukwila 98188	Community religious facility since the 1930s. Nice detailed brick santuary from the 1930s. Assesser dates building at 1926.

Key to Categories Above (If field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives: WA State, King County Sub to Sta: None, HRA, ...	*Original Site Name Date of Construction Architect or Builder, if known References 1994 Condition of Site	1994 Site Name, if known 1994 Owner, if Recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A. Important, B. Rare Building, C. Common, U. Unknown Architecture Codes: A. Special Style, B. Common, C. Minor Alteration of "A" or "B".

214

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
T20-59 Foster 655 None None 8/18/94 B U	Johnson House (temp) 1929 Assessor 94 Unaltered	Johnson House James Johnson 14406 42 Ave South Tukwila 98168	One story, side gable, wooden house.
T20-60 Boeing 625 None None 8/18/94 B U	Josie House (temp) 1929 Assessor 94 Unaltered	Josie House Anna Josie 10035 East Marginal Way South Tukwila 98168	One story, front gable, wooden house.
T20-61 Thorndyke 655 None None 8/18/94 B U	Lee House (temp) 1929 Assessor 94 Unaltered	Unknown Robert M. Lee 4240 146 Street South Tukwila 98168	One story, side gable, wooden house.
T20-62 Allentown 626 None None 8/24/94 C C	*Monroe House 1929 Keinartz 91 Excellent condition in 1994 with picture and metal replacement windows.	Ritch House Lloyd & Doris Ritch 11616 42 Ave South Tukwila 98168	Stucco home of builder/carpenter Paul Monroe who constructed 100s of Seattle homes in the 1920s.
T20-63 Riverton Heights 655 None None 8/18/94 B B	*Northwest House (temp) 1929 Assessor 94 Unaltered	Unknown Northwest Development Trust 3730 142 Street South Tukwila 98168	One and one-half story, steep roof, front gable, shingled house. Very good design and unusual in Tukwila.
T30-01 Riverton 655 None None 8/18/94 B U	Davidson House (temp) 1930 Assessor 94 Unaltered	Davidson House (temp) B. Davidson & G. Evans 4020 128 Street South Tukwila 98168	One and one-half story, front-side gable, wooden house.
T30-02 Allentown 626 None None 8/18/94 B U	Dingle House (temp) 1930 Assessor 94 Unaltered	Dingle House Helen Dingle 4115 114 Street South Tukwila 98168	One story, side gable, wooden house.

Key to Categories Above (if field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives: WA State, King County Ref to Site: None, NRA ... Development & Owner	*Original Site Name Date of Construction Architect or Builder, if known References	1994 Site Name, if known 1994 Owner, if Recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A: Important, B: Rare Building, C: Common, U: Unknown Architecture Codes: A: Special Style, B: Common,

214

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
T30-17 Thorndyke 655 None None 8/18/94 B U	Barber House (temp) 1932 Assessor 94 Unaltered	Barber House Theo. & Eliz. Barber 4231 148 Street South Tukwila 98168	One story, front side gable, wooden house.
T30-18 McMicken Heights 655 None None 8/18/94 B U	Fokkema House (temp) 1932 Assessor 94 Unaltered	Fokkema House Peggy Fokkema 4440 160 Street South Tukwila 98188	Brick, steep roofed, 1930s house.
T30-19 Allentown 626 None None 8/18/94 B U	Looney House (temp) 1932 Assessor 94 Unaltered	Looney House Carrie Looney 12218 49 Ave South Tukwila 98168	One story, side gable, wooden house.
T30-20 Riverton 655 None None 8/18/94 B U	Stanley House (temp) 1932 Assessor 94 Unaltered	Stanley House William Stanley 13029 41 Ave South Tukwila 98168	One story, front gable, wooden house.
T30-21 Allentown 626 None None 8/18/94 B U	Tinsley House (temp) 1932 Assessor 94 Unaltered	Unknown Randy & Candace Tinsley 12219 49 Ave South Tukwila 98168	One story, hipped roof, wooden house.
T30-22 Riverton 655 None None 8/30/94 C A	*Christian Science Church 1933 Keinartz 91 Existing in 1994 in good condition. Only alternation is signage plywood on entrance porch.	Primera Iglesia Bautista Church Bautista Church 13045 42 Ave South Tukwila 98168	Built as Christain Science Church in 1933 and used by the Christian Scientists until 1958. Several Christian organizations have used the building and since 1984 Primera Iglesia Bautista.
T30-23 McMicken Heights 655 None None 8/18/94 B U	Codd House (temp) 1933 Assessor 94 Unaltered	Codd House Robert & Priscilla Codd 4240 158 Street South Tukwila 98168	House

Key to Categories Above (if field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives: WA State, King County Ref to Site: None, NRA ... Development & Owner	*Original Site Name Date of Construction Architect or Builder, if known References	1994 Site Name, if known 1994 Owner, if Recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A: Important, B: Rare Building, C: Common, U: Unknown Architecture Codes: A: Special Style, B: Common,

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
T30-09 Foster 655 None None 9/15/94 B U	**Trone House (temp)** 1930 Assessor 94 Unaltered	Trone House Larry Trone 14020 43 Ave South Tukwila 98168	One story, front side gable, wooden house.
T30-10 Thorndyke 655 None None 9/15/94 B U	**Zuvela House (temp)** 1930 Assessor 94 Unaltered	Zuvela House George Zuvela, Jr. 15205 51 Ave South Tukwila 98168	One story, side gable, wooden house.
T30-11 Allentown 625 None None 9/15/94 B U	**Barrett House (temp)** 1931 Assessor 94 Unaltered	Unknown Randy Barrett 12250 48 Ave South Tukwila 98168	One story, side gable, wooden house.
T30-12 Riverton Heights 655 None None 9/15/94 B U	**Baugart House (temp)** 1931 Assessor 94 Unaltered	Baumgart House Martha Baumgart 3241 135 Street South Tukwila 98168	Very nice one story, front-side gable, wooden house.
T30-13 Allentown 625 None None 9/15/94 B U	**Braucher House (temp)** 1931 Assessor 94 Unaltered	Braucher House Anne Braucher 12223 43 Ave South Tukwila 98168	One Story, front gable, wooden house.
T30-14 Allentown 625 None None 9/15/94 B U	**Driscoll House (temp)** 1931 Assessor 94 Unaltered	Driscoll House Dennis Driscoll 3944 113 Street South Tukwila 98168	House
T30-15 Riverton 655 None None 9/15/94 B U	**Goodale House (temp)** 1931 Assessor 94 Unaltered	Goodale House George Goodale 3726 128 Street South Tukwila 98168	One and one-half story, steep roof, brick 1930's house.
T30-16 Rainier View 625 None None 9/15/94 B U	**Anderson House (temp)** 1932 Assessor 94 Unaltered	Anderson House Lloyd Anderson 4906 114 Street South Tukwila 98168	One story, side gable, wooden house.

Key to Categories Above (if field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives: WA State, King County Refs to Site ... Development & Owner	*Original Site Name Date of Construction Architect or Builder, if known References 1994 Condition of Site	1994 Site Name, if known 1994 Owner, if Recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A: Important, B: Rare Building, C: Common, U: Unknown Architecture Codes: A: Special Style, B: Common, C: Minor Alteration of "A" or "B".

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
T30-31 Thorndyke 655 None None 9/15/94 B U	**McHugh House (temp)** 1934 Assessor 94 Unaltered	McHugh House William & Christina McHugh 15222 42 Ave South Tukwila 98168	Stucco, one story, front-side gable house.
T30-32 Allentown 625 None None 9/15/94 B U	**Moltane House(temp)** 1934 Assessor 94 Unaltered	Unknown Gary Moltane 12205 44 Ave South Tukwila 98168	One story, side gable, wooden house.
T30-33 Riverton Heights 656 None None 8/24/94 B B	***Southcity Motel Sign** 1934 Weiss 94 Excellent condition with two light boxes added.	Southcity Motel Leon Malefak 14242 Pacific Highway South Tukwila 98168	One of remaining three electrical signs from late 30,40 & 50 development along the Pacific Highway. Modern design of painted metal, light bulbs, neon and clock.
T30-34 Allentown 625 None None 8/25/94 C C	**Sundby Interurban House** 1934 Bernhard Sundby, Bld. Keinertz 91 Original, late 30's styles with replacement plate glass picture windows. Excellent condition.	Unknown Unknown 11918 Interurban South Tukwila 98168	Bernhard Sundby was a Quarry resident since 1918. He was respected through out Seattle as a fine carpenter and shipwright. This building was of his construction between 1920 & 1940.
T30-35 Riverton 655 None None 9/15/94 B U	**Walkley House (temp)** 1934 Assessor 94 Unaltered	Walkley House Paul and Linda Walkley 13035 40 Ave South Tukwila 98168	One story, front gable, wooden house.
T30-36 Riverton Heights 656 None None 9/15/94 B U	**Eberhardt House (temp)** 1935 Assessor 94 Unaltered	Eberhardt House Michael Eberhardt 12816 34 Ave South Tukwila 98168	One story, side gable, wooden house.
T30-37 McMicken Heights 655 None None 9/15/94 B U	**Nienaber House (temp)** 1935 Assessor 94 Unaltered	Unknown Duane Nienaber 16228 42 Ave South Tukwila 98168	One story, side gable, wooden house.
T30-38 Thorndyke 655 None None 9/15/94 B U	**Pearson House (temp)** 1935 Assessor 94 Unaltered	Pearson House Anna Pearson 4221 148 Street South Tukwila 98168	One story, front side gable, wooden house.

Key to Categories Above (if field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives: WA State, King County Refs to Site ... Development & Owner	*Original Site Name Date of Construction Architect or Builder, if known References 1994 Condition of Site	1994 Site Name, if known 1994 Owner, if Recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A: Important, B: Rare Building, C: Common, U: Unknown Architecture Codes: A: Special Style, B: Common, C: Minor Alteration of "A" or "B".

Historic Properties Survey: City of Tukwila

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
T30-24 Riverton Heights 655 None None 8/24/94 D A	**Little Church by the Side of the Road** 1933 Kelnertz 91 Orginal 1933 building demolished. 1960s sanctuary constructed and then remodeled in 80's.	Little Church... Fellowship of Christian Assemblies 14800? Pacific Highway South Tukwila 98168	Community church.
T30-25 Riverton Heights 655 None None [illegible] B U	**Lovell House (temp)** 1933 Assessor 94 Unaltered	Unknown Ben and Linda Lovell 3235 135 Street South Tukwila 98168	One story, side gable, wooden house.
T30-26 McMicken Heights 655 None None [illegible] B U	**Presbyterian House (temp)** 1933 Assessor 94 Unaltered	Unknown Riverton Heights Presbyterian 15820 Military Road South Tukwila 98168	Brick house.
T30-27 Riverton Heights 655 None None [illegible] B U	**Ruffino House (temp)** 1933 Assessor 94 Unaltered	Unknown Joseph Ruffino 14662 Pacific Highway South Tukwila 98168	One story, front gable, wooden house.
T30-28 Riverton Heights 655 None None [illegible] B U	**Bowen House (temp)** 1934 Assessor 94 Unaltered	Unknown Harry Bowen 13311 37 Ave South Tukwila 98168	One Story, front-side gable, wooden house.
T30-29 Riverton Heights 655 None None [illegible] B U	**Frymier House (temp)** 1934 Assessor 94 Unaltered	Frymier House Ronald Frymier 13650 Military Road South Tukwila 98168	One story, side gable, wooden house.
T30-30 Allentown 625 None None [illegible] B U	**Martin House (temp)** 1934 Assessor 94 Unaltered,but in very poor condition	Unknown Allison Martin 11662 44 Ave South Tukwila 98168	House

Key to Categories Above (if field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives WA State, King County [illegible]	*Original Site Name* Date of Construction Architect or Builder, if known References	1994 Site Name, if known 1994 Owner, if Recorded Street Address City and Zip Code	Short Statement of Significance History Codes. A: Important, B: Rare Building, C: Common, U: Unknown Architecture Codes A: Special Style B: Common

Historic Properties Survey: City of Tukwila

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
T30-47 Riverton Heights 655 None None [illegible] B U	**Ruja House (temp)** 1936 Assessor 94 Unaltered	Ruja House Nicolae Ruja 3115 135 Street South Tukwila 98168	One and one-half, front gable, wooden house.
T30-48 Thorndyke 655 None None [illegible] B U	**Simkus House (temp)** 1936 Assessor 94 Unaltered	Simkus House Karen Simkus 4320 150 Street South Tukwila 98168	One story, front side gable, wooden house.
T30-49 Thorndyke 655 None None [illegible] B U	**Swanberg Housé (temp)** 1936 Assessor 94 Unaltered	Swanberg House Phillip Swanberg 14809 51 Ave South Tukwila 98168	Two story, side gable, wooden house.
T30-50 Riverton Heights 655 None None [illegible] B U	**Tolland House (temp)** 1936 Assessor 94 Unaltered	Tolland House William Tolland 13636 Military Road South Tukwila 98168	One story, side gable, wooden house.
T30-51 Thorndyke 655 None None [illegible] B U	**Vanness House (temp)** 1936 Assessor 94 Unaltered	Vanness House Mary Louise Vanness 15210 42 Ave South Tukwila 98168	One story, front-side gable, wooden house.
T30-52 Thorndyke 655 None None [illegible] B U	**Eng House (temp)** 1937 Assessor 94 Unaltered	Eng House Marc, Ron & Melinda Eng 4836 150 Street South Tukwila 98168	One story, side gable, wooden house.
T30-53 Riverton Heights 655 None None [illegible] B U	**Fencl House (temp)** 1937 Assessor 94 Unaltered.	Fencl House Lori Fencl 12840 33 Place South Tukwila 98168	One story, front gable, wooden house.
T30-54 Riverton 655 None None [illegible] B U	**Hibbs House (temp)** 1937 Assessor 94 Unaltered	Hibbs House Phillip Hibbs 12633 37 Ave South Tukwila 98168	One story, wooden 1930's house with steep peaked central entrance gable.

Key to Categories Above (if field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives WA State, King County [illegible]	*Original Site Name* Date of Construction Architect or Builder, if known References	1994 Site Name, if known 1994 Owner, if Recorded Street Address City and Zip Code	Short Statement of Significance History Codes. A: Important, B: Rare Building, C: Common, U: Unknown Architecture Codes A: Special Style B: Common

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
T30-39 Riverton 655 None None 8/15/94 B U	**Riverton House #2 (temp)** 1935 Weiss 94 Unaltered. Date is approximate.	Unknown Unknown 13517 43 Ave South Tukwila 98168	One Story, side gable, wooden house.
T30-40 Thorndyke 655 None None 8/15/94 B U	**Simpson House (temp)** 1935 Assessor 94 Unaltered	Simpson House J. B. Simpson 4615 148 Street South Tukwila 98168	One story, front side gable, wooden house.
T30-41 Thorndyke 655 None None 8/15/94 B U	**Teays House (temp)** 1935 Assessor 94 Unaltered	Teays House James Teays 4633 150 Street South Tukwila 98168	One story, side gable, wooden house.
T30-42 Old Tukwila 655 None None 8/24/94 D A	***Tukwila Park** 1935 Kelnartz 91 Nothing but original trees and rock retaining walls exist. Round, picnic shelter rebuilt in 1968 in original style. Inconsistent play equipment and bathrooms added.	Tukwila Park City of Tukwila 153007 65 Ave South Tukwila 98168	WPA built several structures on the site, but not designated in King County Landmarks for WPA Fieldhouses. Originally, had four log cabins, a wood storage shed, an outhouse and a large cook house.
T30-43 Foster 655 None None 8/15/94 B U	**Atkins House (temp)** 1936 Assessor 94 Unaltered	Atkins House Anthony & Shawn Atkins 4321 140 Street South Tukwila 98168	One story, front side gable, wooden house.
T30-44 Riverton 655 None None 8/15/94 B U	**Dunne House (temp)** 1936 Assessor 94 Unaltered	Unknown Michael & Joan Dunne 12812 37 Ave South Tukwila 98168	One story, side gable, wooden house.
T30-45 Allentown 655 None None 8/15/94 B U	**Gomez House (temp)** 1936 Assessor 94 Unaltered	Unknown George Gomez 4518 124 Street South Tukwila 98168	One story, side gable, wooden house.
T30-46 Foster 655 None None 8/15/94 B U	**Lawrence House (temp)** 1936 Assessor 94 Unaltered	Lawrence House Steven & Eileen Lawrence 4461 144 Street South Tukwila 98168	One story, steep roof, front-side gable, wooden house.

Key to Categories Above (if field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives: WA State, King County Risk to Site: None, NRA (n/a), Development & Owner	*Original Site Name Date of Construction Architect or Builder, if known References	1994 Site Name, if known 1994 Owner, if Recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A: Important, B: Rare Building, C: Common, U: Unknown Architecture Codes: A: Special Style, B: Common

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
T30-62 Riverton Heights 655 None None 8/15/94 B U	**Bretthauer House (temp)** 1939 Assessor 94 Unaltered	Bretthauer House Lewis & Ann Bretthauer 14065 33 Ave South Tukwila 98168	Brick house.
T30-64 McMicken Heights 655 None None 8/15/94 B U	**Calibuso House (temp)** 1939 Assessor 94 Unaltered	Unknown Sandra Calibuso 15843 47 Ave South Tukwila 98168	House
T30-65 Foster 655 None None 8/15/94 B U	**Cohen House (temp)** 1936 Assessor 94 Unaltered	Unknown Maggie Cohen 13738 45 Ave South Tukwila 98168	One story, front-side gable, wooden house.
T30-66 Foster 655 None None 8/15/94 B U	**Dietsch House (temp)** 1939 Assessor 94 Unaltered	Unknown Michael Dietsch 4635 144 Street South Tukwila 98168	One story, Front side gable, wooden house.
T30-67 Allentown 625 None None 8/15/94 B U	**Glessner House (temp)** 1939 Assessor 94 Unaltered in poor condition	Glessner House George Glessner 12092 44 Place South Tukwila 98168	House.
T30-68 Thorndyke 655 None None 8/15/94 B U	**Grotem House (temp)** 1939 Assessor 94 Unaltered	Grotem House Randy & Janeen Grotem 4802 150 Street South Tukwila 98168	One story, front side gable, wooden house.
T30-69 Allentown 625 None None 8/15/94 B U	**Patterson House (temp)** 1939 Assessor 94 Unaltered	Patterson House Craig Patterson 3910 113 Street South Tukwila 98168	One story, side gable, wooden house with porch.
T30-70 Foster 655 None None 8/24/94 A A	***Showalter School** 1939 Kelnartz 91 Two story addition in 1946. Covered walkway added to south and detached one story classroom building to west.	Showalter Intermediate School South Central Sch. Dist. 4628 144 Street South Tukwila 98168	Unusual example of concrete deco-modern industrial/institutional building. Exterior in original condition.

Key to Categories Above (if field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives: WA State, King County Risk to Site: None, NRA (n/a), Development & Owner	*Original Site Name Date of Construction Architect or Builder, if known References 1994 Condition of Site	1994 Site Name, if known 1994 Owner, if Recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A: Important, B: Rare Building, C: Common, U: Unknown Architecture Codes: A: Special Style, B: Common

214

Historic Properties Survey: City of Tukwila

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
T30-55 Rainier View 625 None None 8/15/94 B U	**Jones House (temp)** 1937 Assessor 94 Unaltered	Jones House Edward Jones 10415 47 Ave South Tukwila 98168	One story, side gable, wooden house.
T30-56 Thorndyke 655 None None 8/15/94 B U	**Mauzeralle House (temp)** 1937 Assessor 94 Unaltered	Mauzereulle House Thomas & Donna Mauseraulle 4806 146 Street South Tukwila 98168	One story, side gable, wooden house.
T30-57 Foster 655 None None 8/15/94 B U	**Rupp House (temp)** 1937 Assessor 94 Unaltered	Rupp House Melvin Rupp 4611 140 Street South Tukwila 98168	One story, steep roofed, front side gable, wooden house.
T30-58 Allentown 625 KC 0669 Owner 8/25/94 C B	**Sampson House** 1937 KC Survey 85 Unaltered in 1985. Same condition in '94.	Alva Pease Property Alva Pease Estate 11540 East Marginal Way South Tukwila 98168	Two story wooden house associated with motel business.
T30-59 Foster 655 None None 8/15/94 B U	**Santora House (temp)** 1937 Assessor 94 Unaltered	Santora House James Santora 4617 140 Street South Tukwila 98168	One story, side gable, wooden house.
T30-60 Rainier View 625 None None 8/15/94 B U	**Jordon House (temp)** 1938 Assessor 94 Unaltered	Jordon House Doloress Jordon 10918 49 Ave South Tukwila 98168	House
T30-61 Foster 655 None None 8/15/94 B U	**King County House (temp)** 1938 Assessor 94 Unaltered	Unknown Housing Authority of King County 4029 144 Street South Tukwila 98168	One story, side gable, wooden house.

Key to Categories Above (If field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives: WA State, King County Built to Std: None, NRA, and Development & Owner	*Original Site Name Date of Construction Architect or Builder, if known References	1994 Site Name, if known 1994 Owner, if recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A: Important, B: Rare Building, C: Common, U: Unknown

214

Historic Properties Survey: City of Tukwila

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
T40-03 Allentown 625 None None 8/15/94 B U	**Buse House (temp)** 1940 Assessor 94 Unaltered	Unknown Daryl Buss 11611 44 Ave South Tukwila 98168	One story, "modest home", wooden house.
T40-04 Riverton Heights 655 None None 8/15/94 B U	**Chittenden House (temp)** 1940 Assessor 94 Unaltered	Chittenden House Norman Chittenden 13057 34 Ave South Tukwila 98168	One story, hipped roof, wooden house.
T40-05 Allentown 625 None None 8/15/94 B U	**Gustafson House #2 (temp)** 1940 Assessor 94 Unaltered	Unknown Theodore Gustafson 3015 117 Street South Tukwila 98168	One story, front side gable, wooden house.
T40-06 Thorndyke 655 None None 8/15/94 B U	**Holdaas House (temp)** 1940 Assessor 94 Unaltered	Holdaas House Timothy Holdaas 4432 148 Street South Tukwila 98168	One story, side gable, wooden house.
T40-07 Allentown 655 None None 8/15/94 B U	**Morrison House (temp)** 1940 Assessor 94 Unaltered	Morrison House Edna Morrison 12562 50 Place South Tukwila 98168	One story, side gable, wooden house.
T40-08 Riverton Heights 655 None None 8/15/94 B U	**Ramsey House (temp)** 1940 Assessor 94 Unaltered	Ramsey House Ralph & Georgia Ramsey 14040 33 Ave South Tukwila 98168	One story, front-side gable, wooden house.
T40-09 Foster 655 None None 8/15/94 B U	**Sherman House (temp)** 1940 Assessor 94 Unaltered	Sherman House Frederick Sherman 13715 42 Ave South Tukwila 98168	One story, hipped roof, wooden house.
T40-10 Allentown 655 None None 8/15/94 B U	**Yellam House (temp)** 1940 Assessor 94 Unaltered	Unknown Michael & Shirley Yellam 12801 50 Place South Tukwila 98168	One story, front gable, wooden house.

Key to Categories Above (If field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives: WA State, King County Built to Std: None, NRA, and Development & Owner	*Original Site Name Date of Construction Architect or Builder, if known References	1994 Site Name, if known 1994 Owner, if recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A: Important, B: Rare Building, C: Common, U: Unknown

Historic Properties Survey: City of Tukwila

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
T30-71 Riverton Heights 655 None None [illegible] B U	**Sims House (temp)** 1939 Assessor 94 Unaltered	Unknown Marvin & Barbara Sims 14118 37 Ave South Tukwila 98168	One room house.
T30-72 Riverton 655 None None [illegible] B U	**Strand House (temp)** 1939 Assessor 94 Unaltered	Strand House William Strand, Jr. 13235 East Marginal Way South Tukwila 98168	One story, side gable, wooden house.
T30-73 Riverton Heights 655 None None [illegible] B U	**Tom House (temp)** 1939 Assessor 94 Unaltered	Unknown Ping & Earline Tom 13228 37 Ave South Tukwila 98168	House is difficult to see.
T30-74 Riverton Heights 655 None None [illegible] A A	***Trudy's Tavern Sign** 1939 Keinartz 91 1940's electric sign in excellent condition with added light box. Building as been sided with plywood.	Unknown 150017 Pacific Highway South Tukwila	Named after locally known banjo entertainer Trudy Hawley who owned and operated the tavern between 1939 & 58. Sign was a landmark between Seattle and Tacoma as the only Highway 99 sign on 24 hours a day. Sign made of painted metal and electric light bulbs.
T30-75 Rainier View 625 None None [illegible] B U	**Wood House (temp)** 1939 Assessor 94 Unaltered	Unknown David & Charlotte Wood 4926 107 Street South Tukwila 98168	One story, side gable, wooden house.
T40-01 Allentown 625 None None [illegible] B U	**Baker House (temp)** 1940 Assessor 94 Unaltered	Baker House R.E. Baker 11662 42 Ave South Tukwila 98168	House. Relative of Della "Grandma" Merkle.
T40-02 Foster 655 None None [illegible] B U	**Brandeberry House (temp)** 1940 Assessor 94 Unaltered	Unknown Michael Brandeberry 13908 45 Ave South Tukwila 98168	One story, hipped roof, wooden house.

Key to Categories Above (if field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives: WA State, King County Built in Est. Hare, NRA area, Development & Owner	*Original Site Name Date of Construction Architect or Builder, if known References 1994 Condition of Site	1994 Site Name, if known 1994 Owner, if Recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A. Important, B. Rare Building, C. Common, U. Unknown Architecture Codes: A. Special Style, B. Common, C. Minor Alteration of "A" or "B"

Historic Properties Survey: City of Tukwila

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
T40-20 McMicken Heights 655 None None [illegible] B U	**Morgan House (temp)** 1941 Assessor 94 Unaltered	Unknown David & Nadine Morgan 16446 51 Ave South Tukwila 98188	House
T40-21 Riverton Heights 655 None None [illegible] B U	**O'Brien House (temp)** 1941 Assessor 94 Unaltered	Unknown Timothy O'Brien 3408 148 Street South Tukwila 98168	One story, Front side gable, wooden house.
T40-22 Riverton Heights 655 None None [illegible] B U	**Runge House (temp)** 1941 Assessor 94 Unaltered	Unknown Ida Runge 3742 141 Street South Tukwila 98168	One story, side gable, wooden house.
T40-23 Foster 655 None None [illegible] B U	**Barene House (temp)** 1942 Assessor 94 Unaltered	Barene House R. O. Barene 13423 48 Ave South Tukwila 98168	One story, front gable, wooden house.
T40-24 Riverton Heights 655 None None [illegible] A B	***Ben Carol Motel Sign** 1942 Weiss 94 Excellent condition 1950's electric sign. Motel remodeled	Ben Carol Motel Sign L & L Motels, Inc 14110 Pacific Highway South Tukwila 98168	One of remaining three electrical signs from late 30,40 & 50 development along the Pacific Highway. Sign made of painted metal, neon and light bulbs.
T40-25 Allentown 625 None None [illegible] B U	**Carlson House (temp)** 1942 Assessor 94 Unaltered	Unknown Jack Carlson 12248 43 Ave South Tukwila 98168	House.
T40-26 Thorndyke 655 None None [illegible] B U	**Conner House (temp)** 1942 Assessor 94 Unaltered	Conner House D. O. Conner 4616 146 Street South Tukwila 98168	One story, hipped roof, wooden house.
T40-27 Allentown 625 None None [illegible] B U	**Derosier House (temp)** 1942 Assessor 94 Unaltered	Unknown Wayne Derosier 12214 42 Ave South Tukwila 98168	One story, side gable, wooden house.

Key to Categories Above (if field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives: WA State, King County Built in Est. Hare, NRA area, Development & Owner	*Original Site Name Date of Construction Architect or Builder, if known References 1994 Condition of Site	1994 Site Name, if known 1994 Owner, if Recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A. Important, B. Rare Building, C. Common, U. Unknown Architecture Codes: A. Special Style, B. Common, C. Minor Alteration of "A" or "B"

214

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
T40-12 Riverton Heights 655 None None [illegible] B U	**Benson House (temp)** 1941 Assessor 94 Unaltered	Benson House Florine Benson 3720 142 Street South Tukwila 98168	One story, front side gable, wooden house.
T40-13 Allentown 625 None None [illegible] B U	**Coleman House (temp)** 1941 Assessor 94 Unaltered	Coleman House Robert Coleman 12223 48 Ave South Tukwila 98168	One story, hipped roof, wooden house.
T40-14 Riverton 655 None None [illegible] B U	**Coon House (temp)** 1941 Assessor 94 Unaltered	Coon House Kevin Coon 13018 41 Ave South Tukwila 98168	One story, front gable, wooden house.
T40-15 Rainier View 625 None None [illegible] B U	**Glenn House (temp)** 1941 Assessor 94 Unaltered	Glenn House Dorothy Glenn 10333 51 Ave South Tukwila 98168	One story, side gable, wooden house.
T40-16 Riverton 655 None None [illegible] B U	**Greeno House (temp)** 1941 Assessor 94 Unaltered	Unknown Edward & Dorothy Greeno 13722 44 Ave South Tukwila 98168	One story, front-side gable, wooden house.
T40-17 Foster 655 None None [illegible] B U	**Gustafson House (temp)** 1941 Assessor 94 Unaltered	Gustafson House Carl & Alice Gustafson 14650 46 Ave South Tukwila 98168	One story, front side gable, wooden house.
T40-18 Riverton Heights 655 None None [illegible] B U	**Johnson House (temp)** 1941 Assessor 94 Unaltered	Johnson House Ray Johnson III 13048 34 Ave South Tukwila 98168	One story, side gable, wooden house.
T40-19 Riverton Heights 655 None None [illegible] B U	**Mason House (temp)** 1941 Assessor 94 Unaltered	Mason House Perry Mason 13021 33 Ave South Tukwila 98168	One story, side gable, wooden house.

Key to Categories Above (if field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives: WA State, King County [illegible]	*Original Site Name Date of Construction Architect or Builder, if known References	1994 Site Name, if known 1994 Owner, if Recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A. Important, B. Rare Building, C. Common, U. Unknown Architecture Codes: A. Special Style B. Common

214

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
T40-36 Riverton Heights 655 None None [illegible] B U	**NW Realty House (temp)** 1942 Assessor 94 Unaltered	Unknown N.W. Realty 3224 135 Street South Tukwila 98168	One story, front gable, small house.
T40-37 Riverton Heights 655 None None [illegible] C B	**Newporter Motel** 1942 Assessor 94 Deco-modern style in stucco. Fair condition with new metal overhang on office structure.	Newporter Apartments Dawson Development 14848 Pacific Highway South Tukwila 98168	Last remaining 1940s motel on Pacific Highway South in original design condition.
T40-38 Riverton Heights 655 None None [illegible] B U	**O'Brien House (temp)** 1942 Assessor 94 Unaltered	Unknown Robert Obrien 3429 144 Street South Tukwila 98168	One story, side gable, wooden house.
T40-39 Allentown 655 None None [illegible] B U	**Ruggles House (temp)** 1942 Assessor 94 Unaltered	Ruggles House Autumn & Richard Ruggles 12404 50 Place South Tukwila 98168	One story, side gable, wooden house.
T40-40 Riverton 655 None None [illegible] B U	**Sarantos House (temp)** 1942 Assessor 94 Unaltered	Unknown Peter & Natalie Sarantos 3725 126 Street South Tukwila 98168	One story, side gable, wooden house.
T40-41 Allentown 625 None None [illegible] B U	**Steadman House (temp)** 1942 Assessor 94 Unaltered	Steadman House Jerry Steadman 3811 116 Street South Tukwila 98168	One story, front-side gable, wooden house.
T40-42 McMicken Heights 656 None None [illegible] B U	**Tractor House (temp)** 1942 Assessor 94 Unaltered	Unknown Seattle Tractor Parts, Inc 4438 160 Street South Tukwila 98188	House
T40-43 Allentown 625 None None [illegible] B U	**Wickstrom House (temp)** 1942 Assessor 94 Unaltered in poor condition.	Wickstrom House John Wickstrom 12022 44 Ave South Tukwila 98168	One story, side-gable, wooden house.

Key to Categories Above (if field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives: WA State, King County [illegible]	*Original Site Name Date of Construction Architect or Builder, if known References	1994 Site Name, if known 1994 Owner, if Recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A. Important, B. Rare Building, C. Common, U. Unknown Architecture Codes: A. Special Style B. Common

214

Historic Properties Survey: City of Tukwila

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
T40-20 Allentown 625 None None [illegible] B U	**Fox House (temp)** 1942 Assessor 94 Unaltered	Fox House Chris & Jacquel Fox 11863 44 Ave South Tukwila 98168	One story, side gable, wooden house.
T40-29 Allentown 625 None None [illegible] B U	**Gaviglio House (temp)** 1942 Assessor 94 Unaltered	Gaviglio House Albert Gaviglio 4006 114 Street South Tukwila 98168	House
T40-30 Allentown 625 None None [illegible] B U	**Greene House (temp)** 1942 Assessor 94 Unaltered	Unknown Lawrence Greene 11867 44 Ave South Tukwila 98168	One story, side gable, wooden house.
T40-31 Foster 655 None None [illegible] B U	**Ingersoll House (temp)** 1942 Assessor 94 Unaltered	Ingersoll House Jeff & Nancy Ingersoll 13455 48 Ave South Tukwila 98168	One story, side gable, wooden house.
T40-32 Allentown 655 None None [illegible] B U	**Larson House (temp)** 1942 Assessor 94 Unaltered	Larson House Thelma Larson 12524 51 Place South Tukwila 98168	One story, side gable, wooden house.
T40-33 Riverton Heights 655 None None [illegible] B U	**Methodist House #1 (temp)** 1942 Assessor 94 Unaltered	Unknown Riverton Methodist 13842 Military Road South Tukwila 98168	One story, hipped roof, wooden house.
T40-34 Riverton Heights 655 None None [illegible] B U	**Methodist House #2 (temp)** 1942 Assessor 94 Unaltered	Unknown Riverton Methodist 13848 Military Road South Tukwila 98168	One story, front gable, wooden house.
T40-35 Thorndyke 655 None None [illegible] B U	**Mosler House (temp)** 1942 Assessor 94 Unaltered	Mosler House Curtis & Penny Mosler 4411 146 Street South Tukwila 98168	One story, front gable, wooden house.

Key to Categories Above (if field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives: WA State, King County [illegible] Development & Owner	*Original Site Name Date of Construction Architect or Builder, if known References 1994 Condition of Site	1994 Site Name, if known 1994 Owner, if Recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A. Important, B. Rare Building, C. Common, U. Unknown Architecture Codes: A. Special Style, B. Common, [illegible]

214

Historic Properties Survey: City of Tukwila

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
T40-52 Allentown 625 None None [illegible] B U	**Case House (temp)** 1943 Assessor 94 Unaltered	Unknown Duane Case Jr. 12040 44 Ave South Tukwila 98168	One story, side gable, wooden house.
T40-53 Allentown 625 None None [illegible] B U	**Clark House (temp)** 1943 Assessor 94 Unaltered	Clark House John Clark 12217 46 Ave South Tukwila 98168	One story, front-side gable, wooden house.
T40-54 Thorndyke 655 None None [illegible] B U	**Davidson House (temp)** 1943 Assessor 94 Unaltered	Unknown Dennis Davidson 4058 148 Street South Tukwila 98168	One story, side gable, wooden house.
T40-55 Allentown 625 None None [illegible] B U	**Davis House (temp)** 1943 Assessor 94 Unaltered	Davis House Mark Davis 4705 122 Street South Tukwila 98168	One story, hipped roof, wooden house.
T40-56 Riverton Heights 655 None None [illegible] B U	**Dawe House (temp)** 1943 Assessor 94 Unaltered	Dawe House Beverly Dawe 2929 133 Street South Tukwila 98168	One story, "modest home", wooden house.
T40-57 Riverton Heights 655 None None [illegible] B U	**Hunter House (temp)** 1943 Assessor 94 Unaltered	Hunter House Daniel Hunter 13442 34 Ave South Tukwila 98168	One story, side gable, wooden house.
T40-58 McMicken Heights 655 None None [illegible] B U	**Iverson House (temp)** 1943 Assessor 94 Unaltered	Unknown Eugene Iverson 16226 51 Ave South Tukwila 98188	House

Key to Categories Above (if field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives: WA State, King County [illegible] Development & Owner	*Original Site Name Date of Construction Architect or Builder, if known References 1994 Condition of Site	1994 Site Name, if known 1994 Owner, if Recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A. Important, B. Rare Building, C. Common, U. Unknown Architecture Codes: A. Special Style, B. Common, [illegible]

214

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
T40-44 Allentown 625 None None 9/15/94 B U	**Anderson House (temp)** 1943 Assessor 94 Unaltered	Unknown Patricia Anderson 12054 44 Place South Tukwila 98168	One story, hipped roof, wooden house.
T40-45 Allentown 655 None None 9/15/94 B U	**Anderson House (temp)** 1943 Assessor 94 Unaltered	Unknown Donna Anderson 12533 51 Place South Tukwila 98168	One story, side gable, wooden house.
T40-46 Thorndyke 655 None None 9/15/94 B U	**Angle House (temp)** 1943 Assessor 94 Unaltered	Angle House J. L Angle 4831 146 Street South Tukwila 98168	One story, hipped roof, wooden house.
T40-47 McMicken Heights 655 None None 9/15/94 B U	**Axelson House (temp)** 1943 Assessor 94 Unaltered	Unknown David & Galene Axelson 4602 164 Street South Tukwila 98168	House
T40-48 Allentown 625 None None 9/15/94 B U	**Bailey House (temp)** 1943 Assessor 94 Unaltered	Unknown Edward Bailey 12227 44 Ave South Tukwila 98168	One story, side gable, wooden house.
T40-49 Allentown 625 None None 9/15/94 B U	**Barnes House (temp)** 1943 Assessor 94 Unaltered	Unknown Judith Barnes 12222 47 Ave South Tukwila 98168	One story, front-side-front gable, wooden house.
T40-50 Allentown 625 None None 9/15/94 B U	**Bohleen House (temp)** 1943 Assessor 94 Unaltered, but for sale in 1994.	Unknown Melvin Bohleen 12218 46 Ave South Tukwila 98168	One story, front gable, wooden house.
T40-51 Allentown 625 None None 9/15/94 B U	**Burkey House (temp)** 1943 Assessor 94 Unaltered	Purkey House Rexton Burkey 3928 113 Street South Tukwila 98168	One story, front gable, wooden house.

Key to Categories Above (if field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives: WA State, King County Built to Site: None, HRA, etc.), Development & Owner	*Original Site Name Date of Construction Architect or Builder, if known References	1994 Site Name, if known 1994 Owner, if Recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A: Important, B: Rare Building, C: Common, U: Unknown Architecture Codes: A: Special Style, B: Common

214

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
T40-66 Allentown 625 None None 9/15/94 B U	**Reed House (temp)** 1943 Assessor 94 Unaltered	Reed House Shirley Reed 12202 44 Ave South Tukwila 98168	One story, side gable, wooden house.
T40-67 Allentown 655 None None 9/15/94 B U	**Serifica House (temp)** 1943 Assessor 94 Unaltered	Serifica House Felipe Serifica 12542 50 Place South Tukwila 98168	One story, hipped roof, wooden house.
T40-68 Riverton Heights 655 None None 9/15/94 B U	**Vasilieff House (temp)** 1943 Assessor 94 Unaltered	Vasilieff House Andrew Vasilieff 13504 Military Road South Tukwila 98168	One story, front gable, wooden house.
T40-69 Foster 655 None None 9/15/94 B U	**Anderson House (temp)** 1944 Assessor 94 Unaltered	Anderson House Steven & Jeri Anderson 13703 42 Ave South Tukwila 98168	One story, front-side gable, wooden building.
T40-70 Thorndyke 655 None None 9/15/94 B U	**Jenson House (temp)** 1944 Assessor 94 Unaltered	Jenson House Martin Jenson 14647 42 Ave South Tukwila 98168	One story, front-side gable, wooden house.
T40-71 Thorndyke 655 None None 9/15/94 B U	**Pollinger House (temp)** 1944 Assessor 94 Unaltered	Unknown Johann Pollinger 14910 51 Ave South Tukwila 98168	One story, side gable, wooden house.
T40-72 Allentown 625 None None 9/15/94 B U	**Primacio House (temp)** 1944 Assessor 94 Unaltered, but in poor condition.	Unknown Pius Primacio 12048 44 Place South Tukwila 98168	House.

Key to Categories Above (if field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives: WA State, King County Built to Site: None, HRA, etc.), Development & Owner	*Original Site Name Date of Construction Architect or Builder, if known References	1994 Site Name, if known 1994 Owner, if Recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A: Important, B: Rare Building, C: Common, U: Unknown Architecture Codes: A: Special Style, B: Common

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
T40-59 Boeing 625 None NRA 8/19/94 B U	*Jorgensen Forge 1943 Assessor 94 Unaltered	Jorgenson Forge Jorgensen Forge Company 8531 East Marginal Way South Tukwila 98168	Large scale, metal clad buildings. Jorgensen processes steel.
T40-60 McMicken Heights 655 None None 8/19/94 B U	Knaus House (temp) 1943 Assessor 94 Unaltered	Knaus House Mary Knaus 16445 51 Ave South Tukwila 98168	House.
T40-61 Allentown 625 None None 8/19/94 B U	Mathias House (temp) 1943 Assessor 94 Unaltered	Mathias House Robert Mathias 12056 44 Ave South -Tukwila 98168	One story, side gable, wooden house.
T40-62 Allentown 625 None None 8/19/94 B U	Merkle House (temp) 1943 Assessor 94 Unaltered	Merkel House Lydia Merkle 4602 122 Street South Tukwila 98168	One story, front gable, wooden house. Relative of Della "Grandma"Merkle.
T40-63 Allentown 625 None None 8/19/94 B U	Nealy House (temp) 1943 Assessor 94 Unaltered	Nealy House Clifford Nealy 4408 122 Street South Tukwila 98168	One story, side gable, stucco house
T40-64 Allentown 625 None None 8/19/94 B U	Nistor House (temp) 1943 Assessor 94 Unaltered, but in poor condition	Nistor House Ioan Nistor 12253 44 Ave South Tukwila 98168	House
T40-65 Allentown 655 None None 8/19/94 B U	Pearce House (temp) 1943 Assessor 94 Unaltered	Unknown Stephen Pearce 4627 125 Street South Tukwila 98168	One story, flat roof, wooden structure.

Key to Categories Above (If field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives: WA State, King County Link to Site Name, NRA only, Development & Owner	*Original Site Name Date of Construction Architect or Builder, if known References	1994 Site Name, if known 1994 Owner, if Recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A. Important, B. Rare Building, C. Common, U. Unknown Architecture Codes: A. Special Style, B. Common,

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
T99-01 Old Tukwila 655 None None B U	Elliott House (temp) Morgan 94	Unknown Tukwila	Unusual, two story, white, cubic form house. Anne Elliott rented the house in the past.
T99-02 Old Tukwila 655 None None U A	Regal House Morgan 94, Reinartz '91 Not surveyed.	Unknown Unknown 56 Ave South? Tukwila 98168	Home of Rudolf & Marcella Regal. Rudy was a founder of the Tukwila Historical Society, City Council member and school board members.
T99-03 Old Tukwila 655 None None	Walkup House Reinartz 91 Not found in 1994.	Mayor Walkup House Unknown 15001? 65 Ave South Tukwila 98168	Two Walkup Mayors: John R. 1928-32 and John Powell 1933-46. Both important in stabilizing Tukwila as a city.
T99-04 Riverton Heights 655 None ?	Riverton Heights Post Office Morgan 94 Not Surveyed.	Unknown Unknown 3500? 150 Street South Tukwila 98168	Old U.S. Post Office in Riverton Heights.

Key to Categories Above (If field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives: WA State, King County Link to Site Name, NRA only, Development & Owner	*Original Site Name Date of Construction Architect or Builder, if known References 1994 Condition of Site	1994 Site Name, if known 1994 Owner, if Recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A. Important, B. Rare Building, C. Common, U. Unknown Architecture Codes: A. Special Style, B. Common, C. Minor Alteration of "A" or "B"

Historic Properties Survey: City of Tukwila

Location/Code	Historic Information & '94 Integrity	Current Information	Significance
T40-73 Riverton Heights 655 None None 8/13/94 B A	*Subdivision '44, Casade View 1944 Macry, Bld. Assessor 94 Of the 169 houses, 42 are in original condition, 104 have minor changes, 21 have major changes and 3 have been completely remodeled.	Casade View Homes 169 Homeowners 13503 37 Ave South Tukwila 98168	WWII Defense Industry housing for workers in the Duwamish Boeing Factories. The 169 houses have three plans with roof and facade changes to make about 14 models. All are one story wooden houses with an interior chimney and one picture window.
T50-01 Riverton 655 None Owner 8/23/94 A A	*Southgate Elementary School 1950 Ralph Burkhard, Arch. Steinbrueck 83 Fair condition. Some interior changes with dropped ceilings. Cafeteria may be addition or altered. New community center planned.	Tukwila Community Center South Central Sch. Dist. 4101 131 Street South Tukwila	Designed by prominate Normandy Park architect, Ralph Burkhard. School was included in top 100 Seattle area buildings tour for 1953 National American Institute of Architects' convention. Classic simple forms connected by glass cooridors. His finest work, Foster High School, was demolished in 1990.
T50-02 Foster 655 None None 8/23/94 A A	*Foster High School Stadium 1952 Steinbrueck 83 Unaltered condition except possibly for press box.	Werner Neudorf Memorial Field South Central School District 4242 144 Street South Tukwila 98168	Remaining structure from 1952 award winning school design. The stadium seating is a cantilevered roof over hillside seats.
T50-03 Foster 655 None Owner 8/30/94 F A	Foster Senior High School 1952 Ralph Burkhard, Arch. Steinbrueck 83 Demolished in 1990 for new school.	"Demolished" South Central School District 4242 144 Street South Tukwila 98168	Designed by prominate architect, Ralph Burkhard. School was included in top 100 Seattle area buildings tour for 1953 National American Institute of Architects' convention. In 1952, won First Place in the Competition for Better School Design sponsored by the American Association of School Administration.
T50-04 Foster 655 None None 8/24/94 C A	Foster Library 1959 Keinartz 91 Existing in 1994 in original condition. Library to be replaced in 1996.	Foster Library King County Library 4205 142 Street South Tukwila 98168	First built Library building in Tukwila. Undistinguished modern design.
T60-01 Foster 655 None None 8/24/94 B A	St. Thomas Catholic Church 1963 Keinartz 91 Good, original condition on exterior.	St. Thomas Church St. Thomas Church 4415 140 Street South Tukwila 98168	Community church organization since 1912. Forced to build new church with demolition of 1912 building in the construction of I-5. Built with typical light weight, brick and window walls. Strips of colored glass in sanctuary walls.

Key to Categories Above (If field is empty, the other fields move up in each column)

Historic Property Survey Number Neighborhood Thomas Map Page Number Other Historic Archives: WA State, King County	*Original Site Name Date of Construction Architect or Builder, if known References	1994 Site Name, if known 1994 Owner, if Recorded Street Address City and Zip Code	Short Statement of Significance History Codes: A: Important, B: Rare Building, C: Common, U: Unknown

Impact of Aircraft Noise Levels on CTBS Test Scores in Highline School District

Renny Greenmun
June 1995

Description and Method

The purpose of this study was to investigate whether aircraft LDN levels had an effect on CTBS test scores. Student data was collected from Highline School District offices for grades two through seven. Included in the data was information regarding each student's home area school, school actually attending, gender, history of schools attended in the district and participation in the free and reduced lunch program. In addition, based on the student's school history, the number of years in the district was computed for each student. Students were assigned to two LDN categories based on their home school and school actually attended.

To compensate for variance in student test scores occurring as a result of gender and socio-economic differences, each student's gender and participation in the free and reduced lunch program was used as control variables in all analyses. Both correlational and analysis of variance statistical techniques controlling for these variables were employed, with separate analyses conducted for each grade level. Specifically, both residence and school LDN levels were studied as sources of possible impact on CTBS test scores in Reading, Language and Math.

Results

The analysis of variance results yielded a number of significant outcomes at all grade levels. The attached table summarizes these results. In general, the results proved to be somewhat complex with significant interactions occurring consistently between residence and school LDN levels. Neither school LDN or residence LDN were consistently identified by themselves as significant at all grade levels for all tests. However, the two LDN levels in combination were frequently significant and as noted above, their interaction at different levels was, for the most part, significant at most grades and test scores. Some interactions were not calculated because not all LDN levels were represented for both residence and school.

Partial correlation results did not show the same levels of significance as did the analysis of variance results. This is likely a statistical consequence in that Pearson correlations only include linear components in the analysis and the most significant outcomes of the analysis of variance were interaction effects which are curvilinear in nature.

214

Conclusions

It seems clear that school and residence noise levels are having an impact on test scores for most of the grades studied. However, since the interaction of residence and school LDN levels were frequently more significant than either residence or school LDN by itself, it is likely that other variables that are related to area LDN levels, but not included in the study, are also playing a significant role. Further efforts to identify and analyze these unknown variables are certainly needed.

Grades three through six appear more affected by both the residence and school LDN levels than were grades two or seven. Part of the lack of significance for grade seven may be a consequence of fewer schools and thereby more missing school LDN levels for these students. Fewer significant results for grade two may be accounted for in part by less reliable test measurement for students at the lower grade levels and a fewer number of years exposure to the higher LDN levels.

214

Analysis of Variance Significance Summary for Highline School District Noise Impact Study

Grade	Language Main	Language Interaction	Reading Main	Reading Interaction	Math Main	Math Interaction
2	Comb.	NC	Res.	NC	NS	NC
3	Comb.	S	Sch.	S	Comb.	S
4	Res & Sch	NC	Res & Sch	NC	Res & Sch	S
5	Res & Sch	S	Res & Sch	S	Res.	S
6	Res & Sch	S.	Res & Sch	NS	Res & Sch	NS
7	Sch	S	Comb.	S	Res.	NS

Legend:

Comb.=Residence LDN combined with School LDN is significant
Res.=Residence LDN is significant
Sch.=School LDN is significant
NC=Not Calculated
S=Significant interaction effect
NS=Not Significant

214

ENVIROMETRICS INC
4803 Fremont Avenue North Seattle, Washington 98103-6527
(206) 633-4456 FAX (206) 633-4835

Review of Draft Environmental Impact Statement for Sea-Tac Master Plan Update Development Actions (4/95)

Findings

The air quality analyses presented in the draft Environmental Impact Statement contain sufficient deficiencies in procedure and presentation that they cannot be relied on by a responsible official in making decisions regarding this project. The project as presented in this draft Environmental Impact Statement appears to be not in conformity with the State Implementation Plan for air quality.

Summary

The *Draft Environmental Impact Statement for the Proposed Master Plan Update Development Actions at Seattle-Tacoma International Airport* sections related to air quality have been reviewed for completeness and accuracy. The study as presented appears not to have been conducted in a manner consistent with accepted guidelines and procedures and appears to contain inaccuracies. The results of the analyses indicate that some of the proposed alternative actions will result in conditions which do not conform to an approved State Implementation Plan for air quality (absent mitigation for which no committment is made by the project sponsors). Under these circumstances, these alternatives are not eligible for federal assistance under Section 176(c)(1) of the federal Clean Air Act.

The draft EIS relies on the Federal Aviation Administration's Emissions and Dispersion Modeling System (EDMS) to model airport activities and through traffic on roadways adjacent to the airport for the criteria pollutants and to develop an emissions inventory. The Environmental Protection Agency's (EPA) CAL3QHC model is relied on to model traffic through two critical intersections for carbon monoxide. The EDMS was further relied on to provide estimates of the risks associated with emissions of air toxics. CALINE3 was used to model construction truck traffic. Emissions from construction activity were not modeled.

The EDMS is an appropriate model for approximating the annual average air quality impacts of aircraft and motor vehicle traffic on and around Sea-Tac airport. However, without special adjustments the model cannot effectively estimate peak hour conditions and does not include the effects of idling motor vehicles. As utilized, the model does not adequately characterize 24-hour or shorter air quality conditions and may not adequately characterize annual air quality conditions. The manner in which the receptor locations were chosen for the "refined" analysis means the analysis provides no assurance that the annual NO_x ambient air quality standard will not be exceeded by any of the proposed alternatives and suggests that it may be.

The traffic volummes used in the two intersections modeled with CAL3QHC are for the afternoon peak traffic hour not the terminal peak hour traffic which occurs in the morning and noon hours. Several intersections

214

ENVIROMETRICS INC.

4803 Fremont Avenue North Seattle, Washington 98103-6527
(206) 633-4456 FAX (206) 633-4835

Review of the Air Quality Sections in the Draft Environmental Impact Statement for Sea-Tac Master Plan Update Development Actions (4/95)

Prepared for

Airport Communities Coalition
21630 Eleventh Avenue South
Des Moines, WA 98198-6398

June 21, 1995

214

(i) cause or contribute to any new violation of any standard in any area;
(ii) increase the frequency or severity of any existing violation of any standard in any area; or
(iii) delay timely attainment of any standard or any required interim emission reductions or other milestones in any area."

The Washington Clean Air Act (RCW 70.94.037) contains language which has a similar effect on state agencies, metropolitan planning organizations and local governments.

Aircraft Activity and Through Traffic

The EDMS Version 944 model used in this report is the most recent version in the series of EDMS models. The model is designed to estimate receptor pollutant concentrations from aircraft exhaust emitted during idle, taxi, liftoff, arrival, departure, and touch and go. Additional sources typically found at or near airports such as parking lots, roadways, storage tanks and power plants can be added to the model. The draft EIS includes both the major and minor pollutant sources on and adjacent to Sea-Tac. No significant pollutant sources appear to be missing from the modeling.

EDMS estimates the emissions at any given hour by multiplying a "maximum" operating activity by modifier factors for the month, the day of the week, and the hour. Thus every Thursday in June at 2:00 p.m. will have the same predicted activity, as will every Monday in December at 8:00 a.m. The same modifier value applies to every Thursday, every day of the year, and a common modifier value applies to every 10:00 a.m. time slot, every day of the year. While this provides a certain level of variation with respect to the annual changes in weather patterns, it does not fully represent peak travel times. Historically, the peak months are August and July. The peak days, however, occur during the fall and winter holidays, Thanksgiving and Christmas, which have also been periods of adverse weather for air quality.

Although the procedure does fail to represent the actual hourly operations, the annual operations are only slightly underestimated by the annual sum of the hourly operations calculated from the factors. These factors were developed from 1994 actual operations and are stated to have been used for EDMS model runs for the years 2000, 2010, and 2020, as well as existing conditions. Thus the assumption has been made that as traffic grows at Sea-Tac there will be no relative magnitude shifts in the temporal distribution of activity. That is, the assumption is made that the peaks will not be higher relative to the annual average. The actual factors used for hourly variations are, in several cases, counter-intuitive and inconsistent.

Screening analysis

The EDMS modeling for the draft EIS was conducted in two steps, screening and refinded modeling, which is the standard approach. However, in this case the screening runs were used to determine the receptor locations of possible exceedances of the air quality standards. Normally, a screening model is applied to determine if any exceedances might occur. If the screen fails then a more refined analysis is done. This involves establishing a finer grain network within the neighborhood(s) of the maxima located by the screening model runs. In the draft EIS studies, instead, the precise locations identified in the screening model runs were used without any additional receptors being added.

ENVIROMETRICS INC.

214

which may also be important were not modeled. The receptors used in the modeling were placed far from the edge of the roadway.

The air toxics modeling has demonstrated an increase in formaldehyde in excess of target levels and may exceed the acceptable risk for approval of a project.

The CALINE3 modeling of routes to be used by the haul trucks may underestimate the expected concentrations of carbon monoxide (CO) and fine particulate matter (PM_{10}). Peak hour haul truck traffic was not used and receptors were placed far from the edge of the roadway. Although the project is expected to take 2.5 years to complete and diesel trucks are significant sources of NO_x, this criteria pollutant was not modeled.

The on-site fugitive dust emissions during construction were not modeled. A screening level calculation performed for this review indicated violations of the 24-hour and annual ambient air standards for PM_{10}. In a worst case scenario these exceedances extended over 50 kilometers from the construction site. An estimation of project and annual exhaust emissions from the on-site construction equipment was not made.

Introduction

The draft Environmental Impact Statement for the Proposed Master Plan Update Development Actions at Seattle-Tacoma International Airport provides information on air quality impacts in Chapter IV, Section 7, Human Health, subsection (2) Air Quality; Chapter IV, Section 9, Air Quality; Chapter IV, Section 23, Construction Impacts, subsection (E), Air Quality; and Appendix D, Air Quality. The traffic-based air quality analyses rely on material presented in Chapter IV, Section 15, Surface Transportation. Proposed mitigation measures are described in Chapter V, Section 2, Mitigation Measures, subsection (4), Air Quality. These materials were reviewed for this report.

The computer input and output files for the EDMS screening and refined analyses, CALINE3 and MOBILE5A/PART5 haul truck analyses, and the external referenced reports (e.g., the Midway air toxics study) have not been reviewed.

Air quality modeling for documents issued under the National Environmental Policy Act and the Washington Environmental Policy Act (and the guidelines adopted pursuant to those laws) should be consistent with the *Guidelines for Air Quality Modeling* (40 CFR 51, App. W). These guidelines spell out, for example, the procedures for moving from screening to refined modeling and the selection of receptor locations. More detailed guidelines for the modeling of traffic-related air pollutants is provided by a separate EPA *Guideline for Modeling Carbon Monoxide from Roadway Intersections (EPA-454/R-92-005)*. Additional guidance is provided by the *User's Guide to CAL3QHC Version 2.0 (EPA-454/R-92-006)*.

Section 176(c)(1) of the federal Clean Air Act provides that "No department, . . of the Federal Government shall . . . support in any way or provide financial assistance for, . . any activity which does not conform to an implementation plan . . . approved . . . under section 110." Further it defines conformity to include "such activities [that would]

ENVIROMETRICS INC.

214

The fundamental problem with using results from the screening analysis to define receptors for the refined analysis is the difference in meteorology. The meteorology at Sea-Tac, such as during the 1 pm rush hour, does not resemble the screening model meteorology. The typical 1 pm wind is from the south and southwest at 4 to 22 knots. A secondary wind blows from the north at 4 to 17 knots. The moderately stable class E atmosphere does not occur at this time of day. One receptor is placed in the path of the prevailing wind but it is not certain whether actual plume touchdown occurs anywhere near that location under real weather conditions. It is almost certain that the point of maximum annual average will not be at this location.

Ninety-nine roadway links were included in the model. This is useful for modeling the effect of through traffic, not subject to idling at intersections. However, the highest CO concentrations will be found at the end of long lines of idling vehicles found at roadway intersections and parking exit areas. The EDMS will not estimate the emissions from these activities and thus the maximum CO concentrations from traffic cannot be obtained from this model.

The modeling results at the inappropriate receptor locations are sufficiently close to the annual NO_2 standard that values higher than the standard could be reasonably expected to be found with fine grain modeling. At the locations around the projected new parking garages the concentrations may be greater with the proposed alternatives than with the do nothing alternative.

Intersection Analysis

Maximum CO concentrations from traffic are estimated from models that include the effects of vehicles idling at intersections, awaiting a light signal change or an opening to turn or cross. The EPA model, CAL3QHC has built in to it an ability to calculate the queue length when sufficient parameters are provided for signalized intersections. Variants of the CAL3QHC model are available for non-signalized intersections.

The version of CAL3QHC currently recommended for use is version 2, which was released in 1992. It appears that the older version of CAL3QHC released in 1990 was used in preparing this study.

In preparing the model input files, the guidelines for locating receptors around intersections were not strictly followed. It is normal practice to locate receptors 3 to 4 meters from the traveled roadway, unless there are obstructions to access by the public such a fence, roadway, thick groundcover, or a structure. In the case of long approaches, additional receptors should be located at 25 and 50 meters back from the intersection.

In this study, receptor distances from the edge of the traveled roadway at the intersection of International Boulevard and 188th Street range from 10 to 15 meters from the edge of the roadway. Similarly, at the intersection of International Boulevard and 170th Street, receptors were placed far from the edge of the traveled roadway. Receptor 12 was placed inside a building, which is clearly inappropriate unless an air intake vent is being modeled.

Long queues of idling vehicles form at these intersections. The CAL3QHC model estimates queue lengths for the year 2000 at International Boulevard and 188th Street of between 70 and 153 meters long. Similar long

ENVIROMETRICS INC.

It does not necessarily follow that the location of the maximum receptor found in the screening model will be the same as in the refined model. The screening model, as used in the draft EIS study, was used to find the receptor with the estimated highest concentrations under a single meteorological condition for one hour. In the refined modeling runs, five years of hourly meteorological conditions were modeled. The point at which plume touchdown occurs will most certainly be different in each of those hours from that found in the screening analysis.

The receptors chosen for the screening analysis were appropriate for a screening study of that type, but additional receptors should have been used when annual, hourly meteorological data were utilized. It would have been desirable to follow standard practice and run annual, hourly data against the coarse grain receptor locations of the screening analysis grid, followed by a fine grained study of the areas where concentrations are projected to the near or above the ambient air quality standards. Also, public health concerns regarding airport pollutants would have been better served if additional receptors had been placed at sensitive receptors such as nearby schools, hospitals, childcare centers, and nursing homes.

The meteorological condition selected was appropriate for an initial screening analysis. Pollutants released at or near the surface will create maximum surface level concentrations under the given stable conditions (1 meter per second wind, E stability class). However, this is not true for pollutants released several meters above ground level. Elevated emission sources under stable conditions will have minimum impact on surface receptors. Results from screening analysis at D stability with moderate winds would probably result in different locations reporting a maximum concentration.

The results from the screening model indicate violations of the annual NO_2 standard in the future years 2010 and 2020 for all alternatives at two receptors without the addition of background NO_2. Two other receptors exceed the standard with the addition of background and two more are within the error margin of the analysis. This clearly requires refined analysis or mitigation.

The EDMS also provides computations of the total emissions from all of the identified sources. In the draft EIS these are compared to the emissions inventory prepared by the Puget Sound Air Pollution Control Agency for the state implementation plan. While some reductions in emissions will result from improvements in departure delay and aircraft emission characteristics, it would be misleading to imply that the real gains in 1994 are as substantial as the tables suggest since much of the difference is due to different assumptions and calculation procedures and not to real changes on the ground.

Refined analysis

The receptor grid used in the refined dispersion analysis is minimal. If standard procedures had been followed a coarse grid similar to the 200 receptor grid used in the screening analysis would have been utilized, followed by a second run with fewer receptors but more and more-closely spaced receptors in the vicinity of higher concentrations. Additional receptors should have been placed at sensitive receptors such as at schools and hospitals. This would have allowed isopleths depicting the estimated pollutant concentrations to be then drawn about the airport for each alternative. This would be useful to identify how the NO_x plume from departing aircraft changes with the addition of the third runway on the west side of the airport.

a reasonable guess at the procedures suggests the maximum risk will be greater than one in one hundred thousand.

The draft EIS reports that the conversion from the values reported by EDMS to estimated formaldehyde concentrations assumes formaldehyde is 1.8% of the estimated total unburned hydrocarbons. Various speciation profiles exist for engines, which vary widely in their estimate of the amount of each toxic organic chemical emitted. The California Air Resources Board speciation profiles, for example, report 6% formaldehyde from light duty, catalyst-equipped vehicles, 3% formaldehyde from non-catalyst equipped vehicles, and 10% aldehydes (total to C8) from jet engines. The draft EIS does not justify this important choice of variable value. Further, because the value may be significantly different for turbines and for internal combustion engines, it may be necessary to run EDMS for each set of sources separately in conducting the risk assessment analysis.

Off-site Construction Activity

The impact of exhaust from haul trucks traveling along the three probable routes was estimated with the PART5 and MOBILE5A emission factor models and CALINE3 line source model. Since anticipated adverse impacts are due to the traffic movement and not intersection delay, the use of CALINE3 is appropriate. However it is not demonstrated in the draft EIS that there will not be any intersections significantly impacted by haul truck traffic. Since the haul truck traffic is assumed to continue through the afternoon rush hour, it would be more reasonable to assume that there will be substantial impacts at intersections given the substantial numbers of trucks involved.

The criteria pollutants from diesel powered engines of concern are particulate matter (PM_{10}) and nitrogen oxides (NO_x). Diesel powered vehicles emit much less CO per vehicle mile than the average gasoline powered passenger vehicle. Typically, CO concentrations from diesel vehicles are not an issue. In this draft EIS, only CO and PM_{10} were modeled.

Additional fugitive dust can result when material from the haul trucks is allowed to fall off the wheels or body onto the traveled roadway. This dust is then reentrained to the atmosphere by the tires of vehicles traveling over the roadway. This was not included in the emission inventory used.

The receptors were located 60 feet (18 meters) from the traveled lane. As discussed above, this is unusually far from the roadway. As can be seen in exhibits D-9, D-10 and D-11 many of the receptors were placed behind residential homes. Receptors for locating the maximum CO concentration are normally located about 3 meters or a little more from the edge of the traveled roadway where the public has access for the hours under consideration. Thus, the pollutant concentrations given in Table D-20 significantly underestimate the levels that people living, walking, playing, etc. adjacent to the roadway will experience.

The number of haul trucks per hour used in the modeling appears to be an hourly average rather than the peak hour. Also, other construction equipment such as cement trucks and trucks with rebar were not included. Additional traffic analysis suggests the number of haul truck trips per hour needed to meet the 2.5 year plan

214

queues are estimated for all other years at both modeled intersections. Additional receptors should have been placed along the sides and near the ends of these long queues.

It is normal practice when preparing an EIS to model sensitive receptors. Any sensitive receptors such as schools, hospitals, day care facilities, nursing homes, hospitals, and historic preservation sites should be identified and project impact evaluated. Apparently, no effort was made to locate or analyze sensitive receptors.

In addition to the intersections at International Boulevard and 107th and 188th, the draft EIS identifies two other intersections or freeway ramp junctions that will be significantly impacted by the proposed alternatives and will be at a level of congestion that would require modeling. Other intersections near the proposed new parking structures and lots should also be reviewed to see if they meet the criteria for modeling. These intersections should be modeled if there are any adjacent locations where a member of the public might be exposed to elevated pollutant levels.

The traffic data used in the intersection modeling was for the afternoon peak rush hour. No information was presented on the expected hourly traffic pattern of employees or passengers. Information given on parking usage suggests that the peaks associated with the development alternatives will not be at the same time as the afternoon peak hour. It would be important to determine if adverse air quality conditions may be associated with either the employee/passenger peaks or some hour of their increased travel which overlaps a portion of the afternoon peak traffic time. The impacts during this (these) time period(s) should also be modeled.

The draft EIS identifies two mitigation measures related to the two modeled intersections, several additional activities which are already mandated by law, and several other measures which are not described in detail and which may or may not be useful. The draft EIS describes "duel (sic) northbound left-turn lanes" and a "free-flowing right turn lane" as mitigation at South 170th Street, but makes no commitment to implementation of the modification. For both intersections, the reduction in employee parking at the Doug Fox lot is suggested as an effective mitigation measure. Again no committment is made to any implementation. Additonally, there is no analysis made of the impacts that will then occur at the intersection where the employee parking is to be relocated.

Air Toxics

Inadequate information is presented in either the draft EIS or Appendix D to properly evaluate what actually was done in carrying out the risk assessment analysis. However the data presented in the draft EIS shows an increase in the incidence of cancer associated with formaldehyde emissions at levels in excess of the Washington Dept. of Ecology (DOE) target levels. Above these levels, the DOE requires additional study to further clarify the expected risk. If the risk cannot be shown to be less than one in one hundred thousand, then DOE can issue an approval for the project only after the applicant has met several conditions and only with special review and public proceedings.

It is not possible, from the way the data are presented in the draft EIS, to determine the estimated risk at the receptors (n.b., which we have already described as likely not to be the points of maximum impact). However

214

may be double the numbers given. Any additional truck traffic will increase the estimated CO and PM_{10} concentrations.

The fill phase of the project is expected to take 2.5 years to complete. Given the length of time of the haul truck operation it would be reasonable to estimate the annual NO_x concentrations. The impact of the haul trucks may be significant since the NO_x emission factor from a heavy duty diesel powered vehicle is approximately 8 times greater than that for a light duty gasoline powered vehicle.

Normally, in environmental impact studies, special attention is given to sensitive receptors. The DEIS does not mention if any of the haul trucks are expected to pass near schools, hospitals or nursing homes.

On-site Construction Activity

The study estimates unmitigated fugitive dust from the construction activity itself to range from 55,970 to 69,840 to tons of fugitive dust per year. With mitigation, an 80% reduction of fugitive dust is assumed. An 80% reduction with proper mitigation is reasonable however, this would still indicate that a minimum release of 11,194 tons of fugitive dust per year.

To learn if this activity should have been modeled for the draft EIS we carried out a first level screening analysis with the EPA-approved dispersion model SCREEN2 for the worse case and best case emissions. For convenience, it was assumed that all the fugitive dust would come from an area source 590 feet on a side (SCREEN2 only considers square area sources).

When stable atmospheric conditions (F stability), light winds and unmitigated fugitive dust from the construction site are assumed the modeling projects violations of the 24-hour ambient air quality standard for particulate matter, from the edge of the construction site out to and beyond 50 kilometers from the site. At a distance of 1 kilometer from the site, the model reports a staggering annual average particulate matter concentration of 11,864 $\mu g/m^3$. The annual average air quality standard for PM_{10} is $50 \mu g/m^3$.

Under the best conditions described in the draft EIS, 80% mitigation, and with an unstable atmosphere (B stability) and moderate winds (5 meters per second, 11 mph), the modeling predicts exceedances of the 24-hour and annual standards for PM_{10} at distances between 400 and 800 meters of the site. At 1 kilometer from the site, the estimated 24-hour concentration of PM_{10} is 218 $\mu g/m^3$. This compares to the 24-hour standard of 150 $\mu g/m^3$. This indicates the need for either a more refined modeling analysis or much more stringent control of fugitive dust.

Although the Sea-Tac area is attainment for PM_{10}, there are nearby non-attainment areas. This would include the Duwamish area in south Seattle and the Kent area. Consideration should be made as to what effect the construction will have on these non-attainment areas.

Exhaust emissions from the use of on-site heavy duty construction equipment such as dozers, scrappers, rollers, cement pump-trucks, dump-trucks, and diesel generators were not included in the analysis.

ENVIROMETRICS INC.

CONTENTS

214

KATO & WARREN INCORPORATED
2001 Western Avenue
555 Market Place One
Seattle, Washington 98121

Tel: 206/448-4200
Fax: 206/728-5608

Draft Environmental Impact Statement for

Proposed Master Plan Update Development Actions

at Seattle-Tacoma International Airport

Compendium of Comments Reviewing and Analyzing

Construction, Surface Transportation,

Water Quality and Wetlands/Wildlife Impacts

Prepared For:

Airport Communities Coalition

June, 1995

214

Nowhere do they say they are adopting the Master Plan Update—a SEPA action item.

Nowhere do they provide any analytical detail on declared components of the master plan (e.g. terminal expansion, runway extension) or unspoken components of the master plan (e.g. utility, transportation, parking, drainage, etc.). The bulk of the document focuses on 3rd runway. Do they expect that with this document they will have NEPA/SEPA clearance to develop all projects listed in the alternatives? Without including other components of a master plan, how do we know the overall or cumulative affect of the plan.

There is frequent reference to the Master Plan Update as though it is done (see DEIS cover, Executive Summary title page, the cover letter, the Fact Sheet, etc.). This document does not yet exist. Many of the 'technical papers' that are part of the development of the Master Plan, raise issues and sub-alternatives that remain unresolved and that point to the Master Plan Update for final determination.

Issue #4 - Alternatives

The cover letter claims that the DEIS is a "...project specific assessment and examines the full range of alternatives to satisfying these needs, ranging from alternative modes of transportation, use of a new or existing airport, activity needs, activity management/system management, development alternatives at Sea-Tac, and the Do-Nothing/No Build." Then, in a short 20+ pages, all alternatives other than Sea-Tac expansion and no-build are dismissed. While it is possible to agree that some of the alternatives don't lead them anywhere, the dismissal of supplemental sites is without factual backing and conflicts with the FEIS on Flight Plan.

Issue #5 - Uncovered Action

The DEIS introduces the concept of moving a portion of air cargo operations to the SASA site. This was not envisioned in the SASA EIS and I don't believe it was part of the ROD. It is not evaluated in this DEIS yet it introduces a whole new set of impacts (traffic, noise).

Issue #6 - Borrow Sites

The discussion of borrow sites raises more questions than it answers. It appears that a State of Washington mining permit could be required along with closure plans. The predicted net effect of attempting to get approval to extract the quantities they are talking about is that essentially all borrow will need to come from off-site.

The DEIS claims that off-site borrow sites are all permitted. It is possible that they may have permits that limit either the amount of extraction, limit the hours of operation and/or limit the haul routes to be used. This is a topic someone may want to research before August 3rd.

There is no analysis of several of the borrow sites' relationship to or impact on adjacent park lands. It appears as though Des Moines Creek Park is almost totally bounded by borrow sites.

A. OVERVIEW

In addition to the four technical areas we are reviewing, we have noted several broader issues in which the DEIS is deficient.

Issue #1 - DEIS declaration that "Do-Nothing" and "With" alternatives have the same levels of activity/impacts.

This argument is used to avoid any specific discussion of impacts related to certain elements of the environment (e.g. traffic, land use, utilities, etc.). By denying any increment of change allowed by a third runway, the project is able to be presented with little or no mitigation.

As noted in Section C in the discussion regarding Airport Capacity, there is indeed a declared capacity in terms of operations, gates, parking etc. This information was pieced together from the Flight Plan FEIS and the Master Plan Update DEIS. It seems imperative that the project be accountable for this increment of changes. Also, as was pointed out in Flight Plan FEIS, Section 2.3.2 (p. 2-15), "when these (delays) jeopardize airline profitability, this will lead to rescheduling and diversion of aircraft to other airports, and a reluctance by the airlines to add additional service." This observation should lead to a full discussion of how Paine Field (or others) could accommodate some component of the excess operations.

Issue #2 - Cumulative Impacts

This section of the DEIS is <u>extremely</u> weak. In all cases it gets lip service and a standard statement that it is difficult to assess such impacts as the other projects are not fully developed. FAA Guidance 5050.4A Chapter 3, Paragraph 26.a regarding cumulative impacts states "...cumulative impact is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions."

The Port has been part of all major impacting plans in the area, many of which have published EIS's (28th/24th, HCT, SASA, SeaTac Comp Plan, Des Moines Tech. Campus, Federal Detention Center) or which are in EIS preparation and for which public disclosure has occurred (e.g. SR 509/South Access and City of SeaTac Personal Rapid Transit). If one were to put together all the traffic, wetland, noise, earth, water quality/quantity impacts identified by these various area projects and plans, it would indeed paint a picture of an area under siege.

Issue #3 - What is the "Action"?

As a FAA action, the approval of an airport layout plan triggers NEPA. Nowhere do they present the layout plan (or alternatives). What they do present as overall plan graphics are illegible and incomplete (note: on all "With" alternatives the houses in west SeaTac are still there).

personal communication with the wetland biologist that conducted the study for Parametrix indicate that these areas constitute wetland vegetation/soils/ hydrology. Inclusion of this riparian fringe area would add 2.2 acres of wetland to the SASA site.

The original Parametrix *SASA DEIS* and *Wetlands Delineation* report and the Shapiro *Jurisdictional Wetlands Delineation* report indicate that SASA Wetlands #52 and #53 are estimated to be 0.3 and 0.1 acres, respectively. The *SASA FEIS* (1994) included a formal delineation of these wetlands by David Evans & Associates with the field survey showing 1.09 acres and 0.6 acres, respectively, plus a third previously undelineated wetland of 0.4 acres that was not included in the Shapiro report or this *DEIS*. The *DEIS* (Table IV.11-1) indicates two wetlands on SASA (#52 & #53) having acreages of 1.5 and 0.9, respectively. Yet, when total fill of these areas occurs only 1.49 and 0.89 acres of wetlands are lost (?).

Cumulative Impacts (DEIS Page IV.11-5)

This section merely admits that there have been wetlands losses/impacts in the past and there will be losses/impacts in the future. This is not acceptable analysis of past, current and foreseeable future cumulative impacts. No attempt was made to assess quantity or quality of wetlands losses or channelization/relocation impacts to streams due to Sea-Tac Airport construction over the past 20 to 50 years or to urbanization of the surrounding areas. There is no discussion of foreseeable future project impacts to wetlands/streams on either Airport or privately owned lands in the near vicinity.

The Cumulative Impacts paragraph (Page IV.11-5) states that "...a maximum of 9.7 acres of wetlands would be filled..." A total of 1.8 acres of wetlands will be lost to fill removal from Borrow Areas 2 and 3, not to filling. In the absence of any reclamation plans for the Borrow Source Areas it must be assumed that these areas will remain open pits. This condition may result in changes to groundwater hydrology in and adjacent to the borrow sites. There appears to be no discussion of the expected effects of groundwater disruption due to fill removal from Borrow Areas 1, 2, 3, or 5 (Page IV.19-5/6) or from fill placement on the new runway, SASA or warehouse/parking facility sites.

Wetlands Mitigation (DEIS Pages IV.11-5/6C and Appendix P-A)

Wetlands losses are projected to be 9.5 acres within SeaTac city limits (4 acres are within the Des Moines Creek drainage and 5.5 acres in the Miller Creek drainage). An additional 0.2 acres will be lost in the City of Des Moines jurisdiction. No direct impacts to wetlands occur in Burien or Normandy Park jurisdictions.

Table IV.11-3: *Summary of Wetland Impacts and Mitigation Area Required*, and Appendix P-A. *Elements of a Conceptual Wetlands Mitigation Plan*, do not provide for adequate upland buffers to the created mitigation wetlands. Page 6 of Appendix P-A indicates a 50-foot buffer would be established around the new 26.5-acre wetland. The proposal indicates a Class 1 wetland is to be created. This will require a 100-foot wide upland buffer, making a minimum of an additional 10.8 acres of mitigation land necessary if the mitigation wetland has minimal edge-to-area ratio. Circular

B. WETLANDS/WILDLIFE

Wetlands Delineations (DEIS Section 11 and Jurisdictional Wetlands Delineation Report)

None of the 32 wetlands delineated by Shapiro & Associates have been surveyed. The source of acreages provided by Gambrell Urban (1995) is not disclosed. Accuracy of areal acreages in Table IV.11-1 to thousandths of an acre does not appear warranted by lack of field surveys or data. Total acreage values presented do not agree with summation of values provided for the 54 wetlands in the table. Discrepancies occur between Shapiro/Gambrell Urban stated wetland acres and acreages provided in original delineation reports by Parametrix/David Evans (Wetlands 52 & 53), Butler & Associates/Sheldon & Associates (Wetland 38), and CH2M Hill (Wetlands 48 through 50). Acreages on 19 of 32 wetlands described as Shapiro delineated wetlands have different values presented in Table IV.11-1 than are provided in the individual descriptions found in the *Jurisdictional Wetlands Delineation* report. On Exhibit IV.11-2, Wetland 3 in Borrow Area 8 shows no impact will occur, but Table IV.11-1 indicates this wetland is to be filled. On Exhibit IV.11-2, Wetland 27 is indicated to be filled, Table IV.11-1 shows no impact. See attached Table 1. for a listing of numerous other discrepancies identified using available data.

Although Table IV.11-2 presents differing amounts of wetland types that would be affected by the three runway configurations, there are no maps presented that show the proposed three configurations and no text descriptions that discuss variations in specific emergent wetland sites that would be impacted.

The set of 39 sample plots discussed in the *Jurisdictional Wetland Delineation* report are not described in a way that ties them directly to delineated wetlands. Maps provided in Appendix H-A, *Jurisdictional Wetland Delineation* report lead one to guess if a sample occurred in or out of a mapped but unsurveyed wetland.

The *DEIS* and *Jurisdictional Wetlands Delineation* report state that either a "Comprehensive survey under the 1987 manual or Intermediate-level Onsite survey under the 1989 manual" was used for the 39 sample plots. Most sampling techniques suitable to delineating the difference between wetland and upland in a given area provide data on paired plots, one wetland and one upland immediately adjacent to each other. With the data provided in the *Jurisdictional Wetland Delineation* report and the *DEIS* it is not possible to tell if paired-plot sampling was performed at more than 5-6 sites within this study. There is no indication from the data sheets or methods discussion section of the *Delineation* report that line transects or multiple vegetation units in both wetland and upland conditions were sampled as outlined by either of the above cited procedural manuals.

Some of the citations referred to in the *Jurisdictional Wetlands Delineation* report are not provided in the References section of the report.

Parametrix delineations of wetlands on the SASA site did not classify the riparian fringe habitat of Des Moines Creek and its western tributary stream as wetlands, even though the data sheets and

should not be difficult to incorporate replacement forested, shrub/scrub and small emergent wetlands into the reclamation design.

Mitigation for Des Moines Creek relocation and wetlands losses in the *SASA FEIS* are performed on-site or at ponds adjacent to west side of Tyee Golf Course. The FAA Advisory Circular is cited in the *SASA FEIS* as a concern for wetland mitigation. The *FEIS* and *Natural Resources Mitigation Plan*, presumably accepted by all parties concerned, creates onsite and within drainage wetland mitigation for palustrine forested and shrub/scrub habitat that would not be a major attractant to flight-hazard wildlife species.

There is no mention of the Des Moines Creek Technology Center wetland mitigation plan currently being negotiated with the City of Des Moines.

Miller Creek Drainage Mitigation
The 5.5 acres of wetland loss in Miller Creek drainage is under City of SeaTac jurisdiction and will require 11 acres of replacement mitigation. There are two sites in the Miller Creek drainage that are capable of providing up to 96 acres of undeveloped but highly disturbed upland habitat for conversion to palustrine forested and shrub/scrub wetlands and suitable buffers.

The 55 acres of Borrow Area 8 in the Miller Creek drainage will not be utilized for fill removal. Since this area with 19 acres of existing wetlands does not currently provide an unacceptable hazard to FAA-authorized flight operations, it can provide nearly 36 acres of upland habitat that could be modified to create additional palustrine forested and shrub/scrub wetlands. Borrow Source Area 5 has an upland surface area of 60 acres, immediately adjacent to Wetlands 1 and 2. Up to 11 acres of palustrine forested and shrub/scrub wetland mitigation could be created at these sites and would not create a major wildlife attraction beyond that already present.

Wetlands 1 and 2 (0.88 acres) could be totally avoided and/or incorporated into the storm water retention/detention and biofiltration design for the warehouse/parking area planned for north of SR 518. Based on the proximity of Wetlands 1 and 2 to the larger wetlands complex on the south side of SR 518 there is reason to suspect that a subsurface hydrologic connection may exist between the two sites. Eliminating loss of Wetlands 1 and 2 would leave 4.6 acres needing mitigation at a replacement rate of 9.2 acres. Mitigation at this level would require conversion of less than ten percent of the available upland habitat in the area and could be design to improve water quality and flow rates emanating from proposed project impacts.

Creating grass-lined swales/ditches as partial wetland mitigation for palustrine forested wetlands in the unclassified tributaries to Miller Creek and upper Walker Creek drainage does not replace onsite wetland functions nor does it provide similar function of primary prey productivity for downstream fisheries.

or square forms for mitigation wetlands are not normally recommended, and a buffer zone of much more than 10.8 acres will be necessary.

Monitoring for adequate establishment of the proposed palustrine forested wetlands for three years is totally inadequate. A minimum of five years and more realistically ten years should be committed to for monitoring and contingency actions at new reforested sites, if required.

Appendix P-A lists no authors or author qualifications for design of wetlands mitigation.

Jack Kennedy, U.S. Army Corps of Engineers, Regulatory Branch stated in a telephone conversation that the Corps would much prefer that mitigation be performed within the drainage being impacted.

All Airport Communities Coalition Sensitive Areas Ordinances stipulate that wetland mitigation is to take place in the original drainage and, if possible, the same sub-basin.

Statement on Page IV.11-6 of the *DEIS* and numerous other places - Wetlands mitigation within the watershed where impacts may occur is not feasible for two reasons: (1) the majority of area surrounding the airport is developed and not enough land exists in the watershed to create compensatory mitigation wetlands, ... As a result under the proposed maximum project impact of 9.7 acres of wetland loss, 26.4 acres of mitigation are planned as off-site out-of-drainage replacement.

Contrary to assumptions made in the *DEIS* that no undeveloped land suitable for wetland mitigation is available in either the Miller or Des Moines Creek drainages, Borrow Source Areas 1-5 and 8 (DEIS IV.19-5) and the SASA site currently provide 415 acres of vacated or undeveloped land. Approximately 190 acres of Borrow Areas 1-4 and SASA within the Des Moines Creek drainage are indicated to remain as undeveloped land following removal of fill materials. Approximately 96 acres of upland habitat in Borrow Areas 5 and 8 will be available for wetland mitigation in the Miller Creek drainage. No reclamation plans for any of these Borrow Areas have been located within the *DEIS* or other supporting documents.

Des Moines Creek Drainage Mitigation
In the Des Moines Creek drainage 4.2 acres of wetland are proposed for destruction. For mitigation the City of Des Moines Sensitive Areas Ordinance requires a one-to-one replacement in kind within the same drainage and the City of SeaTac requires a maximum of two-to-one replacement within the same drainage sub-basin. Neither city ordinance allows for wetland mitigation to occur outside the same drainage sub-basin as the original wetland and mitigation if possible should also provide for greater biologic and hydrologic functions.

Based on these Sensitive Areas Ordinances, mitigation should provide 8.2 acres of in kind replacement in the Des Moines Creek drainage. There appears to be 190 acres of undeveloped land available on the SASA site and Borrow Areas 1, 2, and 3 for which no reclamation plans have been proposed. With natural seeps currently creating wetland conditions within three of these areas, it

What effects will peak/annual/low flow changes have on erosion of steep drainage slopes south of S. 200th St. where active bank erosion and slope slumping is occurring?

What data is available to indicate that reinforced earth slope construction techniques will provide long-term protection from slope failure into Des Moines Creek and adjacent wetlands.

Comments on FAA Draft Advisory Circular 150/5200-, no date

Chapter 1. Paragraph 1-1. Waste disposal sites (also, waste water treatment facilities and wetlands) are considered wildlife attractions and are normally considered incompatible when located within 10,000 feet of active runways. Siting criteria for new runway construction or extensions to existing runways for turbine-engined aircraft should not occur within 10,000 feet of intense attractions to wildlife. This appears to have been overlooked during the initial assessment of siting criteria for the proposed project.

Chapter 1. Paragraph 1-3. a. "When development on or off airport property requires wetland replacement or mitigation, airport operators should oppose any measures to establish wetlands in the areas defined" (10,000 feet of active runways). This does not say that the project will not meet FAA certification.

Chapter 1. Paragraph 1-3. a. "A plan to establish or support wetland areas that are compatible with safe airport operations should be developed." This appears to have been the case with the *SASA FEIS* and on-site *Natural Resources Mitigation Plan* acceptance by FAA.

Statement on Page IV.11-6. (4) Mitigation 4th Paragraph of the *DEIS* and numerous other places. Mitigation for impacts on wetlands at the Airport, within the watershed where impacts may occur, is not feasible for two reasons, ...and (2) the FAA will not certify airports that have "wildlife attractions" within 10,000 feet of the edge of any active runway. As a result under the proposed maximum project impact of 9.7 acres of wetland loss, 26.4 acres of mitigation are planned as off-site out-of-drainage replacement.

The Draft Advisory Circular states in 2. Background and 1-4. Siting Criteria that wildlife attractions within 10,000 feet of turbine-use runways are not recommended. Nowhere does it say that certification will be withheld if these conditions exist.

Wetlands 3-15 (including open water habitats of Lora Lake and Lake Reba) in and adjacent to Borrow Area 8 are not cited as "wildlife attractants", yet they occur within 1200 to 2400 feet of existing and proposed runways. The south end of Tub Lake, an 18 acre palustrine open water/forested/shrub-scrub/emergent wetland complex, begins within 4,000 feet of the north end of existing and proposed new runways. Likewise, Wetland 28 has 18 acres of palustrine open water/forested/shrub-scrub wetlands habitat that occurs within 1,000 feet south of runway 16R and 3,000 feet of runway 16L. Wetlands 43 (30 acres of palustrine forested/shrub-scrub) and 45 (5 acres of palustrine emergent) occur within 1,500 feet and 2,000 feet, respectively of the proposed new

Stream Mitigation (DEIS Pages IV.11-5/6C and Appendix P-B)

Selective incorporation of large woody debris into both Miller and Des Moines Creeks will be needed over the ten to twenty years following streambed relocation as it will take that long for new trees to establish, die and fall into the waterway.

Miller Creek
As a conceptual design the mitigation plan by Shapiro & Associates for relocation of Miller Creek is acceptable. Some potential for future removal of downstream fish barriers to anadromous fish at First Avenue South should be discussed in the *FEIS* and included in proposed stream relocation/wetland mitigation plans.

Stream channel relocation plan appears acceptable on the surface. No geotechnical data available to assess ability of proposed relocation site to not downcut excessively under anticipated flows.

What is the proposed change in peak/annual/low flows in Miller Creek that may result from new multiple storm water detention/retention facilities?

What effects will peak/annual/low flow changes have on erosion of steep drainage slopes in lower reaches of Miller Creek where active bank erosion and slope slumping is occurring?

What data is available to indicate that reinforced earth slope construction techniques will provide long-term protection from slope failure into Miller Creek and adjacent wetlands.

Appendix P-B lists no authors or author qualifications to design stream relocation mitigation.

Des Moines Creek
Since no new plans are presented it must be assumed that the *SASA FEIS Natural Resources Mitigation Plans* will be implemented as published. As a conceptual design the mitigation plan by Parametrix, Inc. for relocation of Des Moines Creek is acceptable. Some potential for future removal of downstream fish barriers to anadromous fish at Marine View Drive, the Des Moines sewage treatment plant and South 200th Street should be discussed in the *FEIS* and included in proposed stream relocation/wetland mitigation plans.

The *SASA FEIS* and *Natural Resources Mitigation Plan* indicate that the upper Des Moines Creek channel relocation would be located along the west boundary of that project area, whereas the *DEIS for Proposed Master Plan Update Development Actions* (Sea-Tac Third Runway) states that the relocation will be to the east.

What is the proposed change in peak/annual/low flows in Des Moines Creek that may result from new multiple storm water detention/retention facilities?

Stream relocations allowed only for:

- Class 1 streams - no relocation allowed.
- Class 2 streams as part of a public road project.
- Class 3 streams for stream enhancement purposes.

Plants & Animals and Endangered Species Sections of DEIS and Biological Assessment Report

Although there is much needed data missing and the *Biological Assessment*, in particular, is very poorly written and referenced, we agree with the final assumptions made in the *DEIS* and *Biological Assessment* that impacts to federal and state-listed threatened, endangered or candidate species are highly unlikely as a result of proposed project activities. A few glaring errors are pointed out below.

DEIS

Page IV.16-10. The Cumulative Impacts section under Fish is inadequate to evaluate the past, current and future impacts that have or may occur on the project site or in a larger cumulative effects area. For the most part cumulative impacts analyses of past, present and future actions on vegetation, wildlife and fish do not provide definitions or affects discussions for an acceptable cumulative effects area. Highly mobile species of birds, mammals, and fishes will utilize habitats on the project area and for miles around. As a minimum the cumulative effects analysis for vegetation and animals should cover an area extending 10,000 feet in all directions from the Airport property line and should evaluate the full Miller and Des Moines Creek drainages for fishes. Given existing capabilities in state-of-the-art aerial photography, satellite imagery, historical data and geographic information systems analysis coupled with both plant community succession and wildlife habitat modeling this would be a relatively easy analysis to accomplish.

Exhibit IV.16-1. Vegetation Communities in the Study Area. The mapping efforts on this exhibit are too incomplete to provide any meaningful analysis of vegetation community composition or wildlife habitat fragmentation/corridors/availability relative to the Airport property and adjacent ownerships. There are large acreages of suitable urban wildlife habitat that appear as blank space, presumably indicating paved or full development of the site with buildings. Until this is a more complete presentation and covers a much larger cumulative effects area, meaningful analyses of impacts to migratory and mobile resident animal species are not possible.

Page IV.17-1. The *DEIS* acknowledges the presence of Great blue heron, a State Monitor species, and pileated woodpecker, a State Candidate for Threatened or Endangered listing, but does not discuss the affects of large acreages of habitat removal in the South Borrow Area and SASA sites on these two species. The viability of the species would not be jeopardized, but a further reduction of fragmented habitats in a developed urban environment would most likely have an adverse impact on local populations of both species. This needs to be addressed in the Future Conditions and Cumulative Impacts discussions of Section 17.

runway. Irrespective of proposed wetland losses and resulting off-site mitigation due to project activities, these existing 102 acres of wetland wildlife attractants that are not being proposed to be filled, relocated or treated to modify their degree of attraction for certain classes of hazardous wildlife would appear to preclude location of a third runway at the chosen location.

Creation of mitigation wetlands (17.4 to 19.2 acres of palustrine forested, shrub/scrub and emergent) at Borrow Source Areas 1, 2, 3 and 5 (sites 6,000 to 8,000 feet south and 3,000 feet north of active runways) would not unduly add to existing "wildlife attractant" habitat. Proper vegetation composition selection in the design of replacement wetlands as discussed and accepted as feasible in the *SASA DEIS, Natural Resources Mitigation Plan*, and *FEIS* would not entice wildlife species that are not already present and that do not appear to currently be creating major safety hazards.

Strike hazard analysis (Colville Airport report) - An analysis was completed a few years ago for an EIS on the proposed moving of the Colville Airport into a valley containing a major Canada goose migration path and wintering bald eagle foraging habitat. The calculations showed very low probability of aircraft/wildlife hazard due to airborne collisions. We can track down the citation for doing this analysis, but will need some additional data on Sea-Tac flight paths.

Sensitive Areas Ordinances Review

<u>City of Burien</u>

Wetlands goal - no net loss within drainage.
No wetlands disturbance projected for Burien.

<u>City of Des Moines</u>

Wetlands goal - no net loss within drainage.
All impacted wetlands - 1:1 replacement or enhancement/restoration ratios
Buffers - Significant wetland - 100 ft.; Important wetland - 35 ft.

<u>City of Normandy Park</u>

Wetlands goal - no net loss within drainage.
No wetlands disturbance projected for Normandy Park

<u>City of SeaTac</u>

Wetlands goal - no net loss within drainage sub-basin.
Class 1 and 2 wetlands - replacement ratio 2:1; Class 3 - replacement ratio 1:1
Buffers - Class 1 - 100 feet; Class 2 - 50 feet; Class 3 - 35 feet.

Table 1. Wetland Acreage Discrepancies. First four columns from Table IV.11-1. Last two columns extracted from original wetlands delineation reports.

Wetland Number	Classification	Study Area	Impact	Source Data	Est. Impact
1	PFO	0.08	0.08	0.09	0.09
2	PFO/EM	0.8	0.8	0.8	0.8
3	PFO	0.9	0.79	0.9	0.0
4	PFO	5.4	0.0	5.3	0.0
5	PFO/SS	5.4	0.0	5.4	0.0
6	PSS	1.8	0.0	1.8	0.0
7	PFO/OW/EM	7.2	0.0	7.2	0.0
8	PSS/EM	6.2	0.0	6.2	0.0
9	PEM/FO	2.4	0.0	2.4	0.1
10	PSS	0.6	0.0	0.6	0.0
11	PFO/EM	0.54	0.54	0.5	0.5
12	PEM/FO	0.2	0.19	0.14	0.14
13	PEM	0.2	0.15	0.05	0.05
14	PFO	0.06	0.06	0.06	0.06
15	PEM	0.3	0.02	0.09	0.09
16	PEM	0.03	0.03	0.03	0.03
17	PEM	0.007	0.007	0.01	0.01
18	PFO	0.2	0.2	0.16	0.16
19	PFO	0.3	0.3	0.46	0.46
20	PSS/EM	0.08	0.08	0.16	0.16
21	PFO	0.2	0.16	0.23	0.23
22	PSS/EM	0.01	0.01	0.05	0.05
23	PEM	0.3	0.26	0.25	0.25
24	PEM	0.04	0.04	0.04	0.04
25	PFO	0.2	0.2	0.06	0.06
26	PEM	0.07	0.07	0.02	0.02
27	PEM	0.8	0.0	0.23	0.23
28	POW/SS	18.1	0.003	18	0.01
29	PFO	0.82	0.82	0.8	0.8

214

We do not agree with the statement that suitable habitat for the western pond turtle does not occur in any of the open water habitats in and around the Airport project area. The ponds west of the Tyee Golf Course and Tub Lake provide both open water and large woody debris resting habitat. Reba Lake or Lake Lora may also provide some suitable habitat. Two assumptions appear to have been made, one, that no habitat was likely to occur, and, two, western pond turtles are not indicated, based on Shapiro's literature search, to occur in west central Washington. It does not appear from the discussion in the *DEIS* or the *Biological Assessment* that any surveys for pond turtle or their habitat were conducted. There is also a discrepancy in the literature review in not referencing two western Washington citations (David Evans 1991 and WDFW 1994) of pond turtle sightings in Pierce and King counties. Sandy Adelman, western pond turtle expert for The Nature Conservancy, Washington Field Office, stated that at least three other verified observations of western pond turtles have been reported from Pierce County and one from King County (personal communication 1995). Although under currently proposed project activity impacts to potential western pond turtle habitat are unlikely, there is a potential that this species is present within the project area and its presence in adjacent habitats should be further investigated.

Page IV.17-2. Statement - Impacts on red-legged frogs resulting from construction of the proposed alternatives would include displacement of individuals or local populations, and loss of breeding and overwintering habitat. Red-legged frogs are not mobile enough to get out of the way or be displaced by earth-moving equipment. Individuals and local populations would be more likely extirpated along with their habitat. Since the species has recently been delisted by the Washington Department of Fish and Wildlife, this loss of individuals is locally not a problem, but local population losses of federally-listed candidate species must be viewed as potentially harmful to the species and the **impacts need to be evaluated accordingly.**

Biological Assessment

Page 8. Statement - Populations of western pond turtles in Washington State are confirmed only in Klickitat and Skamania Counties. No observations of any western pond turtles have been made in King County since 1987. See Comment relating to DEIS - Page IV.17-1 above.

Page 26. Statement - Areas assumed to be unsuitable for bald eagle nesting include Green Lake, Lake Washington, Tub Lake, Elliott Bay and Shilshole Bay. There are seven active bald eagle nesting sites located at three of these sites:

1 - in West Seattle on Elliott Bay for one or more years
1 - on Shilshole Bay for the past eight years directly under Sea-Tac, Boeing Field and Lake Union flight paths. Probably the most complete history of any single pair of nesting eagles in the world, with statistical analyses of human/eagle disturbance relationships, has been compiled for METRO West Point Secondary Treatment Plant Project.
5 - different nests on Lake Washington some of which have been active for over ten years.

These discrepancies among many other inaccuracies in the Biological Assessment lead one to question the thoroughness of review and assessment conducted on the rest of the DEIS and Biological Assessment reports.

214

C. SURFACE TRANSPORTATION

Framing The Issue - Capacity

As we initiated review of Section 15 - Surface Transportation, we were immediately confronted with a major issue associated with the Airport expansion (first bullet item):

- **Total Airport surface traffic is expected to increase from approximately 87,600 vehicles per average day in 1994, to approximately 161,500 vehicles per average day in the year 2020 <u>with or without airport improvements. In each future year, the Do-Nothing and "With Project" alternatives would experience the same quantity on airport-related surface traffic.</u> (Emphasis added)**

We believe that there is a major flaw in this assumption. There is considerable evidence in the DEIS, and in the October 1992 *Flight Plan EIS*, that the airport does not have capacity beyond 2000 to accommodate flight operations, terminal space needs, aircraft gate needs, terminal drive demands, parking demands, and other limiting elements. Though it may be true that theoretical demand for use of these elements of the airport will grow in relation to regional air travel needs, it does not in any way follow that those demands would or could be accommodated at the Sea-Tac Airport site if the master plan development proposals do not occur.

The EIS appears to be structured in a way that shows the need for a third runway to resolve aircraft delays during inclement weather. It then proceeds to imply that when the inclement weather operations are resolved, we need to double the terminal size, increase the number of aircraft gates by 33%, increase parking by 65%, double the terminal curb loading lengths, and accept a doubling of off-site traffic. If the third runway was only needed to bring terminal operations on inclement days up to the same air passenger operating capacity as on VFR1 days, there would be no need to double the terminal capacity; there would be no increase in aircraft operations.

The airport is being expanded to meet future projected air travel needs. Without the proposed expansion, those needs would not be accommodated at the present airport site. With its expansion, all associated on-site and off-site environmental impacts associated with the doubling of airport activity must be viewed as an impact of the expansion action.

It is true that Sea-Tac Airport could absorb further growth in aircraft operations beyond 2000 without runway expansion, provided increasing aircraft delays and terminal overcrowding can be tolerated. However, as will be shown below, the 3rd runway extends by 20 to 30 years the time before which such deterioration must be tolerated. Therefore, the 3rd runway together with associated terminal expansions will result in a 20 to 30-year growth in airport activity that would not occur without such improvements.

Airport 'Capacity'

Table 1 shows the current growth estimates for air passengers and total aircraft operations at Sea-Tac Airport, together with needed expansions of terminal support facilities. All data is from the Airport MP DEIS, except as noted, for 1995, 2000, 2010, and 2020. We have used interpolation to create

Wetland Number	Classification	Study Area	Impact	Source Data	Est. Impact
30	PSS/FO	0.8	0.79	0.8	0.8
31	PEM	0.04	0.005	0.04	0.04
32	PEM	0.04	0.04	0.06	0.06
33	PFO/SS/EM/OW	17.6	0.0	18	0.0
34	POW	1.4	0.0	3.3	0.0
35	PEM	0.2	0.18	0.2	0.0
36	PFO/EM	0.3	0.0	0.3	0.0
37	PFO/SS	2.4	1.68	2.4	1.68
38	PEM/SS	0.7	0.0	0	0
39	PFO	0.07	0.0	0.07	0.0
40	PFO	0.09	0.09	0.09	0.09
41	PEM	0.08	0.08	0.08	0.08
42	PEM	0.5	0.0	0.5	0.0
43	PEM/SS/FO/OW	30.3	0.0	30	0.0
44	PFO/SS	0.7	0.0	0.74	0.0
45	PEM	5.0	0.0	5.0	0.0
46	POW	0.06	0.0	0.06	0.0
47	POW	0.2	0.0	0.16	0.0
48	PEM	0.02	0.0	0.04	0.0
49	PSS	0.02	0.02	0.03	0.03
50	PEM	0.03	0.03	0.125	0.125
51	PFO	8.1	0.48	8.1	0.48
52	PFO/SS	1.5	1.49	1.5	1.5
53	PFO	0.9	0.89	0.6	0.6
54	PSS/OW	25.7	0.0	25.7	0.0
SASA C		0.0	0.0	0.4	0.4
SASA D		0.0	0.0	0.55	0.55
		0.0	0.0		
Total		149.987	10.585	150.985	10.685

Table 1. Master Plan Update Forecasts [1]

Year	Air Passengers Enp+Dep (Millions)	Air Passengers Avg Day	Total Operations Annual	Total Operations Avg Day	Pass Per Carrier Operation	Ann Average Delay[5] Arrivals (Minutes)	Ann Average Delay[5] Total (Minutes)	Aircraft Gates (NBEG)	Terminal Space[3] (1000s sf)	On-Site Parking[3] General	On-Site Parking[3] Empl	
1995 (Exist)	21.0	57,500	355,000	973	64	10.0	7.0	90	1,900	9,400	4,500	
2000	21.6	58,200	379,200	1,039	62	18.5	10.0	100	2,400	9,700	4,600	
Capacity[2]	22.0	60,300	380,000	1,041	63	19.0	10.0	90	1,900	9,400	4,500	
2005[3]	25.0	68,500	391,400	1,072	69	21.0	11.5	105	2,600	10,600	5,300	Capacity
2010	29.0	79,500	405,800	1,112	78	23.5	13.5	110	2,800	11,900	6,100	increase
2015[3]	33.4	91,500	422,500	1,158	86	28.0	16.0	115	3,000	13,300	7,000	effected by
2020	38.3	104,900	441,600	1,210	95	34.0	19.0	120	3,200	14,850	8,000	3rd runway
2025[3]	43.8	120,000	463,200	1,269	104	40.0	23.0	125	3,400	16,300	9,100	
Capacity[4]	48.0	131,500	480,000	1,315	110	10.0	7.0	130	3,600	17,300	9,900	
% Incr	118.2%		26.3%					44.4%	89.5%	84.0%	120.0%	

[1] *Proposed Master Plan Update DEIS*, Tables I-3, I-4, II.1-2, and interpolations.
[2] Capacity of existing runways and support facilities (*Flight Plan FEIS*, Figure 1-2; *Proposed Master Plan DEIS*, Table II-1.4).
[3] Interpolated estimate.
[4] Capacity with 3rd runway (*Flight Plan FEIS*, Figure 1-2, page 1-4; PSRC, 1992).
[5] Interpolated from *Proposed Master Plan Update DEIS*, Table II.1-2.
[6] Alternate estimate prepared by Kato & Warren, Inc. to show effect of a slightly less rapid increase in aircraft load factors.

Table 2. Master Plan Update Forecast (With Reduced Increase Rate in Load Factors) [6]

Year	Air Passengers Enp+Dep (Millions)	Air Passengers Avg Day	Total Operations Annual	Total Operations Avg Day	Pass Per Carrier Operation	Ann Average Delay[5] Arrivals (Minutes)	Ann Average Delay[5] Total (Minutes)	Aircraft Gates (NBEG)	Terminal Space[3] (1000s sf)	On-Site Parking[3] General	On-Site Parking[3] Empl	
1995 (Exist)	21.0	57,500	355,000	973	64	10.0	7.0	90	1,900	9,400	4,500	
2000	21.6	59,200	379,200	1,039	62	18.5	10.0	100	2,400	9,700	4,600	
Capacity[2]	22.0	60,300	380,000	1,041	63	19.0	10.0	90	1,900	9,400	4,500	
2005[3]	25.0	68,500	400,000	1,096	68	22.0	12.0	105	2,600	10,600	5,300	Capacity
2010[3]	29.0	79,500	424,000	1,162	74	28.5	15.5	110	2,800	11,900	6,100	increase
2015[3]	33.4	91,500	450,000	1,233	81	36.0	19.5	115	3,000	13,300	7,000	effected by
2020[3]	38.3	104,900	480,000	1,315	87	45.0	25.5	120	3,200	14,850	8,000	3rd runway
Capacity[4]	38.3	104,900	480,000	1,315	87	19.0	10.0	120	3,200	14,850	8,000	
% Incr	74.1%		26.3%					33.3%	68.4%	58.0%	77.8%	

the data for the intermediate 5-year periods, and to extend the forecasts beyond 2020. The bolded numbers shown for 2020 or beyond are the 25-year design objectives of the master plan.

Note the two rows labeled "Capacity" and their footnotes. The airside 'capacity' of Sea-Tac Airport is determined by the number of aircraft operations that can be accommodated within certain limits of overall average aircraft operations delay. According to the October 1992 *Flight Plan FEIS* prepared by the PSRC and the Port of Seattle, the existing airport runways have capacity to handle up to 380,000 aircraft operations per year (takeoffs and landings). Relative to the most current forecasts, this capacity will be reached by shortly after 2000. With the addition of the 3rd runway, airport capacity would be increased to 480,000 annual aircraft operations.

The 100,000 increase in aircraft operations allowed by the 3rd runway is equivalent to the total forecasted increase in aircraft operations between 1995 and 2020. Therefore, all impacts identified in the DEIS as related to airport growth can be directly related to the addition of the 3rd runway, and associated terminal improvements to accommodate the increased air passenger demands.

Aircraft Operations Delay

The amount of delay encountered by aircraft during takeoffs and landings is a primary determinant of airport airside capacity. In the last paragraph on page II-4 of the DEIS, it is noted:

> "... the NPIAS indicates that when average (annual) delay exceeds 7 minutes per operation, impacts occur to the national aviation system."

During good (VFR1) weather, both runways at Sea-Tac Airport can be used for both takeoffs and landings. However, during poor weather, the airport is limited to only one arrival stream of aircraft; the runways are too close together to safely allow for two incoming streams. Hence, arrival delays at Sea-Tac Airport rise quickly during poor weather. Because of this poor weather limitation, the Port of Seattle has lowered the overall annual average delay standard for Sea-Tac Airport to 10 minutes (DEIS, page II-5, 1st paragraph). ***That limit will be reached by 2002 (DEIS, page II-5, last paragraph).***

Suggested DEIS Revision

The Surface Transportation section of the DEIS should be revised to describe 'Do Nothing' transportation impacts as those that would occur by such time the airport reaches 380,000 aircraft operations per year. The transportation impacts of the action alternatives should be described and evaluated relative to Do Nothing as the increases associated with the increases in aircraft operations from 380,000 per year to 480,000 per year. Since the 480,000 operations are not expected to occur until beyond 2025 under the new forecasts, an equivalent analysis would be to compare the 2020 estimates for the action alternatives to the 1995 existing levels of airport landside activity. ***The landside impacts of the proposed airport master plan capacity improvements are equivalent to the differences between existing 1995 transportation and parking conditions, and those estimated by 2020.***

SPECIFIC COMMENTS - DEIS SECTION 15

5. ***Page 15-1, First Paragraph.*** It needs to be pointed out that the existing airport will reach capacity by 2000. Beyond 2000, only non-airport related traffic growth is included in the No Action Alternative; further airport traffic and parking increases beyond 2000 are enabled by the Action Alternatives.

6. ***Bullet 1.*** No foundation is laid in Appendix O to substantiate the 1994 AADT airport traffic generation estimate of 87,600. Terminal traffic is estimated to be 62.1% of the total airport traffic, shown as 54,374 trips in Table 1, App O. App O Exhibit 2 shows a total of 63,550 AADT to/from the terminal in 1994 (44,700 on North Access Freeway south of S. 170th Street, and 18,850 on the SR-99 airport access drives). By dividing 63,550 by 0.621 would result in a total 1994 AADT traffic generation estimate of 102,300. These differences need to be explained, or the airport traffic generation estimates need to be increased. As per Comment 2 above, all airport traffic should be shown and analyzed in terms of a 'design day' level of activity. *Airport traffic growth beyond 2000 will not occur under the Do-Nothing (No Action) Alternative (see comment 4).*

7. ***Bullet 2.*** See Comment 12 below.

8. ***Bullets 3, 4 and 5.*** These summaries need to be revised after airport impacts and mitigation needs are reevaluated against a 2000 No Action airport capacity baseline.

9. ***Bullet 6.*** An at-grade intersection of Airport South Access with S.188th Street was rejected over ten years ago by King County. That was the reason for all of the Airport South Access planning studies that have occurred over the past 12 years. The S.188th/SR-99 intersection is currently operating at LOS F. Studies showed that the short segment of S.188th Street between 28th Avenue S and SR-99 could not accommodate the large increase in traffic volumes, turning movements, and traffic queue/storage requirements caused by a South Access intersection with S. 188th Street. A much more detailed analysis of the combined operations of these two intersections is necessary.

Methodology

10. ***Inadequate Scope.*** Please review the 'General Comments' above, and expand the methodology discussion accordingly. The methodology must address 'design day' airport traffic and parking conditions, recognize a 2000 airport growth limit for the No Action alternative, and develop airport 'design year' traffic and parking demands based upon air passenger forecasts associated with 480,000 aircraft operations per year. The approach/methodology for on-site operations analyses, and for both on-site and off-site parking supply/demand analyses must also be addressed.

11. ***Page 15-2 - Peak Periods.*** There are currently some very severe operating conditions along the Airport's upper (enplane) drive system during a 7-8 am peak as well as during the 11 am to 1 pm combined drive system peak period.

214

GENERAL COMMENTS

1. ***Inadequate Scope.*** The 'transportation' analysis is limited to a study of off-airport 'traffic' operations only. It must be expanded to provide detailed analyses of on-site traffic circulation, of on- and off-site public and private transit services and mode splits, and particularly of on- and off-site parking generation, seasonal variation, and parking overflows. There is widespread concern of businesses in the airport vicinity that airport parking overflows may affect their business operations. A survey needs to be conducted of all on- and off-site parking supply and seasonal occupancy available to support airport generated parking needs. Future off-site airport parking demands must be evaluated relative to on-site parking use and pricing policies. Mitigating measures should include specific plans for accommodating airport generated off-airport parking demands and potential overflows.

2. ***Must Address 'Design Day' Conditions.*** The airport is subject to substantial seasonal variation in activity. Seasonal variation in traffic and parking activity needs to be discussed; and appropriate 'design levels' need to be defined for airport traffic and parking activity (e.g., average August weekday?), including the estimated number of days each year these design levels will be exceeded. All subsequent operations analyses should be carried out for the designated design conditions, not for an average day of the year. AADT values are generally acceptable for the non-airport background traffic data.

3. ***Map exhibits of 'design day' airport generated traffic distributions on the vicinity freeway and arterial network need to be prepared.*** As currently presented, the DEIS does not provide sufficient information from which to distinguish airport traffic volumes from background traffic growth forecasts; it only shows cumulative traffic estimates for each forecast year and alternative. The new exhibits showing airport-only traffic distributions should include airport traffic volumes on streets in neighboring cities.

4. ***No Action Airport Growth Should be Capped at 2000 Level.*** There is also a gross misrepresentation that airport traffic and parking demands will increase as part of the background traffic forecasts, with or without the master plan improvements. This is unacceptable and must be corrected. Sea-Tac Airport is expected to reach its operational capacity soon after 2000 (380,000 annual aircraft operations). Therefore, the 2000 No Action Alternative airport traffic and parking forecasts should be established as a baseline for impact comparison of all post-2000 No Action as well as Action Alternatives. To accommodate air travel growth beyond 2000, the 3rd runway and all other planned terminal improvements will need to be implemented (the 'Actions' to be evaluated by the DEIS). The proposed 3rd runway master plan action would result in a 20 to 25-year extension of airport capacity (to 480,000 annual aircraft operations; see separate Memo on 'Airport Capacity'). The 2020 traffic and parking forecasts should be increased to reflect the levels of activity made possible by a forecast of 480,000 annual aircraft operations, so that the EIS will reflect the full ultimate impact of the 3rd runway element of the master plan.

214

17. ***Additional Truck Analysis Needed.*** Public input during preparation of the City of SeaTac comprehensive transportation plan indicated a major concern about truck traffic circulation on all northerly approaches to Air Cargo Road. This concern should be addressed here, and in all future year alternatives analyses.

18. ***Future Conditions Without Airport Expansion.*** The DEIS should again note that the existing airport will reach effective capacity by 2000. A 2000 estimate of 'design day' airport traffic generation and distribution on the vicinity freeway and arterial system should be prepared and illustrated (new exhibit) as the 'baseline' against which to compare all future airport traffic estimates for the Action Alternatives. The 2000 cumulative traffic estimates should be revised to reflect the 'design day' airport traffic generation estimates, all LOS analyses revised accordingly, and two new exhibits added to illustrate these findings.

19. ***2000 On-Site and Parking Conditions.*** 2000 baseline conditions need to also be established as extensions of Comments 15, 16 and 17.

20. ***2020 Conditions Without Airport Expansion.*** A 2020 "No Action" forecast of cumulative traffic estimates should be prepared, including only the 2000 baseline level of airport generated traffic. This forecast and its associated levels of service should be illustrated on new exhibits.

21. ***Baseline Deficiency Mitigation.*** The list of planned transportation system improvements shown on pages IV.15-3 and 4 should be expanded to include all planned improvements, sub-stratified by those funded under current TIP programs, and those that are unfunded. The 2000 and 2020 LOS analyses should clearly note which improvements are assumed to be in place by each respective year.

Environmental Impacts

22. ***Alternative 1 (No Action).*** Provide reference to the results of responses to Comments 18-21.

23. ***Prepare Design Year Airport Traffic Forecasts.*** Prepare 'design day' (not AADT) airport traffic generation and distribution estimates for each action alternative, and reflecting the expanded airport capacity of 480,000 annual aircraft operations. Prepare new exhibits showing the estimates, including streets extending through neighboring cities, and the differences from the 2000 baseline estimates prepared in response to Comment 18.

24. ***Cumulative Traffic and LOS.*** For each of the action alternatives, add the traffic differences found from Comment 23 to the 2020 No Action baseline traffic forecast developed in response to Comment 20. Calculate LOS at all analysis locations, and provide a table comparing the findings for each action alternative to the LOS findings for the 2020 No Action baseline. At each location for each alternative, show airport (entering) traffic as a proportion of total (entering) traffic.

214

12. *Page 15-2 - Future Traffic Volume Forecasts Not Responsive to City of SeaTac Planning.* The City of SeaTac completed a comprehensive transportation plan study in 1993. It has since conducted analyses of various 'urban center' land use development scenarios. Extensive studies have been completed and/or are in progress for the SR-509/Airport South Access projects. All of these studies utilized much more detailed land use/transportation forecasting models than available from the PSRC. Those same models were used in preparing a comprehensive transportation plan for the City of Des Moines; and they are currently being used in the development of a transportation plan for the City of Burien. It appears that the surface transportation studies in this DEIS and its Appendix O made no attempt to utilize the City of SeaTac travel forecasting models, nor made any attempt to coordinate the Airport Master Plan off-airport traffic forecasts with the more detailed traffic forecasts that have been developed by the City of SeaTac. To ignore the City of SeaTac traffic models and forecasts appears to be a gross oversight.

13. *Page 15-2 - Airport Trip Generation and Travel Patterns.* See Comment 6 above, and redraft accordingly. The forecast methodology for each of the six traffic categories should be described, leading to reference to Table IV.15-1. Table IV.15-1 (and all associated tables and exhibits in Appendix O) should be revised to respond to Comment 6 and a 'design day' rather than AADT. Airport employee traffic and parking was assumed to grow in direct relation to aircraft operations. This assumption needs to revisited. Larger aircraft require larger crews, more gate and service personnel, and more ticketing assistance. It would seem that airline employees would increase more in relation to air passengers than to aircraft operations.

Existing Conditions (Affected Environment)

14. *Restructure Section (2).* This section and part of Section (3) should be restructured into a two-part section titled "Affected Environment". The first sub-section should present "Existing Conditions"; and exhibits should be added to show 1994 'design day' traffic estimates and levels of service. The second sub-section should present "Future Conditions Without Airport Expansion", as commented further below.

15. *On-Site Traffic Analysis Not Addressed.* A sub-section needs to be added to describe existing on-airport traffic facilities and operations, particularly for the terminal drive system and for the custom operations of various surface transportation modes. There are currently some very severe operating conditions along the upper (enplane) drive system during a 7-8 am peak as well as during the 11 am to 1 pm combined drive system peak period. Current capacities of the terminal drives need to be defined, and LOS analyses presented.

16. *Parking Not Addressed.* A sub-section needs to be added providing extensive data and discussion of on- and off-site parking supply, seasonal demand, and utilization by time of day and season (see also General Comment 1). Airport parking is a major element of environmental concern; it has not been addressed in the DEIS nor in Appendix O.

214

It should also be noted that the 2010 LOS analyses show severe congestion at the intersections of International Boulevard with S. 188th and S. 200th Streets, and along the SR-518 freeway corridor and ramps. Implementation of the airport 3rd runway should be conditioned with a requirement that at least the South Access Expressway, grade separation with International Boulevard, and new partial interchange with I-5 portions of the proposed SR-509/Airport South Access project be in place by no later than 2010.

31. *SeaTac PRT System Not Provided For.* The City of SeaTac is diligently pursuing development of a grade-separated automated personal rapid transit (PRT) system to serve Sea-Tac Airport and its vicinity. The DEIS does not acknowledge the PRT system plans; the Master Plan alternatives do not show how it would be physically integrated with terminal access systems; and the transportation analyses do not evaluate the changes and impacts it would have on airport access, terminal drives by mode of access, and parking both on- and off-site.

32. *Airport Induced Secondary Impacts.* Much of the development in the airport vicinity is induced by the airport -- hotels, meeting facilities, and rental car operations are notable examples. If the airport capacity is not expanded, some of the future airport induced development in the airport vicinity would not occur. The EIS should consider the secondary induced development traffic impacts of airport expansion; and mitigation should include responsibility for a portion of the 2000 to 2020 non-airport traffic growth in the airport vicinity.

Mitigation

33. *Based Upon Post-2000 Airport Traffic Increases.* All airport-generated 'design day' traffic and parking increases after 2000 (when the existing airport facilities reach practical capacity) must be subject to mitigation.

34. All traffic mitigation identified on pages IV.15-5 and 6 reflect a minimum of direct mitigation needs.

35. *Need to Mitigate post-2000 Airport Traffic Growth.* Additional off-site mitigation must be identified to accommodate the 2000 to 2020 airport-generated traffic increases on the vicinity freeway and arterial system that were erroneously identified as part of the background traffic growth in the DEIS. This would include proportional shares of needed improvements at all locations in the airport vicinity where the revised EIS analyses (per above comments) find unacceptable operating conditions.

36. *SR-509/Airport South Access.* The adopted City of SeaTac and City of Des Moines transportation plans included severe limitations on land use development to be permitted south of the airport until the SR-509/Airport South Access road improvements are implemented. The Airport Master Plan should likewise be heavily conditioned upon participation in and completion of these high-capital improvement needs.

25. *'Off-Site Impact Assessments.* For each action alternative, list all locations where cumulative LOS will exceed acceptable operating standards. Discuss mitigation options and proportional responsibilities for implementing mitigation measures.

26. *'On-Site' Transportation Impacts.* The DEIS did not include adequate assessments of on-site transportation and circulation impacts. This is particularly important along the existing and future terminal drive systems, and should include descriptions of all surface transportation modes under each action alternative, together with comparisons to the 2000 No Action levels of operations.

27. *On- and Off-Airport Parking Impacts.* The DEIS did not adequate assessments of parking impacts. The year 2020 'design day' needs associated with 480,000 annual aircraft operations need to be estimated and compared to existing on- and off-site parking supplies. The analysis should lead to development of a parking mitigation program, including TDM strategies. Assumptions regarding non-POS actions needed to accommodate future parking demands must be clearly identified.

Cumulative Impacts

28. *City of SeaTac Land Use Plans.* The DEIS gave no indication as to whether or not the 2020 cumulative traffic forecasts are consistent with City of SeaTac land use plans (see Comment 12). Evidence of consistency with City of SeaTac plans must be presented.

29. *Regional Transit Plan Assumed* .On page IV.15-2, it is stated that regional assumptions included "construction of the Regional Transit Authority (RTA) system". That plan, as presented to the voting public in March 1995, includes construction of a light rail line in the median 40 feet of SR-99/ International Boulevard (preempting three or more traffic lanes) from Seattle to Tacoma. Yet the traffic forecasts and operations analyses presented in the DEIS all assume that International Boulevard would provide seven traffic lanes from S. 152nd Street to S. 216th Street by 2000 and continuously thereafter (page IV.15-3). If this assumption is to be accepted, the DEIS must show how seven traffic lanes plus rail transit would be accommodated along International Boulevard. It must also show how the rail line would be integrated with the terminal expansion plans and/or interfaced with Sea-Tac Airport landside access.

30. *SR-509/Airport South Access Assumed.* On page IV.15-2, it is stated that regional assumptions included "Construction of the SR-509 extension to I-5 (called South Access Road)." The 2020 traffic analyses reflect Alternative 2 for the SR-509 Extension/Airport South Access project, as described at the bottom of page IV.15-3. At the present time, and well into the foreseeable future, this project has no local or state commitments for funding or implementation. Since this is a critical element of traffic mitigation for any Airport expansion plan alternative, the EIS must show how this project will be implemented before 2020.

D. CONSTRUCTION IMPACTS

SPECIFIC COMMENTS

1. *Total Construction Activity Not Addressed.* The evaluations of Construction Impacts in both the DEIS and Appendix J appear to be limited to the movement of earth hauls. The EIS needs to also address the movement of construction materials and equipment for the runway pavement, terminal expansions, gate expansions, parking expansions, new/modified drive construction, etc. The latter elements of master plan construction would have major impacts on passenger terminal operations, airport drive operations, and parking operations during construction. These impacts need to be addressed, and interim mitigation programs offered to assure smooth airport operations during the construction period. Impacts associated with the relocation of line maintenance and air cargo operations also need to be addressed.

2. *Haul Activity Unclear; Appendix J Inconsistent.* Appendix J addressed the earth hauling impacts associated with the movement of 17.25 mcy of 'compacted' fill for the 8,500-foot new runway option over a 30-month period; and it separately addressed as a later action the movement of 3.38 mcy of 'compacted' material associated with existing runway/taxi extensions and safety improvements. Table IV.19-1 in the DEIS 'Earth' Section identified total 'compacted' fill requirements of 22.96 mcy, including 0.13 mcy for the S.154th Street relocation and 2.40 mcy for the SASA area fill. Total 'loose' haul earth movement is shown as 26.40 mcy in Table IV.19-1, with 3.1 mcy as 'common' (on-site) earth movement. DEIS Chapter IV, Section 23, showed 21.11 mcy 'loose' haul during the 30-month period; presumably it assumes that the 2.76 'loose' mcy for Runway 34R Extension and the 2.53 'loose' mcy for SASA occur non-simultaneously with 3rd runway haul operations. ***It is very likely that all haul operations would occur simultaneously; the impacts of earth haul should be based on the movement of 26.40 'loose' mcy during the 30-month haul period, of which 3.1 mcy is on-site 'common', and 23.3 mcy need to be trucked to the site from 'near-site' and 'off-site' locations.***

3. *How Much is 23.3 mcy?* This would be the largest landfill operation ever attempted in the Puget Sound region by many magnitudes. It involves four times the volume of earth moved by the regrade of Denny Hill which resulted in all the fill along the Seattle waterfront, and filling in the tide flats south of Jackson Street. It involves nearly six times the volume of material removed from Mercer Island for the construction of I-90, the largest earth movement in modern history. The paint and windshield dings and cracks of vehicles that shared the roads with these earth moving trucks are long from being forgotten.

4. *Truck Impacts Underestimated.* Appendix J evaluated truck impacts based upon the movement of 19.83 'loose' mcy, of which 16.27 mcy would be moved by truck from off-site locations; 3.1 'loose' mcy are expected to be 'common' on-site material movement. Deducting the 'common' material from 26.4 mcy leaves a total off-site movement of 23.3 'loose' mcy. DEIS Section 23 discussed impacts of only 17.5 'loose' mcy of off-site hauling.

All earth movement is apparently scheduled to occur over a 30-month period. The DEIS assumed that all truck activity would be measured evenly over 16 hours each day and over

37. *On-Site Mitigation.* Considerable on-site traffic mitigation would be necessitated by the action alternatives that would allow up to a doubling of airport traffic volumes. These improvements need to be identified, and included as part of the master plan action alternatives.

38. *Air Cargo Relocation to SASA Site.* The DEIS transportation analyses did not address the relocation of air cargo operations to the SASA site south of the airport. The traffic impacts of locating these more traffic and truck intensive operations must be addressed, and additional mitigation identified. Such impacts and mitigation would affect the proportion of POS responsibility for planned arterial improvements in the 28th/24th Avenue S corridor, extending south into the City of Des Moines.

39. *International Boulevard/RTP.* Mitigation must be addressed relative to comment 29 above.

40. *Airport RTP and PRT Access.* Site design/mitigation must address accommodation of airport access via the proposed regional rail transit line and the proposed local city of SeaTac PRT system.

41. *Parking Management Plan.* Mitigation must include a plan for development and management of adequate on- and off-site parking facilities and operations. It must also address to the satisfaction of the City of SeaTac the potential effect on vicinity hotels and businesses of airport parking overflows when design levels are exceeded.

42. *Transportation Management Program (TDM).* Sea-Tac Airport is host to a number of tenant/users who employ more than 100 employees. Therefore, it is highly subject to compliance with the Washington State Commuter Trip Reduction Act. Mitigation should include an intensive TDM program to reduce employee commuting by single occupant vehicle (SOV) mode. Any on-site parking pricing strategies need to be accompanied by coordinated off-site parking supply and management strategies.

equivalents (PCE) in terms of road and intersection capacity it uses. On grades such as SR-518 westbound, each truck is estimated to have a PCE of up to 10. The capacity calculations included in Appendix J appear to have treated these trucks as 1.0 PCE. Peak hour capacity impacts are compared as follow:

Per DEIS, Appendix J Approach

Truck trips to move 16.27 mcy - Per average day = 1,972; PCE = 1,972
Peak Hour trips = 124; <u>PCE = 124</u>

Per Suggested Approach (1 truck = PCE)

Truck trips to move 23.3 mcy - Per average day = 3390; PCE = 10,170
Peak Hour trips = 404; <u>PCE = 1,212</u>

Note that the operations and capacity impacts of the earth moving trucks could be up to ten (10) times greater than disclosed in the DEIS Appendix J.

6. *Truck Impacts on Des Moines Memorial Way Grossly Underestimated.* Truck movements between the 'near-site' borrow locations and the runway fill sites were identified as moving via Des Moines Memorial Way South. As shown near the end of Comment 4 above, the maximum haul could be up to 8.0 mcy resulting in up to 1164 truck trips per day and up to 140 peak hour trips. With a PCE of 3.0, this would be equivalent to adding 3500 auto trips per day to Des Moines Memorial Way, and up to 420 peak hour trips. These more likely impacts would substantially change the impact findings shown on pages 5 thru 10 in Appendix J.

7. *Specific Truck Approach Routes Need to be Identified.* In commenting on the Sea-Tac Westin Hotel DEIS, the City of SeaTac made it clear that it would object to use of International Boulevard and other city arterial streets by heavy construction vehicles. Certainly even more strenuous objections will be raised for the earth haul routes for runway fill. The EIS needs to present a clear definition of the specific site approach routes to be used by the trucks, and analyze the capacity and operations of these routes under the truck and PCE loads identified above. The likely approach routes would be SR-518 and SR-509 via the S.160th Street interchange. Truck impacts on the I-5/SR-518 ramps, on the SR-518 uphill grade section, on the signalized intersections at the SR-518/SR-509 interchange, and on the SR-509/S.160th Street ramps and intersections would likely be extremely severe.

8. *Truck VMT Impacts Need to be Addressed.* The average trip length to/from the 'off-site' borrow sites was estimated to be about 20 miles. Total truck vehicle-miles of travel (VMT) is estimated as follows:

21.0 (max) mcy / 22 cy per trip x 2 trips per load x 20 miles = 38.2 mvmt

300 days per year for 2.5 years. It is not possible to properly lay and compact fill material on days of heavy rain and/or freezing weather. It is very likely that only 250 actual haul days may be available per year. The borrow sources may have additional restrictions. It is very likely that fill operations would be prohibited between 10 pm and 6 am; and it is very likely that the WSDOT and local cities would restrict the truck hauls during commuter peak periods -- 6-8 am and 4-6 pm. Therefore, it would be unrealistic to assume that the daily haul period would exceed 12 hours. It is very likely that truck peaking would occur during that 12-hour period; a 'peak hour factor' of 0.7 would perhaps be appropriate.

Average daily and peak hour truck movements to/from off-site borrow sites would be calculated as follow (off-site is any haul requiring use of the public road system to reach the fill site):

*Per DEIS, Appendix J Approach**

Earth Movement = Near-site of 5,554,500 cy + Off-site of 10,718,000 cy = 16.27 mcy

Trucks = 16.27 mcy / 22 cy per truck / 2.5 years / 300 days per year = 986 truck loads/day
x 2 trips per truck = 1972 truck trips/day
/ 16 hours/day = 124 pear hour trips

*NOTE: Section 23 of the DEIS is so confusing, it cannot be easily determined what was evaluated. It is assumed that its conclusions are based upon the Appendix J findings.

*Per Suggested Approach***

Earth Movement: Max 'Near-site' = 8.0 mcy; Max 'off-site' = 21.0 mcy; Total = 23.3 mcy (from Table IV.19-1 of DEIS Section __ 'Earth').

Trucks = 23.3 mcy / 22 cy per truck / 2.5 years / 250 days per year = 1695 truck loads/day
x 2 trips per truck = 3390 truck trips/day
/ 12 hours/day = 282 average hour trips
/ PHF of 0.70 = 404 peak hour truck trips

**NOTE: This more likely haul scenario would result in an average daily truck impact 72% greater than evaluated in the DEIS, and a peak hour truck impact 3.25 times that evaluated in the DEIS.

Maximum 'Near-site' truck movements = 8.0 mcy / 22 / 2.5 /250 x 2 = 1164 truck trips/day
(Impacts on Des Moines Memorial Drive) / 12 / 0.70 = 140 peak hour truck trips

Maximum 'Off-site' truck movements = 21.0 mcy / 22 / 2.5 / 250 x 2 = 3055 truck trips/day
(Impacts at SR-509/S. 160th?) / 12 / 0.70 = 364 peak hour truck trips

5. *Truck PCE Not Considered.* These large trucks with trailers are 76-feet long. In standing queues and in operating on flat grades, each truck is equal to three (3.0) passenger-car-

15. *Page IV.23-3, Off-Site . . .* Transportation impacts need to be totally reassessed in view of all comments above. Tables IV.23-1 and -2 appear to be missing. The off-site borrow sites are likely subject to permit restrictions commensurate with local road and land use conditions. These need to be researched and described.

16. *Page IV.23-4, Cumulative . . .* A more realistic set of worst case assumptions for truck haul rates will likely result in much worse findings relative to traffic operations impacts. LOS calculations must take into account truck PCE. Summary tables should be included here rather than by reference to Appendix J.

It would be desirable to disclose how many trucks and tires would be consumed by this operation, and what the total fuel consumption would be.

9. *Load Controls and Accidents Not Adequately Addressed.* The 4.0 mcy Mercer Island I-90 earth haul resulted in numerous accidents and incidents involving rocks and materials flying off the moving trucks on high-speed freeways and arterials. At least one fatal accident occurred as a result of a large rock flying through the windscreen of a following vehicle; and hundreds of windscreens and body damage incidents were reported. The I-90 earth haul (or other major haul operations) need to be evaluated and estimates prepared of number, type and frequencies of similar incidents that can be expected as a result of the runway fill operation. Strict load control mitigation must be identified and guaranteed.

10. *Air and Noise Impacts Need to be Revised.* The more realistic assessments of truck operations noted above would require major revisions of the air and noise sections of the EIS.

SPECIFIC COMMENTS - DEIS Section 23

11. *"Construction Impacts are short-term and temporary in nature."* Considering a 2.5-year period for the earth hauls, and up to a 10-year period of runway, terminal, terminal drive and parking structure construction, construction impacts cannot be accepted as "short-term and temporary".

12. *Methodology - Schedule.* As noted in comments above, a constant measured haul operation averaged over 16 hours per day, 6 days per week, 50 weeks per year is highly unlikely and inappropriate for use in measuring impacts. The EIS needs to more realistically assess the effects of peak hour and nighttime haul restrictions, and the effects of weather restrictions. Considering the broad fill area and the availability of up to 24 'near-site' and 'off-site' borrow sites, peak day and hour truck haul rates could be many times the 'average' rate measured evenly over the maximum number of days and hours available for the operations. A more realistic worst case assumption needs to be presented and evaluated; and mitigation needs to include controls to assure that these haul rates would not be exceeded.

13. *Page IV.23-2 - Data Inconsistent With Other Sections of DEIS and Appendices.* A major 'cleanup' is necessary to make the data on this page consistent with data presented in Section __ 'Earth' and in Appendix J (and vice-versa). A table similar to Table C-1 in Appendix J is needed to clearly establish relationships between earth quantities (both 'compacted' and 'loose') and numbers of daily and peak hour truck trips. These relationships need to include peaking characteristics and PCE relationships as presented in comments above. The term 'on-site' should be changed to 'near-site' where trucks will need to travel over public roads.

14. *Page IV.23-3, Column 1.* The impact assessments of 'near-site' haul operations needs to be revised to reflect the more realistic impacts suggested in comments above, and assuming the maximum of 8.0 mcy potential haul. Appendix J needs to be completely revised to match the earth quantities used here and in the "Earth' section of the DEIS, if it is going to be used for technical support of this section.

5. The DEIS notes that Miller and Des Moines Creeks "occasionally" violate Class AA water quality standards for selected parameters. The document also states that the quality during storm flow conditions generally appears to be good.. This is in conflict with the statement later on page IV.10-3 that says that Miller and Des Moines Creeks presently fail to meet many of the state water quality standards listed in Table IV.10-6.

6. Currently much of the terminal area de-icing activity occurs in areas served by the IWS. The runway de-icing activities, however, drain directly to the storm drainage system. Mitigation for urea and potassium acetate used for de-icing runways is described as a system that detects elevated levels of ammonia in the stormwater runoff and diverts flows then to the IWS treatment plant. There is no discussion of the treatment plant's capacity to handle this new flow.

7. There is discussion about heavy metals, particularly copper, lead and zinc, which is detectable in the stormwater runoff from the airport. Approximately 40% of total copper and zinc in the stormwater runoff may be in the form of dissolved metals. Dissolved metals are very difficult to remove from stormwater using standard stormwater quality related measures. These metals can pass sedimentation ponds and biofiltration swales and end up in the aquatic environment. Mitigation discussed in the DEIS concentrates solely on solid bound pollutants. Impacts to aquatic life are not addressed.

8. Groundwater quality is discussed in the DEIS and describes three distinct groundwater resources: shallow, intermediate and deep. The DEIS indicates that there is no comprehensive surveys or mapping of shallow groundwater in the vicinity of the airport. There is also no known use of shallow groundwater as a source of drinking water in the airport vicinity. Pumping of the Highline Aquifer has indicated that some of the shallow aquifers may in fact be connected to the deeper aquifers. Existing and future quality impacts to upper aquifers may affect the deeper aquifer which is used as a source of drinking water. There is not enough information on the groundwater existing condition to identify negative impacts and mitigation.

9. IWS Treatment Plant. The plant was constructed in 1968 to treat stormwater from certain parts of the airfield to reduce discharge of toxic material into Des Moines Creek. The plant is under an NPDES permit which allows for a discharge of 2500 gpm. This limitation is based on the share of the outfall pipe capacity with Midway Sewer District. The capacity of the plant, therefore, is restricted to that 2500 gpm rate and has been modified to provide storage in certain storm conditions so that water is slowly metered through the plant. The effluent of the plant is also restricted by the requirements of the NPDES permit.

a. The Port is supposed to be monitoring and recording the flow data from the plant to verify it is meeting the requirements of the permit.

b. The plant is designed to remove hydrocarbons and may not be removing other dissolved contaminants:

E. WATER QUALITY/SURFACE WATER

GENERAL COMMENTS

1. The opening statement of this section states that the Alternatives will 1) decrease the amount of rainfall infiltrating the soil, 2) increase runoff flow rates, and 3) increase runoff volumes. Of the three, only the increase in stormwater runoff flow rates is analyzed to sufficient detail to quantify impacts. There is very little discussion of how much infiltration is being lost and how this would be offset by mitigation. The DEIS states that the higher runoff volumes could be partially offset by stormwater infiltration where on-site soils are suitable, and goes on to say that stormwater infiltration also would recharge shallow groundwater. The type of soils that are prevalent in the area are glacial till which are not well-suited for groundwater recharge. Also the entire area of the fill needed to level the area of the new dependent runway effectively **decreases any chance of infiltration at the existing ground levels.**

SPECIFIC COMMENTS

Methodology

2. The analysis for the quantity related issues was accomplished using the HSPF model for Miller and Des Moines Creeks. Several "challenges" for developing and calibrating the model were identified in Appendix G- HSPF Hydrological Modeling Analysis. Generally, the model had to manipulate parameters outside of their normal ranges to simulate the recorded flows. The amount of deep aquifer recharge in the areas above Lake Reba was increased and the basin impervious areas were manipulated in an attempt to calibrate the model. This brings into question the underlying landuse and soils data used to create the existing conditions. This also highlights the lack of understanding the existing importance of the recharge system in the headwaters of Miller Creek. The report also indicates that the modeling of the existing stormwater facilities were based on pre-design information that may not reflect the built and operating conditions. King County stream flow data had many gaps and appears to have **erroneous readings. The use of parameter manipulation and questionable data indicates that the basin existing conditions are not accurately described.**

Existing Conditions

3. **There is little or no discussion on existing problems in the Miller and Des Moines creeks which may be exacerbated by the proposed projects. Documentation of flooding problems, streambank erosion, sedimentation and loss of habitat should be discussed in the EIS.**

4. **Appendix G- HSPF Hydrological Modeling Analysis states that further analysis of the 100 year storm should be undertaken during the design of the detention facilities. The 1990 storm had a low runoff volume. This was not discussed in the text of the DEIS.**

11. Miller Creek

a. Miller Creek is also a Class AA stream with several violations being noted. The airport consists of approximately 5% of the stream's 5000 acre basin. Considering that a basin experiences degradation at 10% basin development, 5% is a significant portion of the basin. Changes to impervious areas will impact the stream.

b. The runway project proposes to relocate approximately 3600 feet of Miller Creek in the vicinity of the northwest corner of the airfield. A 1994 report to the Port, Parergent Consultants, Inc., states that "Any proposed development within the creek (Miller) or its defined buffer areas, or which otherwise impacts the creek, such as drainage runoff, will be subject to extensive environmental impact assessment, permitting and mitigation requirements." Alternatives to creek relocation have not been clearly identified and assessed. Avoidance of creek and buffer impacts should receive serious consideration. Mitigation should not be confined to relocated portions of the creek as is implied in Chapter IV, Section 16, **Plants and Animals.**

c. The cumulative impacts of the changes to the basin have not been addressed by the DEIS.

Future Conditions

12. **Generally, the proposed DEIS Alternatives are not described in sufficient detail to identify the water quality impacts. The land side and terminal improvements' configuration, for example, will have a dramatic affect on utilities and potentially water quality. Relocation of fueling facilities may require extensive remediation and mitigation.**

13. **The document describes Alternatives 2, 3 and 4 as introducing approximately 98 acres of new impervious surface and 249 acres of fill area to drain to Miller Creek and approximately 95 acres of new impervious area and 299 acres of fill area would Des Moines Creek. This amount of land is significant and does not appear to address the borrow sites. The runway's proposal descriptions do not clearly identify borrow sites' impacts and mitigation.**

14. The DEIS also indicates that the runway construction, which involves clearing and grading of about 249 acres, would contribute significant quantities of sediment to Miller and Des Moines Creeks. It is unclear how the construction area of 249 acres relates to the previously stated 249 acres in the Miller Creek basin only. Construction impacts on surface water quality are not discussed in enough detail to understand their total impact on the water resources. The discussions on the temporary erosion and sediment control programs are generic and not specific to the proposed construction impacts. The assumption that construction BMP's will successfully mitigate the impacts to the stream is wrong.

214

c. Sludge from the plant has been removed from the lagoons and deposited in sites on and off airport property. This practice was stopped in the late 1980's. Where are these sites? These sites are not discussed in the DEIS. The location of these sites should be identified in relation to the proposed projects.

d. The 1993 studies indicate that the plant would have to be substantially upgraded or a new plant installed to provide capacity for both SASA and the dependent third runway. According to the NPDES permit, all hard stand which is exposed to aircraft traffic shall be treated through the industrial waste system. The DEIS has no discussion of plant capacity and proposed mitigations. New treatment facilities would need new permitted outfalls.

e. The SASA EIS indicated that the flow out of the ponds may reach 10 cfs which is greater than the amount identified in the permit. The assumption in the SASA EIS is erroneously based on the flow capacity of the outfall pipe prior to the installation of the diffuser. This may affect the size of the SASA IWS holding lagoon and the capacity of the outfall to handle the proposed projects.

f. Cross connections may exist between the storm drain system and the industrial waste system (KCM 1993, Anne Symonds, 1993). These should be identified as an existing condition that must be mitigated.

10. Des Moines Creek

a. Sea-Tax Airport comprises about 30% of the Des Moines Creek basin. This is a significant portion of the 3600 acre basin. The Creek is a Class AA stream and there have been several violations of the quality parameters for that category of stream. The airport's contribution to the degradation of Des Moines Creek should be clearly described in the existing conditions discussion.

b. The Des Moines Creek has experienced over the years habitat destruction caused by the urbanization of the basin. The impact of the SASA development is the reduction of flow rates to the stream. A large portion of the new development for SASA will be directed to holding ponds and industrial waste treatment systems. This treated water will be released to the existing industrial waste treatment outfall and disposed of to Puget Sound. Significant impacts to low flows are not discussed.

c. Borrow site development will have potential impact to Des Moines Creek by depleting shallow aquifers, increasing direct discharge of ground water to stream, increasing sediment loading, etc. These are not addressed in the DEIS.

214

Mitigation

21. Stormwater quality treatment would be provided in a combination of wet vaults and biofiltration swales. As noted, much of the heavy metals are in a dissolved form which are not effectively removed by either wet vaults or biofiltration swales. The suggested mitigation does not address many of the pollutant loadings on the two creeks.

22. The erosion and sediment control discussion is too generic to determine whether this mitigation would be adequate. The size of this construction project and its potential impact to the headwaters of two streams justifies a National Pollutant Discharge Elimination Permit for the construction project. Use of generic BMPs without enforcement capability invites severe problems. Pollutant loading will continue at an elevated level during the entire course of construction. Construction has been identified as taking 2-1/2 years working 50 weeks a year, 16 hours a day. Mitigation for the stormwater impacts, however, discusses conducting construction activities only during dry seasons (i.e. April through September) which would extend the construction period to 5 years.

23. The capacity of the IWS Treatment plant is not discussed in enough detail to determine whether the proposed mitigation will work or meet the requirements of the NPDES permit conditions.

24. Mitigation of runoff volume increase should include stormwater bypass system. The highly erodible condition of both Miller and Des Moines Creeks warrant this type of mitigation.

Normally, the BMP's are 60% effective. Uncontrolled construction site sediment loads have been reported to be on the order of 35 to 45 tons/acre/year. The potential loading to the streams from 249 acres is approximately 15,000 tons (40 tons/acre/year @60% removal over 2.5 years). Impacts to stream habitat are not fully disclosed or mitigated.

15. Destruction of shallow aquifers at the borrow sites and at the proposed project sites will significantly impact low flow water availability to the creeks. Simply stating that potential impacts on water quality are not expected is not really an accurate assessment of the situation.

Cumulative Impacts

16. Primary concern is the impact on both Miller Creek and Des Moines Creek that the potential reduction of low flows. Low flows are normally supplied by groundwater recharge. The problems encountered in replicating recorded flows with the computer generated flows indicates the lack of understanding the actual movement of the water and the interaction with the aquifers.

17. The proposed projects severely reduce the opportunities for groundwater recharge by increasing impervious area and surface routing water away from the site.

18. There is no mitigation specifically or adequately addressing the increase in runoff volume caused by the proposed projects. Although flow rates are discussed at length, flow volumes are not. Volume are increased by the proposal. The 2-year event is generally thought to define the stream banks. Extended duration and increased frequency of the 2-year event together with the reduction in low flow contribute to stream damage. Both Miller and Des Moines Creeks have existing problems with sloughing. Sediment from construction and subsequent streambank sloughing cause loss of habitat.

19. The borrow sites also provide an opportunity to lose shallow aquifers by cutting through and draining them. There is no discussion of the many impacts associated with the borrow sites.

20. Impacts not discussed:
    - Loss of aquifer recharge
    - Lake Reba degradation
    - Surface water discharge quality
    - Operation of existing flood control facilities
    - Treatment plant condition and operational failings
    - Secondary impacts caused by the proposed actions

215

BOEING

John F. Hayden
Vice President
Government Affairs

The Boeing Company
P.O. Box 3707, MS 14-49
Seattle, WA 98124-2207

July 31, 1995

REC'D ANM-610
PLAN, PGM, & C... ?
AUG - 3 1995
ANM-610___

Mr. Dennis Ossenkop, ANM-611
Federal Aviation Administration
Northwest Mountain Region
1601 Lind Ave. S.W.
Renton, WA 98055-4056

Dear Mr. Ossenkop:

The Boeing Company has reviewed the recently published Seattle-Tacoma International Airport Draft Environmental Impact Statement for the Master Plan Update. We appreciate the opportunity to comment on it.

In our opinion the draft EIS adequately depicts the impacts of the alternatives studied. It is one of the most comprehensive EISs ever written on an airport. But, most important, because it adequately discloses the impacts which must be mitigated, it allows the region to implement the alternative which is least disruptive to the environment and least costly, the third runway.

The data indicates that current capacity will exhaust early in the next decade. If no relief is provided, the economic health of this region and the state will begin to deteriorate. This will negatively impact the state's most prominent industries and approximately one in five jobs that are reliant on two-way international trade.

More specifically, Boeing has invested several billion dollars in capital facilities and product development in the Puget Sound Region since 1989. Much of our future competitive advantage is predicated upon our ability to move people and goods in a timely fashion. One of the strategic geographic advantages we enjoy is our close proximity to air, rail and sea transportation. Many of the parts we receive are fabricated in locations outside the State of Washington. We are a major global corporation with numerous international customers. We are also the major provider of spare parts for more than 6,000 of our aircraft that are in service throughout the world.

Boeing must be assured that the current service level of Sea-Tac will not worsen. Expeditious *adoption* of this EIS and *selection* of the third runway alternative is the best and surest action to maintaining or improving air service capacity for the ensuing thirty years at the least cost and in the shortest period of time.

215

BOEING

Mr. Dennis Ossenkop
July 31, 1995
page two

We recommend adoption of the EIS without further delay.

Thank you for the opportunity to comment on this significant project. If you have any questions please contact Frank Figg at 655-3640.

Sincerely,

John Hayden

John Hayden

cc: Jack Block, Port Commissioner
Pat Davis, Port Commissioner
Gary Grant, Port Commissioner
Paige Miller, Port Commissioner
Paul Schell, Port Commissioner
Slade Gorton, U.S. Senator
Patty Murray, U.S. Senator
Norm Dicks, U.S. Representative
Jennifer Dunn, U.S. Representative
Richard Hastings, U.S. Representative
Jim McDermott, U.S. Representative
Jack Metcalf, U.S. Representative
George Nethercutt, U.S. Representative
Linda Smith, U.S. Representative
Randy Tate, U.S. Representative
Rick White, U.S. Representative
Dean Thornton, Air Washington

216

REC'D ANM-610
PLAN, PGM, & CAP BR
AUG - 3 1995
ANM-610

August 3, 1995

Mr. Dennis Ossenkop
ANM-611, FAA
1601 Lind Ave.
Renton, WA 98055

Dear Sir:

Although I have not read all of the EIS on the third runway proposal, I still wish to make some general comments via questions.

R-13-32

For instance, in regard to the destruction of and tampering with the vital flood plain and drainage basin of Miller Creek, even to the point of diverting a major stream to hook up somewhere else so that the runway and its immense buffer zones of dirt can be built, tell me who then will be held legally accountable for detectable, injurious and irreversible changes which will undoubtedly result from this wholesale tampering with such an important set of geological features? When one considers that all this water, surface and subterranean, drains down into a few acres at the bottom of Normandy Cove, it is the survival of the whole west side that is in jeopardy. Does the tampering and altering that is necessary to ensure this compromised expansion plan have the express legal blessing of the Corps of Army Engineers, who have to decide the probability of future harm of a given region, depending on what happens "upstream"? Are these people going to be held responsible as well?

R-17-3

What about the tremendous new electrical needs that this incremental buildout of the airport is going to require, now and "unanticipated" future needs? Do you plan to approve for strategic reasons the mandated construction of a whole new power substation network and high power lines with their associated EMR risks for unfortunate Burien neighborhoods?

R-13-4

Also, there is the question of water potential. Where are the Port authorities going to get the water needed for their Airport City West? We barely have our own needs met. Will the Seattle Water District be responsible for the hardships and restriction this diversion of our water will bring in the near future?

The third runway will bring the landing paths right over main street in downtown Des Moines and the main area of West Seattle. Also, the confiscation of SeaTac and Burien homes west of the airport for this new runway and its new buffer lands (wherever they finally end) will bring the jets one-half mile closer to the heart of a city that has been here since 1883, a time period long before the airport and jets were a designated feature of the landscape around here. How can this sort of information be overlooked legally and

Page 1 of 3

216

-2-

R-4-18

morally? I have heard that the logical airport boundary is going to have to be hwy 501. Does the FAA realize what that does to Highline High School and its neighborhoods? Can you guarantee, by approving this EIS, that the noise (decibel) levels will be harnessed and lowered, and incidentally, that the "kerosene rain" falling from descending, slowing jets is going to be well under the allowed limits of petroleum distillate concentrations for populated areas?

In deference to the monied Eastsiders who so piteously complained about those planes flying over their previously quiet neighborhoods (before Temple Johnson and the Four Post Plan), will the Port then revert to bring in as many planes as it can over Des Moines and West Seattle to mollify those who demand a change back to the old flight path into Sea-Tac? If so, this will be quite illegal and the Port will be held accountable for breaking its agreements with the FAA and the regional governments and, of course, the people who live here.

R-7-21
R-12-6

Whose island, by the way, is going to 'removed" for this soil project? Barring all other potential disastrous outcomes of the monumental tampering, whose home is the Port going to declare surplus for it needs?

R-4-9

Where is the forthcoming Global Positioning Satellite System in this scenario? An alternative such as this is already in use in Alaska and is a perfect answer to the "compelling reasons" listed by the Port for the necessity of the third runway. It beats the MLS all to bits and it makes the side-by-side landings in marginal weather a safe and uncomplicated reality.

R-4-4

In the meantime, I wish to know exactly why the "third runway" can only be located at Sea-Tac. Where does the safety responsibility lie when a region has a Federally built county airport at its disposal and is not allowing or mandating its use as a reliever airport (Paine Field)? What Federal Court do we as citizens turn to make the FAA do its duty by us, the beleaguered people of the region? Direct flights out of Paine are crucial at this point in time. Senators Magnuson and Jackson expressly procured Paine for this very reason! A detrimental environmental impact is partly resulting from Paine Field's not being utilized as it legally should. Danger is being generated from this withholding, I believe.

I don't know what the FAA expects to gain by helping give birth to this project when all these things are tremendous question marks and, when all is said and done, committing this very liveable metropolis to tremendous amounts of escalating jet noise bombardment and pollution because, having cancelled out all alternatives, Sea-Tac has now become the "only choice." What a future to look forward to.

216

-3-

Respectfully,

S. G. Schneider

S.G. Schneider
16446 9th SW
Burien, WA 98166

217

Washington State Department of Transportation
Sid Morrison
Secretary of Transportation

Office of Urban Mobility
401 Second Avenue South, Suite 307
Seattle, WA 98104-2862

(206) 464-5878 /SCAN 576-5878
Fax (206) 464-6084

August 3, 1995

REC'D ANM-610
PLAN, PGM, & CAP BR
AUG - 8 1995
ANM-610

Mr. Dennis Ossenkop
Federal Aviation Administration
Northwest Mountain Region
1601 Lind Ave S.W.
Renton, WA 98055-4056

DEIS Master Plan Update at Seattle-Tacoma International Airport

Dear Mr. Ossenkop:

Thank you for the opportunity to review the Draft Environmental Impact Statement (DEIS) for the Master Plan Update for the Seattle-Tacoma International Airport. The DEIS shows a need to address the poor weather operating capability of the Airport to accommodate forecasted growth in passengers, cargo and aircraft operations. The focus of this proposal is the third runway which will allow for more simultaneous landings during peak periods.

In summary the DEIS evaluates:

- Development of a third runway;
- Extension of Runway 34R;
- Development of Standard Runway Safety Areas for existing Runways;
- Terminal improvements and expansion;
- Parking and access improvements and expansion;
- Development of the South Aviation Support Area;
- Relocation, redevelopment and expansion of support facilities.

The Puget Sound region is forecasted to add an additional 1.5 million residents by the year 2020. This significant population growth will increase demand for air and surface transportation. WSDOT recognizes that the development of the third runway and expansion of support facilities will provide economic benefits keeping the State and Puget Sound region nationally and internationally competitive by creating a more efficient air transportation system for the movement of both people and freight.

217

Mr. Dennis Ossenkop
Seattle-Tacoma Airport DEIS Review
August 3, 1995
Page 2

WSDOT also recognizes that the current 19 million annual passengers at Sea-Tac will increase to 38 million passengers per year, and that the current daily vehicle trips per day to the airport will increase from 87,600 to 161,500, with or without the construction of the third runway by 2020. The DEIS concludes therefore that the construction of the third runway will not create any adverse impact on the regional surface transportation system as compared to the no-build alternative.

WSDOT's view of this proposal is that it does discuss the three basic functions of airside capacity, terminal configurations and ground transportation. Each of these elements must be in balance to provide for an effective and efficient regional hub airport. WSDOT is very concerned about the adequacy of ground access facilities to balance with projected airport demand. Therefore, our following comments concentrate on ground transportation issues.

Sea-Tac is a regional transportation facility and relies on the regional surface transportation system to transport people and freight to and from the airport. Nearly every trip coming or leaving the airport site is on a state route. This includes SR 99, SR 518, I-5, I-405 and SR 509. Therefore, WSDOT feels it is important that the DEIS consider the airport within a regional context recognizing current and future deficiencies of the regional highway network.

Currently the regional highway network experiences significant delays on roadways accessing the airport as presented in the document. It is understood that 1993 August daily activity at the airport was 46,000 air passengers using ground access with another 18,000 visitors and 10,000 employees. For the air passengers and visitors the mode split was: 70% by private automobiles, 12% by courtesy buses from within the city of SeaTac, 8.5% by for-hire shuttles, 5% by rental cars, 2.5% by taxis, and 1% by public transit.

R-9-13

It appears that the DEIS has extended current mode splits out to 2020 and does not identify any shift or means to shift future mode splits. It is doubtful the regional system will be able to accommodate a 203% increase in future demands generated by airport growth without significant shift in travel mode. WSDOT questions whether this assumption is reasonable considering the PSRC's Metropolitan Transportation Plan (MTP) prioritizes Transportation Demand Management (TDM) and transit as important techniques to address growing travel demand. We also question if this meets the project objectives as stated in the Port Resolution 3125 to "Promote regional transit and reduction in use of automobiles". Assuming the continuation of current 89.5% access by automobile and 9.5% access by private or public coaches not only affects the degree of impact on the state's regional

217

Mr. Dennis Ossenkop
Seattle-Tacoma Airport DEIS Review
August 3, 1995
Page 3

highway network but also directly affects sizing of airport on-site facility needs such as parking requirements and curb zones.

R-9-13

One method to accommodate growing travel demand which is in accordance with regional policy is to aggressively pursue alternative modes of transportation for people traveling to and from Sea-Tac. WSDOT is working closely with the Port of Seattle's Aviation Division and a number of other major employer in the SeaTac area on formation of a Transportation Management Association (TMA). We strongly encourage active and on-going participation in and support for such a group in SeaTac. Several TMA's across the country have been organized around airports and have created TDM programs for employees and, in at least one case, have also successfully operated TDM programs aimed at air passengers accessing the airport on ground transportation.

The DEIS identifies Airport peak hours as 11:00 AM to 1:00 PM and the highway peak period between 3:00 PM and 6:00 PM. Although it appears that airport and highway peaks don't occur at the same time, regionally the fastest growing travel period is mid-day and the MTP indicates peak periods will continue to spread to beyond 5 hours. WSDOT requests the DEIS acknowledge impacts on the ground transportation system beyond current peak periods by assuming extended peak periods in 2020.

R-9-2
R-9-3

WSDOT recognizes that when the analysis for the DEIS was being prepared, the preferred alternative for the MTP contained congestion pricing (Package 3) which has since been supplanted in the final adopted MTP by a moderate capital strategy (Package 2). Although the congestion pricing package showed limited effects on local transportation facilities, the removal of congestion pricing results in poorer performance of the regional transportation system in terms of congestion. Therefore, WSDOT believes it is appropriate to reconsider the regional distribution of trips to identify the impacts on the regional transportation networks' ability to serve the airport.

The DEIS assumes:

- the construction of the Regional Transit Authority system;
- the extension of SR 509 and South Access; and
- the completion of the freeway and major arterial High Occupancy Vehicle (HOV) system.

WSDOT believes that the construction of the third runway, the RTA, the SR 509/South Access, and HOV system projects are mutually supportive, improving the efficiency of air and ground transportation in the movement of goods and people. However, the construction of SR 509/South Access, the

217

Mr. Dennis Ossenkop
Seattle-Tacoma Airport DEIS Review
August 3, 1995
Page 4

RTA and completion of the HOV system are not forgone conclusions; currently no construction funding has been identified to complete any of these projects.

R-8-2
R-8-3

With current public transportation carrying less than 1% accessing the airport, and with RTA forecasts of only 1200 daily boarding at the SeaTac station, a with and without condition of the RTA may not significantly affect the airport decision process. For the purposes of public information the DEIS should address this.

In regards to SR 509, the DEIS assumes that nearly a quarter of terminal traffic will access the Airport via the South Access roadway. If in fact the SR 509/South Access is not constructed those trips will have to be accommodated at the North Access point or through city of SeaTac streets, potentially having adverse impacts. Therefore, as requested in our February 25, 1994 Agency Scoping Letter, WSDOT requests that the DEIS consider scenarios with and without the construction of SR 509 to determined the impacts of the increased air travel demand on the ground transportation system.

The Southcenter Interchange at I-5 and I-405/SR 518 is a critical bottleneck in the ground transportation system with the vast majority of airport trips passing through. As documented in the DEIS the level of service here is "F". Current analytical procedures are unable to show the continued degradation of traffic flow that will occur in the forecast years. Nor is methodology sensitive enough to differentiate between impacts created by airport related, and "other" increases in traffic volumes on the regional network.

R-8-12
R-8-16

The SR 509/South Access project will provide an alternative route to the heavily congested Southcenter Interchange and allow for more efficient movement of freight to and from the airport. This project is recognized as beneficial to the Port of Seattle under current conditions and increasingly so in the future. WSDOT understands the critical public partnership with the Port of Seattle that is needed to provide acceptable ground access facilities including obtain funding to implement the SR 509/South Access project. Therefore, we request the commitment of the Port of Seattle as part of the development of the Sea-Tac Airport Master Plan to participate in a partnership with WSDOT to address funding of the SR 509/South Access project. The linkage of the airside, terminal and ground access facilities are fundamental to an effective regional hub airport. Specifically, WSDOT requests commitment in the Airport Master Plan Update EIS to fund the South Access Roadway and a pro-rata share to fund the link from the South Access to Interstate 5. This request is predicated on a build alternative selection of the current SR 509/South Access Corridor EIS work.

R-8-24

217

Mr. Dennis Ossenkop
Seattle-Tacoma Airport DEIS Review
August 3, 1995
Page 5

The north terminal expansion option calls for reconstructing the North Access Road. It also considers a new interchange on SR 518 at 20th Avenue South. While WSDOT is willing to work further with the Port on this concept of a new interchange there are a number of concerns that must be addressed. The current interchange on SR 518 serves South 154th Street as a regional arterial. Closing this access point for a 20th Avenue South location would need to be considered from the city of SeaTac view for access and circulation to the surrounding area. The 20th Avenue South site also is well less than a mile from the Des Moines Memorial Drive Interchange. The state's concern is with adverse effects to the operation of SR 518 due to merging and weaving traffic movements. If the north terminal option is pursued further, a specific evaluation of this proposed interchange will need to be made using a "six-point added access" evaluation. Final approval would be needed by WSDOT. Based on the drawings provided in the DEIS, WSDOT would not allow such an interchange to be constructed without closure or major modifications of the upstream and downstream interchanges. Funding for such work on SR 518 would be the responsibility of the proponent.

R-8-25

The DEIS presents the significant earthwork required to build the third runway. Potential pit sites have been identified. WSDOT requests that pit site work in the locations concurrent with a final SR 509/South Access alignment be final graded to accommodate the highway meeting acceptable design standards.

R-3-28

Depending on the build alternative selected, between 10 and 14 million cubic yards of fill could be trucked into the site with as many 1,984 trips a day added to the area roadway system. Off-site truck trips is calculated to average about 82 trips per hour. Due to the significant truck haul of material to the site for the earthwork from across the region and the identified impacts, WSDOT requests that the Port coordinate construction activities and scheduling with our Construction Coordinator's office. In addition a firm commitment must be made to mitigate any resulting infrastructure damage from this intensive hauling effort.

R-12-8
R-12-15
R-12-26

To summarize, WSDOT requests the following:

- Evaluate means to enable mode shifts in ground access transportation to higher occupant vehicles consistent with the Metropolitan Transportation Plan;

217

Mr. Dennis Ossenkop
Seattle-Tacoma Airport DEIS Review
August 3, 1995
Page 6

- Acknowledge in the EIS impacts on the ground transportation system recognizing spreading peak periods in airside and ground transportation projected to occur in 2020;
- Present in the EIS impacts to the surface transportation system based on the adopted MTP (package 2) without the assumption of congestion pricing;
- For purposes of public information discuss the proportion of trips to SeaTac that will be accommodated by the RTA;
- Identify regional distribution of trips generated by the airport in order to identify impacts on the regional network;
- The DEIS shou[illegible]vide an analysis with and without SR 509 Extension/South Access;
- The Port of Seattle should participate in a partnership with WSDOT to address funding issues for the construction of SR 509/South Access, and commit to fund the South Access roadway and a pro-rata share of the South Access to Interstate 5 link of SR 509;
- If the north terminal expansion option is chosen, fund the reconstruction of the North Access Road and a new interchange on SR 518 at 20th Avenue South;
- Grade the final SR 509/South Access alignment within pit sites to meet design standards; and
- Coordinate construction activities, construction mitigation measures and scheduling with WSDOT's Construction Coordination office and commit to mitigate direct roadway damage based on earthwork haul.

Thank you for the opportunity to review the DEIS. If you have any questions regarding these comments, please contact myself or Craig Stone at 464-6017.

Sincerely,

Renée Montgelas

Renée Montgelas
Director, Office of Urban Mobility

RM/CJS:cah

cc: Bob Aye, Acting Regional Administrator, Northwest Region
Bill Brubaker, Director, Aviation Division
Charlie Howard, Manager, Transportation Planning Office

218

REC'D ANM-610
PLAN, PGM, & CAP BR
AUG - 3 1995
ANM-610

HIGHLINE WATER DISTRICT

Serving the Southwest Metropolitan Area since 1946

July 27, 1995

CERTIFIED MAIL
Return Receipt Requested

Mr. Dennis Ossenkop
ANM-611
Federal Aviation Headquarters
Northwest Region, Room 540
1601 Lind Avenue SW
Renton, WA 98055-4056

Re: <u>SeaTac Airport Master Plan - Update Draft EIS</u>

Dear Mr. Ossenkop:

Highline Water District has some major concerns with regard to the potential improvements outlined in the SeaTac Airport Master Plan Update Draft EIS.

At the present time Highline Water District has production capability and is using 2.5 MGD of groundwater from the Highline intermediate aquifer. The District also hold water rights for an additional 15 MGD withdraw from the natural groundwater within the area.

R-13-21A

The EIS document does not adequately define the aquifer system, and the system could better be defined by use of cross-sections based on well logs. The EIS indicates that fuel from the airport and auxiliary operations has contaminated both the shallow and intermediate aquifers in a number of locations. The contamination in these areas may, over the years, migrate into the aquifers being used by Highline Water District. If this were to occur, the contaminated potable water would become a health hazard.

R-13-21B

In order to mitigate this existing health hazard, the contaminated groundwater and fuel must be removed. This removal should precede any expansion of the existing SeaTac facility and be made a prerequisite to issuance of any new permits for construction at SeaTac.

C:\PAT\KAH-EIS

23828 · 30th Ave. S. · P.O. Box 3867 · Kent, WA 98032 · 824-0375 / FAX: 824-0806

218

Mr. Dennis Ossenkop

The EIS documents also indicate that approximately 0.5 MGD of precipitation presently naturally recharging the aquifers will be diverted into surface water for Miller Creek and Des Moines Creek. Removal of this natural groundwater from the area may require that an alternate new source of water be purchased by the Highline Water District. The capital cost to obtain a new water source is estimated at $4 million per one MGD of water! As a possible mitigation for the Port's removal of the groundwater recharge water from the system there should be payment of $2 million to the Highline Water District. R-13-29

An alternative mitigation measure would be to treat the surface water runoff and directly inject it into the existing groundwater aquifers. The proposed mitigation for loss of wetlands (construct new wetlands outside of the area) does not reduce the impact on water purveyors within the SeaTac area. R-13-32

Mr. Ossenkop, these two issues (contamination and diversion of potable water) should be addressed, and acceptable mitigation measures should occur before any development project at SeaTac goes to construction.

Please feel free to contact me at the number shown below, Ext. 142, if you have any questions.

Very truly yours,

Keith Harris

Keith Harris, P.E.
Manager
Planning and Construction

KAH:w

cc: Peggy S. Rosley, General Manager, HWD

C:\PAT\KAH.EIS

219

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101
July 24, 1995

REC'D ANM-610
PLAN, PGM, & CAP BR
AUG - 4 1995
ANM-610

Reply To
Attn Of: WD-126

Dennis Ossenkop
Federal Aviation Administration
Northwest Mountain Region
1601 Lind Avenue Southwest
Renton, Washington 98055-4056

Dear Mr. Ossenkop:

In accordance with our responsibilities under the National Environmental Policy Act and Section 309 of the Clean Air Act, the Environmental Protection Agency has reviewed the draft Environmental Impact Statement (draft EIS) for Proposed Master Plan Update Development Actions at Seattle-Tacoma International Airport. The draft EIS analyzes 3 action alternatives to meet the objectives of the purpose and need as well as a No Action alternative.

The draft EIS is a very thorough document. The background information provided is useful in order to understand the complexities of airport operations. The draft EIS is very well-referenced and very well-organized.

Our review revealed a number of important concerns regarding purpose and need for the project and air quality analysis. We have rated the draft EIS EO-2 (Environmental Objections -- Insufficient Information). Our enclosed comments explain the basis for that rating and make suggestions for the final EIS.

This rating and a summary of our comments will be published in the *Federal Register*. A copy of our rating system is enclosed. Thank you for the opportunity to review this draft EIS. Please contact John Bregar at (206) 553-1984 if you have any questions about our comments.

Sincerely,

Richard B. Parkin

Richard Parkin, Acting Chief
Program Coordination Branch

Enclosures

cc: Barbara Hinkle, Port of Seattle
Gene Peters, Landrum and Brown
Mary L. Vigilante, Landrum and Brown

Printed on Recycled Paper

Environmental Protection Agency Comments on the Draft Environmental Impact Statement for Proposed Master Plan Update Development Actions at Seattle-Tacoma International Airport

General Comments

The basic premise for construction of the proposed third runway and associated terminal options is to reduce aircraft delay and increase terminal capacity. The draft EIS does not contain adequate information to easily understand why the purpose and need statement does not include the need to enhance capacity at the airport. In general, there is an overwhelming sense from the document that infrastructural improvements at the airport are designed to increase capacity. The final EIS should place further emphasis on foreseeable indirect effects resulting from increased capacity. The following points in particular should be further analyzed in the final EIS: R-3-4 R-3-24

- An analysis of the third runway as a departure runway. The third runway will be located an additional 2500 feet from the existing runway 16r/34L. The additional few minutes of taxi time during a potentially busy day could be justified to reduce even more substantial delays from ques waiting to depart from the closer runways. R-3-25

- An analysis of simultaneous departures. FAA Advisory Circular #150/5300-13 Change #4, 11/10/94, page 11 states at #2(b) "Simultaneous radar departures require a parallel runway centerline separation of at least 2500 feet (750m)." The EIS states that aircraft operations are expected to increase by 23% over present conditions in the year 2020. If growth continues beyond this time, or if unanticipated growth occurs before 2020, the capacity of three runways may be stretched. R-3-36

- The final EIS should re-model the noise and air impacts using revised peak hour figures for arrivals and departures. We recommend three new model runs using higher total operations numbers that analyze the following: 1) A high number of departures against a low number of arrivals, 2) a high number of arrivals against a low number of departures, 3) an equal number of arrivals and departures. Total operations should start at present (1995) with a maximum of 90 operations per hour. As stated in the Technical Memorandum, Environmental Screening of the Master Plan Update Preliminary Airside Options, September 20, 1994, "...the maximum throughput of Sea-Tac is 78 operations per hour." Contrary to this statement, according to S46 Traffic Management Unit Traffic Count Worksheets for June 7, 1995 through June 10, 1995, peak hour operations reached a maximum of 86 at 0300 hours (Zulu) on June 7, and there were R-10-13 R-10-14

6 occasions where peak hour operations exceeded 80. In addition, peak hour departures are stated in Table D-1 for 1994 to be 43.90. Traffic counts during the above three days recorded 6 instances of more than 54 departures per hour. These three days are representative of average days in June. There were no unique circumstances to elevate the peak levels. Therefore, we feel it is quite reasonable to assume that during a particularly busy day in a peak month (August) operations could easily reach 90 per hour and perhaps more. For future calculations, the final EIS should evaluate peak operations at a much higher peak hour level. We would recommend using numbers that are 23% higher for the year 2020, consistent with the expectations in the above paragraph. Please refer to the following air comments for the importance of peak hour figures. R-10-13 R-10-14

Comments on the Air Quality Analysis contained in the Sea-Tac 3rd Runway Draft EIS

Chapter IV, Section 9

Overall, we believe that the presentation of the results of the air quality analysis could be streamlined in the main body of the final EIS. For example, for purposes of describing impacts for the existing conditions and for the proposed alternatives, the presentation of maximum modeled concentrations is all that is needed to judge impacts relative to applicable ambient air quality standards. Tables IV.9-5 through IV.9-10 present more information than is necessary to define existing conditions and project-related impacts, and we believe that they are ultimately more confusing than clarifying in nature. Because the information contained in these tables are contained in Appendix D, we recommend that they be summarized to clearly present the "bottom-line" results in Section 9 of Chapter IV. Similarly, it appears that it would be more appropriate to place Figures IV.9-4 and IV.9-5 in Appendix D. R-10-51 R-10-13

Appendix D

Section (3)(A)1 of Appendix D states that the aircraft emissions inventory is based on a "peak month annualized average day level" derived from the June 1994 Official Airline Guide. It is unclear what a "peak month annualized average day level" is. From an air quality perspective, keeping in mind that some of the ambient air quality standards are short-term in nature (24-hours averaging time or less), it is not clear that "annualized average" activities are appropriate for characterizing potential project impacts relative to short-term standards. It is our understanding that the values in Table D-1 are associated with August (the "peak" month) departures. We have concerns that these levels, while reflecting conditions associated with

219

monthly-averaged peak aircraft traffic, may not adequately reflect activity levels that could be associated with maximum short-term air pollutant concentrations. The final EIS should clearly explain what daily and/or hourly levels are being used in the analysis, how those levels were derived, and why those levels are appropriate for use in the analysis presented in the draft EIS. It may be worthwhile to develop "worst-case" hourly operation levels (both present and future cases) and meteorological scenarios associated with the different VFR and IFR categories and evaluate each scenario to identify "worst-case" hourly air quality impacts. R-10-52

It is difficult to determine how the peak hour departure values presented in Table D-1 were derived. It is our understanding that information developed as part of the Capacity Enhancement Study was used to estimate the peak hour activity levels in the air quality analysis. Unfortunately, the report entitled Seattle-Tacoma International Airport, Data Package No. 11, Airport Capacity Enhancement Plan Update, dated April 1995, provides information that does not provide an understanding as to how the values contained in Table D-1 were ultimately determined. Additional clarification as to the data sources and methodologies employed is needed to understand how peak hour departures (or any other operation, for that matter) were calculated. R-10-14

The proposed project is identified as being necessary to reduce arrival delays, yet the analysis evaluating potential air quality impacts from the project seems to focus on emissions (and associated air quality impacts) related to departure queue delays. The draft EIS states that a reduction in operating delay would reduce pollutant concentrations, primarily in the areas where departure queues occur and concludes that "the primary measures for reducing aircraft emissions are through a reduction in delay time aircraft incurred on arrival and departure from the airport." It is difficult to determine, based on the information presented in the draft EIS, whether the change in arrival rates has been adequately reflected in the air quality impact analysis. It seems reasonable to conclude that with decreased delays in arrivals, potentially more aircraft will be arriving at the airport on an hourly basis (and under conditions characterized by poor dispersion meteorology). Has the effect of increased emissions associated with increased approaches and landings been addressed in the analysis contained in the draft EIS? Because this type of change is directly linked to the purpose of the proposed project, such conditions should be incorporated into the air quality analysis presented in the final EIS. If such conditions are reflected in the analysis, the final EIS should clearly present how this type of information has been used in the analysis. If they have not, the analysis (and associated discussion in the draft EIS) should be revised to reflect the potential impact of increased hourly arrival rates. R-10-52 R-10-13

219

In the discussion of the development of the emissions inventory, the draft EIS indicates that taxi-in and taxi-out times are based on "existing airfield taxi distances and aircraft speeds." It is difficult to determine from the information presented whether the increased taxi-in times (associated with the more distant proposed runway) have been included in the development of the inventory, and the subsequent modeling analysis. If current airport activities have been used in the evaluation of the proposed alternatives, we have concerns that increased emissions associated with the increased taxiing time/distance from a new runway have not been adequately reflected in the analysis.

In an attempt to place the present analysis in some sort of regulatory context, Page D-15 discusses the differences between the assumptions used in the analysis conducted for the draft EIS and those used by PSAPCA in the derivation of the CO, NO_x, and VOC inventories for 1990. Another technical effort related to the evaluation of air quality near Sea-Tac is the modeling analysis conducted by the Department of Ecology in early 1991. Members of the public are aware of this work and are concerned with the differences between the results presented in the draft EIS analysis and those developed by Ecology. We recommend that the final EIS present/acknowledge that earlier work more completely and provide sufficient information to explain why/how the draft EIS analysis differs from that work.

We remain unconvinced that the screening analysis is adequate for identifying locations of maximum concentrations warranting further evaluation with a more refined technique (see our letter at end of Appendix D). We acknowledge that the screening technique applied is a useful methodology for identifying the potential for the project to pose adverse air quality impacts. The method used extrapolates 1-hour average predictions to longer time periods using common scaling factors. This generally produces conservative (high) estimates of the magnitudes of project impacts. Very often, however, maximum concentrations of averaging periods longer that 1-hour are not found at the same location (downwind distance and/or direction) as the 1-hour maximum when estimated using measured meteorological parameters. Hence, the methodology should not be relied upon for identifying locations of maximum impacts. We have questions as to whether maximum project-related air quality impacts have been identified and, therefore, we recommend that locations (and magnitudes) of maximum project impacts be determined using the meteorological measurements taken at Sea-Tac. Additionally, we recommend that the first sentence of the <u>Results of the Screening Dispersion Analysis</u> section on page D-23 be modified to be consistent with the foregoing discussion. R-10-13

R-10-10

It is not clear that the receptor areas selected for the refined analysis represent areas of maximum air quality impacts in ambient air. Ambient air is any area with unrestricted public access to the general public. The analysis conducted in support of the proposed project must demonstrate that ambient air quality standards will not be violated in ambient air. Figures indicating where access is controlled by the Port and restricted to the general public should be included in the final EIS and accounted for in the air quality analysis (e.g., assessment of "fenceline" impacts). Additionally, figures contained in the Appendix D (as well as Chapter IV, Section 9 of the draft EIS) do not identify the location of the proposed runway for the different alternatives. Such figures would be extremely useful in interpreting the modeling results.

Figures D-1 through D-4 contain no scales to readily assess the spatial extent of the modeling analysis. These figures, as well as those presented in Chapter IV, Section 9, should be modified to include information to aid in understanding the receptor spacing used in the modeling analysis (i.e., scales).

Results for the screening analysis are summarized in Tables D-5 through D-8 identifying receptors by a numbering system which is not defined in the text or on any figure. Clarification of the locations of the receptors identified (1-15) should be provided in the final EIS.

The current analysis assumes that all NO_x emissions are converted to NO_2 for purposes of comparison with the annual-average NO_2 NAAQS of 0.053 ppm. Pending changes to the Guideline on Air Quality Models (Revised) (40 CFR 51, Appendix W) include a method by which annual NO_2 concentrations can be estimated from modeled NO_x concentrations using an ambient ratio method proposed by Chu and Meyer (attached). While not officially incorporated into EPA guidance as of this date, we believe that the method is appropriate for use and is applicable for estimating annual NO_2 impacts for the proposed project. For purposes of comparison with the NAAQS for NO_2, all modeling results should be presented as NO_2, not NO_x (as presented in the current draft EIS).

R-10-12

It is not clear that 12 receptors per intersection are adequate to identify maximum impacts in the CAL3QHC analysis. The final EIS should provide the rationale used for defining the receptor network used in the analysis.

It is difficult to determine the distance receptors were placed from the roadway in the intersection modeling analysis. EPA guidance recommends that receptors be placed at least 3 meters from traveled roadways. Region 10 interprets this guidance to mean that receptors should be placed 3 meters from traveled roadways, as long as the receptor locations would be considered to be in ambient air. Consequently, we recommend that

the intersection analysis be revised to include receptors located 3 meters from traveled roadway links. This will allow for a more thorough assessment of ambient CO concentrations in the vicinity of the airport. Because the modeling suggests that the potential for violations of the 8-hour CO NAAQS appears to be very high at both intersections, we strongly recommend that the Port conduct CO monitoring using standard reference methods at one or both intersections. The intersection of South 188th and Pacific Highway is of particular interest due to the large number of predicted concentrations well above the 8-hour NAAQS. The monitoring would ensure that existing CO levels have been adequately and accurately characterized at these critical intersections.

R-10-30

In the discussion of the ambient monitoring networks operated by PSAPCA and Ecology, data from the monitoring sites "closest" to the airport are presented. First, we recommend that these data be updated to reflect the most current information available. Second, because a monitoring location that is physically "closest" to the airport does not necessarily mean that measurements from that location are representative of conditions at the airport, we recommend that maximum concentrations measured throughout the monitoring network be presented in the final EIS. Worth noting in the summary of the networks were the two exceedances of the ozone (O_3) standard at the Enumclaw site and one exceedance of the O_3 standard at the Pack Forest site in July 1994 and an exceedance of the 8-hour CO standard in Bellevue in January 1995.

R-10-27

It is difficult to determine the adequacy of the CALINE3 modeling analysis of impacts from construction-related vehicles, particularly the assessment of PM_{10} impacts. The draft EIS states that construction activities could generate between 52 and 82 truck trips per hour, yet the modeling analysis employed an assumed 57 trips per hour. The final EIS should clarify why the use of 57 trips per hour is appropriate for estimating potential maximum short-term PM_{10} levels. The final EIS also needs to provide the basis/rationale used to define the roadway links modeled. Justification for the number of receptors used (and their placement 60 feet from roadway) is also needed. It also appears the modeling may not have included the contributions of reentrained roadway dust to predicted PM_{10} concentrations. PM_{10} emission factors presented on page D-69 would suggest that only tailpipe (and perhaps brake and tire wear) emissions were evaluated. If necessary, the analysis contained in the draft EIS should be revised to ensure that reentrained roadway dust is reflected in the modeled results. Finally, it is difficult to determine if fugitive dust emissions associated with activities in the "borrow" areas have been evaluated as part of the draft

EIS analysis. The impact of these emissions should be integrated into the analysis contained in the final EIS. As with all the modeling analysis, pollutant levels should be predicted in "ambient" air. R-10-27

In its summary of the air monitoring conducted in the vicinity of the airport in 1993 (see page D-66), the draft EIS points out that measured levels of certain toxic constituents exceeded the annual-average ASILs (acceptable source impact levels) established by Ecology and then concludes the discussion with a statement that indicates that those levels are typical of urban areas. First, it is difficult to conclude that sampling conducted during an extremely limited sampling effort (4 days) can be used to define ambient levels as "typical." The Port should be cautious in concluding that the results their monitoring effort is of sufficient "robustness" to draw conclusions about "typical" conditions. Secondly, as it is presented in the draft EIS, one is presumably left to conclude that because the measured values have been interpreted to be "typical" of urban levels, those levels are not of concern. If the final EIS is to present and discuss the results of the monitoring study (as it should), further elaboration as to the potential implications of the measured values is warranted. R-10-72 R-10-29

The draft EIS indicates that potential cancer risks associated with current aircraft activities and airport configuration were estimated. Because aircraft activities and airport configurations are projected to change with the implementation of any of the future "build" options, the final EIS should include some estimate of potential incremental changes to risks associated with those changes. R-10-66

In the discussion of <u>stability class</u>, we recommend that the word "unusually" be deleted from the last sentence of the last paragraph on page D-21. R-10-73

91-180.6

Use of Ambient Ratios to Estimate Impact of NOx Sources on Annual NO_2 Concentrations

Shao-Hang Chu
Edwin L. Meyer
U.S. Environmental Protection Agency
Research Triangle Park, North Carolina

Air & Waste Management Association
Since 1907

For Presentation at the
84th Annual Meeting & Exhibition
Vancouver, British Columbia

INTRODUCTION

A relatively straightforward methodology for estimating the effect of sources of nitrogen oxides (NO_x) emissions on annual nitrogen dioxide (NO_2) concentrations is desirable for two reasons. The first of these is as a means for evaluating whether a proposed source may consume more than the allowable PSD increment. The second reason is to provide a means for ranking control priorities for sources which contribute to observed violations of the National Ambient Air Quality Standard (NAAQS) for NO_2. The PSD regulations for NO_2 were developed under Section 166 of the Clean Air Act[1]. These regulations require all applications for major new stationary sources and major modifications emitting NO_x to provide numerical estimates of NO_2 impacts to serve as a basis for comparison against PSD "increments." In cases where a violation of the NAAQS for NO_2 is observed, it is necessary to propose remedial measures which, if implemented, would likely lead to attainment of the NAAQS. A method such as the one we describe here may prove useful in diagnosing causes for a high NO_2 problem by identifying single or small groups of sources which may be contributing to the observed problem.

The two principal NO_x species are nitric oxide (NO) and NO_2. For most sources, NO_x emissions consist primarily of NO. This NO is converted to NO_2 by various processes, including reaction with ozone and highly reactive free radical species. The NO_2 thus formed is acted upon by sunlight or reacts with free radicals found in the ambient air to produce ozone, organic nitrates, and nitric acid.

Given the reactive nature of NO_x, a rigorous numerical analysis of long-term NO_2 increments would require sophisticated photochemical dynamic modeling. This is not only complex but also burdensome. Therefore, no currently available photochemical models are designed for accurate estimation of annual concentrations of any reactive pollutants. The US EPA Guideline on Air Quality Models (Revised)[2] suggests a three-tiered screening approach for major point sources. Each tier relies on Gaussian dispersion modeling of total emitted NO_x. The first level screen assumes that all emitted NO is converted to NO_2. This gives the most conservative estimate. The second and third level screens use the ozone limiting method (OLM)[3] to estimate the amount of NO_2 converted from NO. Although the OLM procedure can reduce some of the overestimates, it is subject to several potential shortcomings: (1) the assumed conversion of the emitted NO to NO_2 may oversimplify the governing atmospheric chemistry[4]; (2) chemical conversion of NO may be overestimated by assuming complete mixing of the plume with the ambient air[4]; and (3) no pollutant sink (e.g., conversion to nitrates or nitric acid) is considered[5].

In order to provide a more refined but not resource-intensive technique to estimate annual NO_2 concentrations resulting from NO_x point source emissions, an ambient ratio method is proposed. In this method, we argue that, for long-term estimation, the

219

photochemical conversion of NO to NO_2 is essentially controlled by the characteristics of the ambient air. This, in turn, is reflected in the annual NO_2/NO_x ratio monitored downwind. Thus, since the complex photochemistry is implicitly accounted for by the annual NO_2/NO_x ratios, no sophisticated photochemical modeling is needed. In this paper, we demonstrate a methodology of using standard regulatory Gaussian models coupled with the monitored annual NO_2/NO_x data which is capable of providing reasonable estimation of NO_x emission impact on annual NO_2 concentrations. This method relies only on the availability and accuracy of monitoring data and the application of standard Gaussian modeling techniques.

RATIONALE FOR THE AMBIENT RATIO METHOD

The observed ratio of $(NO_2)/(NO_x)$ can be viewed as a resultant measure of the atmospheric oxidizing ability to convert NO to NO_2 in the vicinity of the monitoring site. This oxidizing ability reflects not only the governing chemistry, but the physical dilution/mixing and deposition rates as well. Thus, given the locally predicted NO_x concentrations (obtained with Gaussian models), the NO_2 concentrations can be obtained by the following relationship:

$$(NO_2)_p = (NO_x)_p \times \left(\frac{(NO_2)_{av}}{(NO_x)_{av}}\right)_o \qquad (1)$$

where p : Predicted
o : Observed
av: Averaged over a given period of time

For an instantaneous or a short-term estimate of NO_2 concentration from an individual source, very little would be gained by using equation (1) because the NO_2 and NO_x concentrations would have to be measured simultaneously along the plume. However, if a long-term average is to be estimated, the ratio of the annual NO_2 and NO_x monitoring data at some distance downwind can be used in equation (1) to greatly simplify the estimation.

The use of long-term averaged monitoring $(NO_2)/(NO_x)$ ratios in the methodology described herein is justified for several reasons: First, the plume NO-NO_2 conversion has to be limited by the ultimate atmospheric oxidizing ability downwind. Second, the long term evolution of nitrogen oxides has to reach the steady chemical balance with the ambient atmosphere. Thus the amount of plume NO_2 that can be converted from NO emissions should be governed only by the ambient atmospheric oxidizing ability

downwind and not by the characteristics of any single NO_x emission source. Atmospheric oxidizing ability, in turn, is reflected in the observed ambient ratios of annual averages of NO_2 and NO_x data. Statistics of currently available annual $(NO_2)/(NO_x)$ ratios nationwide are shown in Figure 1 for 1980-1989. The ratios are calculated from annual averages of NO_2 and NO_x for all days with minimum NO_x concentrations greater than or equal to 20 ppb. This 20 ppb lower limit is imposed to avoid potentially large errors introduced by small signal to noise ratios typical of current monitoring instruments at low ambient levels of NO_x. Two features stand out in the data. First, in the last 10 years (1980-1989), for over 80 percent of nationwide NO_2 data collected at monitoring sites reporting 70% or more data completeness, the annual $(NO_2)/(NO_x)$ ratios lie between 0.48 and 0.74. The 90th percentile ratio calculated from the most recent three year (1987-1989) data base is 0.75. Second, the year-to-year variability of any single station's ratio is less than 10 percent. The robustness of the ratios implies that, on an annual basis, the resultant atmospheric oxidizing ability to convert NO to NO_2 is relatively stable and obviously not single source dependent.

Furthermore, since chemical reactions take place at a molecular level, the plume NO-NO_2 conversion rate close to the source is essentially limited by the rate of turbulent mixing with the ambient air. At some distance (> 10 km) away from the source, however, the plume is well mixed with the ambient air. Hence, the downwind plume NO-NO_2 conversion rate is governed almost entirely by the chemical characteristics of the ambient air. Thus, the quasi-steady state (or the long-term averaged) plume NO_2/NO_x ratio, which is a measure of the optimum plume NO-NO_2 conversion rate, will have to approach the rather stable ambient value at some distance downwind. Clear evidence of plume NO_2/NO_x ratios reaching quasi-equilibrium state with the ambient air at some distance downwind is noted in a number of observational studies of power plant plumes[4,6].

THE PROCEDURE AND EXAMPLES

The Ambient Ratio Method is applied in the following manner.

1. Use an appropriate Gaussian model, such as ISCLT, consistent with recommendations in the US EPA Guideline on Air Quality Models (Revised)[2] to calculate the maximum annual averaged NO_x concentration due to dispersion alone from any point source and/or from small groups of point, area or mobile sources of NO_x. Here, NO_x is treated as if it were a non-reactive pollutant.

2. Locate an ambient NO_2 monitor within the predicted impact area at a distance sufficiently far downwind to avoid the relatively low and rapidly changing zone close to the source, yet near enough to share the same chemical characteristics of the ambient air. A suggested range is between 15 to 80 km. Here, "downwind" means in

219

the general direction (± 22.5°) of the predicted maximum concentration from the source(s).

3. Use the most recent data from the NO_2 monitor to calculate the ratio of annual averages of NO_2 and NO_x concentrations. At least one year of data is required, however, an average of 3 consecutive years ratios would be preferred. For example, if an application for an operating permit were being considered during 1991, only the most recent year of monitoring data is required, but data from 1988-90 would be most desirable. Exclude all days with daily averaged NO_x concentrations less than 20 ppb to reduce the error-to-signal ratio. In addition, we recommend use of the ratios of the annual averages instead of the annual averages of the ratios in the estimation of the $(NO_2)/(NO_x)$ ratios. This is likely to reduce bias introduced by errors in the data base.

If the NO_2 monitor is in a large city, only the ratios of annual daytime (7 AM to 6 PM) averages of NO_2 and NO_x concentrations are recommended because urban ratio of annual averages tend to be biased toward the low side due mainly to the influences of significant nighttime emissions of area sources, particularly, the nighttime traffic.

4. Apply equation (1) to calculate the annual NO_2 increment.

5. If no NO_2 monitor is within 15 to 80 km downwind of the source, we recommend use of a national default value of 0.75 for the NO_2/NO_x ratio. This corresponds to the 90th-percentile value observed for all sites reporting both NO_2 and NO_x data during 1987-89.

6. If it is desired to assess relative contributions of different source(s) to an observed violation of the NAAQS for the purpose of ranking control priorities only, superimpose calculated maximum source contributions at the given monitoring site over the observed annual NO_2 concentrations, determined consistently with monitoring guidance[8].

Examples of different applications are shown in Table 1 for the following situations

1. urban/suburban application

2. rural application

3. application in areas where no monitor is available within 15 - 80 km downwind.

1744

COMPARISONS AND DISCUSSION

The Ambient Ratio Method, while retaining simplicity, appears to provide conversion rates for annual NO_2 concentration estimations which are consistent with case study results observed downwind from individual sources of NO_x. In a recent study of power plant plumes, Janssen et al. (1988)[9] showed in their 10 years of aircraft measurements that the average plume $(NO_2)/(NO_x)$ ratios tend to level off at a distance less than about 15 km downwind of the sources (Figure 2). Earlier studies of selected power plants in the United States by Keifer (1977)[8] also found similar results (Figure 3). Builtjes' (1981)[11] wind tunnel data also showed that along the plume centerline the $(NO_2)/(NO_x)$ ratios start to level off at some distance downwind from the source (Figure 4).

The good agreement between the averaged $(NO_2)/(NO_x)$ ratios recommended in the Ambient Ratio Method and those measured in the plume studies described above supports the theoretical arguments made earlier on the applicability of using downwind monitoring data to estimate long-term averaged NO-NO_2 conversion rates for sources of NO_x. However, we believe estimates obtained with the Ambient Ratio Method are still likely to be conservative. This conservatism results from the likelihood that the calculated maximum annual NO_2 concentrations are generally located less than a few kilometers from the source, where the plume $(NO_2)/(NO_x)$ ratios are somewhat smaller (due to incomplete mixing) than the ambient monitored values. This is demonstrated in Figure 5. Nevertheless, a comparison with other screening techniques shown in Table II reveals that for annual NO_2 estimates, the Ambient Ratio Method is less conservative than both the total conversion and ozone-limiting screening procedures. The reason that the ozone-limiting method does not seem to help in reducing the overestimation by total conversion is probably due to its oversimplified assumptions on photochemistry and complete mixing all the time.

Because of the data dependent nature of this technique one has to be aware of some limitations that are inherent in the method. These are summarized below.

1. Most of the NO_2 monitors are located in large cities or their suburbs. Therefore, there may be situations where no monitor is available within the impact range of 15 - 80 km, and the previously described national default conversion factor has to be applied.

2. The chemiluminescent instruments currently used in NO_2 monitoring are known to have relatively large errors in detecting NO_2 less than about 20 ppb. In order to minimize the estimation errors, it is suggested that, until better instruments become routinely available, only data with daily averaged NO_x concentrations greater than 20 ppb be used in the calculations. This may eliminate or greatly curtail use of rural NO_2 data to derive NO_2/NO_x ratios.

SUMMARY

In this paper, we have proposed an alternative screening method that, although likely to be conservative, is somewhat less so than existing screening methods for estimating annual PSD NO_2 increments for NO_x sources. This method is easy to apply because it relies only on the standard regulatory Gaussian models and data from nationwide NO_x monitoring networks. Since the photochemistry involved in converting NO to NO_2 is implicitly accounted for by the annual NO_2/NO_x ratio monitored downwind, no long-term complex photochemical calculation is needed. Thus, it makes the modeling exercise much simpler, yet still provides results consistent with available plume observational studies. For these reasons, we believe that the proposed Ambient Ratio Method is worthy of consideration for calculating maximum impacts on annual NO_2 concentrations from one or a group of NO_x emission sources. The procedure is summarized as follows:

1. Use an appropriate Gaussian model as described in the US EPA Guideline on Air Quality Models (Revised)[2] to calculate the maximum annual average NO_x concentration due to dispersion from any NO_x source. Here, NO_x is treated as if it were a non-reactive pollutant.

2. Locate a downwind NO_x monitor within the impact area at a distance ranging from 15 to 80 km in the general direction (± 22.5°) of the predicted maximum concentration.

3. Calculate the averaged ratio of annual averages of monitored NO_2 and NO_x concentrations for the three (or, if necessary, at least one) most recent years. Exclude all days with daily averaged NO_x concentrations less than 20 ppb to reduce the error-to-signal ratio. If the monitor is in a large city, only the ratios of annual daytime (7 AM to 6 PM) averages of NO_2 and NO_x concentrations are recommended.

4. Apply equation (1) to calculate maximum annual NO_2 increment.

5. If no NO_x monitor is within the range of 15 to 80 km downwind of the source, a national default value of 0.75 is recommended for the $(NO_2)/(NO_x)$ ratio.

6. If it is desired to rank which source or small group of sources may be most useful to control in order to reduce observed violations of the annual NO_2 NAAQS at a monitoring site, two additional steps are necessary:

a. ensure the observations at the monitoring site in question are sufficiently numerous and appropriately distributed throughout the year for assessing compliance with the NAAQS[10];

b. superimpose the calculated annual NO_2 impact of the modeled source(s) at monitoring site with an observed annual NO_2 average, determine as recommended in 40 CFR 50.11[10].

ACKNOWLEDGMENTS

The authors are grateful to Dr. Marcia C. Dodge and Dr. Aubrey P. Altshuller for reading the original manuscript and helpful discussions. Thanks also go to Mr. Phil Gibbs and Mr. Keith A. Baugues for preparing the data.

DISCLAIMER

This paper reflects only the authors' own views and does not necessarily reflect the U.S. Environmental Protection Agency's policy.

REFERENCES

1. Federal Register: 40 CFR 51 and 52. Prevention of Significant Deterioration for Nitrogen Oxides, Final Rule, (October 1988).

2. Environmental Protection Agency: Guideline on Air Quality Models (Revised), EPA-450/2-78-027R, Research Triangle Park, North Carolina, (July 1986).

3. Cole, H. S. and J. E. Summerhays: "A review of techniques available for estimating short-term NO_2 concentration," JAPCA, Vol. 29, No. 8, 812-817, (1979).

4. Georgopoulos, P. G. and J. H. Seinfeld: "Mathematical Modeling of Turbulent Reacting Plumes - II. Application to the NO-NO_2-O_3 System," Atmospheric Environment, Vol. 20, No. 9, 1809-1818, (1986).

5. Keyes, D. L., M. A. Scruggs and Kumar, B.: "A Reexamination of Ozone Limiting Approach to Estimating Short-Term NO_2 Concentrations," JAPCA, Vol. 31, No. 6, 671-673, (1981).

6. Richards, L. W.: "Comments on the Oxidation of NO_2 to Nitrates - Day and Night," Atmospheric Environment, Vol. 17, 397-402, (1983).

7. Russel, A. G., G. J. McRae and G. R. Cass: "The Dynamics of Nitric Acid Production and the Fate of Nitrogen Oxides," Atmospheric Environment, Vol. 19, 893-903, (1985).

8. Keifer W. S. II: "The generation of ozone in plumes from large point sources dealing with power plants and other rural point sources," PhD dissertation, University of Maryland, (1977).

9. Janssen, L. H. J. M., J. H. A. van Wakeren, H. van Duuren and A. J. Elshout: "A classification of NO Oxidation Rates in Power Plant Plumes Based on Atmospheric Conditions," Atmospheric Environment, Vol. 22, No. 1, 43-53, (1988).

10. Federal Register: 40 CFR 50.11 National Primary and Secondary Ambient Air Quality Standards for Nitrogen Dioxide, (June 1985).

11. Builtjes, P. J. H.: "Chemically reacting plume experiments for the wind tunnel." Netherlands Organization for Applied Scientific Research. Division of Technology for Society Ref. No. 81-013563, File No. 8710-20330, (1981).

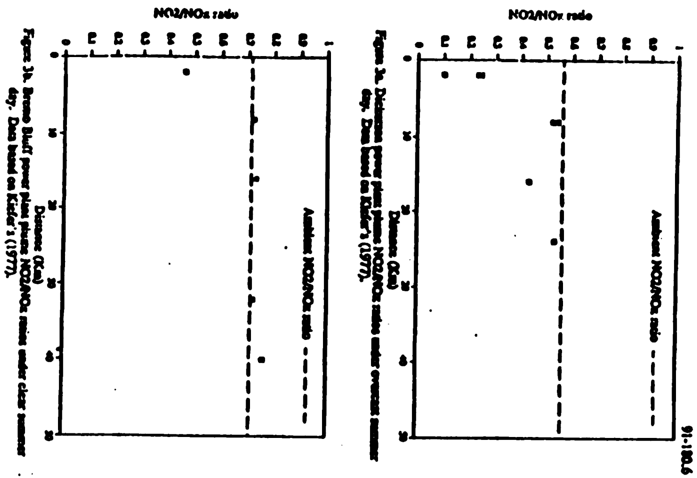


Figure 3b. Bremo Bluff power plant plume NO2/NOx ratios under clear summer day. Data based on Kiefer's (1977).

Figure 3a. Dickerson power plant plume NO2/NOx ratios under overcast summer day. Data based on Kiefer's (1977).

12

91-180.6

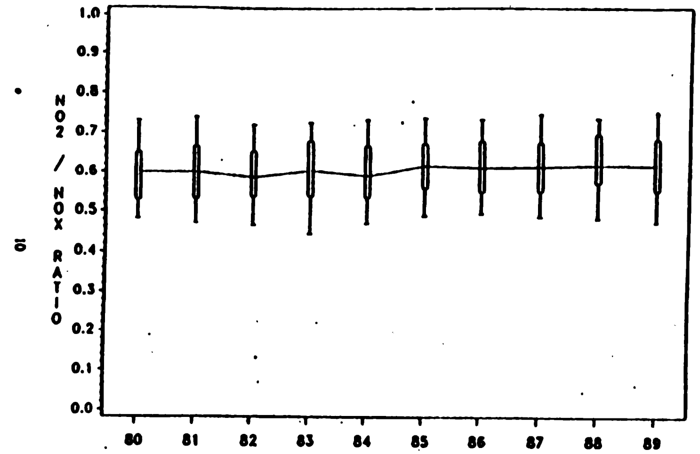


FIGURE 1. NO2/NOX RATIOS FOR CONTINENTAL U.S.

10

91-180.6

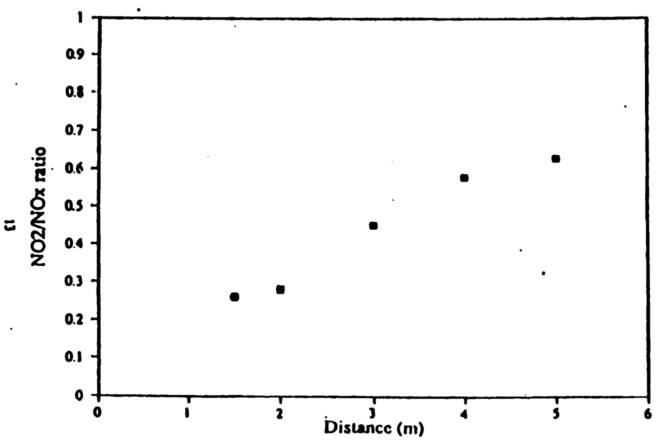


Figure 4. Wind tunnel plume NO2/NOx ratios. Here the corresponding field distance scale is .5 km to 1 m wind tunnel distance. Data based on

13

91-180.6

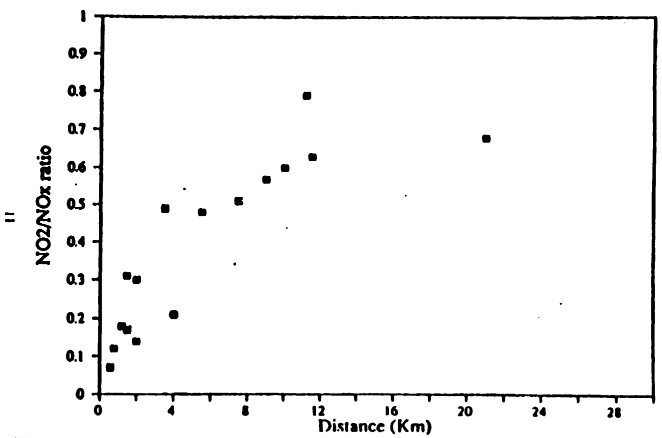


Figure 2. Power plant plume NO2/NOx ratios measured in spring/autumn under ambient ozone 40-60 ppb, and wind 5-15 m/s. Data based on Janssen et. al.

11

91-180.6

Table II. A Comparison of Various Estimation Methods

A. Source

The same NO_x point source listed in Table I is used in this comparison.

B. Comparisons

1. Urban/Suburban Environment

City	Predicted NO_x Conc. (ug/m3)	Annual 03 Conc. (ug/m3)	Annual NO_2/NO_x Ratio	Estimated Annual NO_2 Conc. (ug/m3) TCM	OLM	ARM
Los Angeles	76.6	62.2	.61	76.6	69.9	46.7
Chicago	31.8	60.8	.51	31.8	31.8	16.2
Houston	25.6	73.0	.56	25.6	25.6	14.3

2. Rural Environment

City	Predicted NO_x Conc. (ug/m3)	Annual 03 Conc. (ug/m3)	Annual NO_2/NO_x Ratio	Estimated Annual NO_2 Conc. (ug/m3) TCM	OLM	ARM
Los Angeles	17.91	50.0*	.75**	17.9	17.9	13.4
Chicago	13.97	50.0*	.75**	14.0	14.0	10.5
Houston	8.97	50.0*	.75**	9.0	9.0	6.8

* a natural background value is assumed
** a national default ratio is applied
TCM — Total Conversion Method
OLM — Ozone Limiting Method
ARM — Ambient Ratio Method

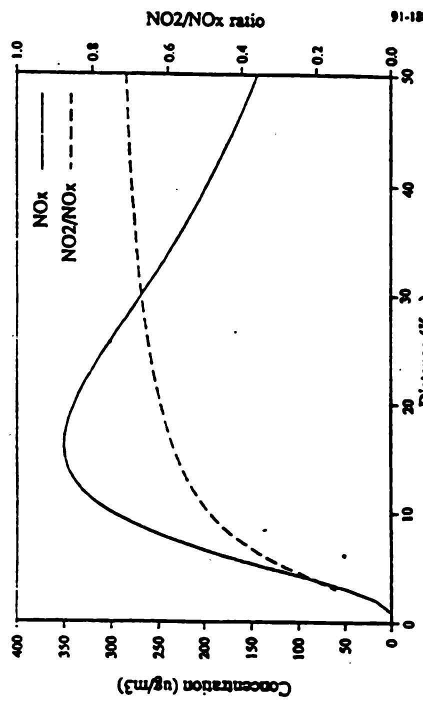


Figure 5. Spatial relationship between ground level maximum NOx concentrations and plume NO2/NOx ratios

Table I. Examples of Applying Ambient Ratio Method

A. Model Source Parameters

Source: Type	Capacity	Emission: Rate (g/s)	Stack: Ht. (m)	Dia. (m)	Vel. (m/s)	Temp (K)	Building: Ht. (m)	Wd. (m)
Electric power plant	5300 million Btu/hr	549.3	65.0	6.1	15.2	415	40.0	40.0

B. Gaussian Dispersion Calculation: ISCLT Model Run Output

Area	Year	Predicted Max. Annual NO_x Conc (ug/m3) Urban/Suburb	Rural
Los Angeles	1983	76.6	17.9
Chicago	1983	31.8	14.0
Houston	1983	25.6	9.0

C. Ambient Ratio Method (ARM)

$(NO_2)_e = (NO_x)_e \times (NO_2/NO_x)_e$

D. Estimated Maximum Annual NO_2 Concentration Using ARM

	Area	NO_x Conc. (ug/m3)		NO_2/NO_x Ratio Obs (Default)*		NO_2 conc. (ug/m3)
Urban/ Suburban	Los Angeles	76.6	x	.61 (.75)	=	46.7 (57.5)
	Chicago	31.8	x	.51 (.75)	=	16.2 (23.9)
	Houston	25.6	x	.56 (.75)	=	14.3 (19.2)
Rural	Los Angeles	17.9	x	(.75)	=	(13.4)
	Chicago	14.0	x	(.75)	=	(10.5)
	Houston	9.0	x	(.75)	=	(6.8)

*National Default NO_2/NO_x Ratio

219

U.S. Environmental Protection Agency Rating System for
Draft Environmental Impact Statements
Definitions and Follow-Up Action*

Environmental Impact of the Action

LO - - Lack of Objections

The Environmental Protection Agency (EPA) review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

EC - - Environmental Concerns

The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce these impacts.

EO - - Environmental Objections

The EPA review has identified significant environmental impacts that should be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no-action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

EU - - Environmentally Unsatisfactory

The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the Council on Environmental Quality (CEQ).

Adequacy of the Impact Statement

Category 1 - - Adequate

EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis of data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

Category 2 - - Insufficient Information

The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses or discussion should be included in the final EIS.

Category 3 - - Inadequate

EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the National Environmental Policy Act and or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

* From EPA Manual 1640 Policy and Procedures for the Review of Federal Actions Impacting the Environment. February, 1987.

220

REC'D ANM 610
PLAN, PGM, ... BR
AUG - 4 1995
ANM-610

5007 S. Brandon
Seattle WA, 98118
Aug. 1, '95

Dear Mr. Ossenkop,

R-1-5

As a concerned Rainier Valley resident, I urge you to extend the August 3rd deadline for considering the Environmental Impact Statement on the Seatac Airport third runway issue. Despite an earlier extension, I seriously question whether federal guidelines for public comment have been met.

R-1-2

Have the communities to be affected been adequately informed? As evidence to the contrary, I note that five copies of the EIS were placed in the Beacon Hill Library but none in the Columbia City Library, which many believe to serve a more "impacted" area. It was only last week that a copy was sent down from Beacon Hill (at user request), while a copy that Jeannette Volland (of the downtown library's Government Publications Department) forwarded to Rainier Beach Library in June cannot be found. Does its disappearance perhaps reflect cost-cutting procedures of the FAA, which shipped these lengthy documents to the downtown Seattle library as loose sheets of paper, boxed and nothing more. "I couldn't believe it," says Volland. "Next time send bound copies!"

R-1-4

Are you also aware that significant numbers of South Seattle area residents do not read English? Thus, public service agencies truly interested in getting information to a broad spectrum of the population translate at least a portion of their message (commonly into Spanish and major Asian languages). Have you made any efforts in this direction? Have you put notices in any of our community newspapers? If so, I would be interested to know where and when.

R-1-10

I realize that the EIS is a highly technical document, not easily reduced to the length of other public service notices; that the issues are not only couched in technical language--they're profoundly middle-class, which is to say, unlikely to incite to action those who are still struggling to pay the rent and put food on the table. So the Rainier Valley, with its relatively low-cost real estate, is a natural target for environmental degradation. Does that make it a fair target? Where, in a plan that puts most at risk from airplane noise and airplane emissions those who use airplanes the least, is environmental equity?

R-8-18

And has the FAA counted long-term health costs? Less evident than the aggravation of jet noise, the health costs of fuel emissions (and fuel dumping?) are admittedly speculative. But it is a known fact that the Rainier Valley has the largest

220

concentration of infants and youth in the county. We have a tremendous human investment here; has the FAA taken it into account?

I wonder, too, if the FAA cares that Seattle's current city leaders have made upgrading the quality of life in the Rainier Valley a priority; that they see the valley's ethnic mix (white, black and Asian, in roughly equal parts) as a springboard to sustained growth, sustained community pride. Efforts have started to pay off, too, in big and little ways, visible and not so visible. A vacant lot four blocks from me that's now a thriving P-patch; three bits of barren ground that neighborhood volunteers planted this year with rugosa roses (bought through a city grant); the fanciful "whirligigs" decorating bus stops along Rainier Avenue; former home renters who are now, thanks to the Homesite Project, home owners.... But the whole enterprise is undermined--or rather, overwhelmed--by the noise overhead. More and more, I am told, househunters are having second thoughts about buying into an area apparently "written off" by aviation experts.

R-5-5
R-4-18

Now airplanes are a fact of modern life. They have to take off and land over someplace. But do flight patterns that mean dramatically increased air traffic over the Rainier Valley make sense, even from the aviation standpoint?

The Port of Seattle tells us that "nothing has changed since 1990." Perhaps nothing has changed on paper, but in the skies above us something has definitely changed for the worse this year. Are we seeing perhaps the implementation of the 1990 flight plans, as set forth in the third runway EIS? Or is there another explanation? Whatever is happening here, we need to know more about it.

R-5-4

Extending the EIS comment period would not only bring more citizens to the table; it would enable the FAA, I hope, to ascertain and make public the facts of the matter. (Have you monitored air noise over the Columbia City area this summer, for instance? Have you measured the decibel increase as planes bank overhead to the northwest--having first followed a far more easterly route, up Martin Luther King and Rainier Avenue, than they were previously observed to follow?)

R-1-5

The third runway is not necessarily the issue here. Seemingly attendant flight patterns are. We need more information on what is still a very confused and troubling situation. We need more time.

Sincerely yours,
Jean Lepley
Jean Lepley

Copies to Patty Murray, Gary Locke, Larry Gossett, Ron Sims
Norm Rice...

221

Dennis Ossenkop
FAA
Airports Division

Re: Proposed Third Runway/Seattle Tacoma International Airport

Dear Mr. Ossenkop:

We respectfully request that our entire property be included in the noise abatement program offered to neighbors of the Seattle Tacoma International Airport. The program boundaries as currently drawn bisect our property such that half of our property is included in the noise abatement program and the other half is not.

R-6-27

We are owners of Glen Acres - a condominium community - including Glen Acres Golf Course, Clubhouse, swimming pool, tennis courts and other amenities. We own 225 homes in this condominium community located to the North of the airport in Boulevard Park (Glendale Way and 10th Avenue South). The golf course is the front yard of our homes. We believe that the intent of the Port of Seattle through its noise abatement activities is to protect their neighbors from noise and other damages suffered as a result of having the airport as their neighbor. We believe that the boundaries as currently proposed, bisecting our property, are in need of revision.

R-5-4

We want to be good neighbors and feel certain that the Port of Seattle wishes to be a good neighbor as well. By our signature we request a positive response to our request that our entire property be included in the noise abatement program.

Thank you.

Marion B. Terrell

Address: 10750 - Glen Acres Dr S
Seattle, Washington
98168

REC'D ANM-610
PLAN, PGM, & CAP BR
AUG - 4 1995
ANM-610 ______

222

Dennis Ossenkop
FAA
Airports Division

Re: Proposed Third Runway/Seattle Tacoma International Airport

Dear Mr. Ossenkop:

R-6-27

We respectfully request that our entire property be included in the noise abatement program offered to neighbors of the Seattle Tacoma International Airport. The program boundaries as currently drawn bisect our property such that half of our property is included in the noise abatement program and the other half is not.

R-5-4

We are owners of Glen Acres - a condominium community - including Glen Acres Golf Course, Clubhouse, swimming pool, tennis courts and other amenities. We own 225 homes in this condominium community located to the North of the airport in Boulevard Park (Glendale Way and 10th Avenue South). The golf course is the front yard of our homes. We believe that the intent of the Port of Seattle through its noise abatement activities is to protect their neighbors from noise and other damages suffered as a result of having the airport as their neighbor. We believe that the boundaries as currently proposed, bisecting our property, are in need of revision.

We want to be good neighbors and feel certain that the Port of Seattle wishes to be a good neighbor as well. By our signature we request a positive response to our request that our entire property be included in the noise abatement program.

Thank you.

George E. Hales
Address: 10748 Glen acres Dr
Seattle Wa 98168

REC'D ANM-610
PLAN, PGM, & CAP BR
AUG - 4 1995
ANM-610

223

F.A.A.
DENNIS OSSENKOP
AIRPORTS DIVISION, ANM-611
1601 LIND AVE. S.W.
RENTON, WA 98055-4056

REC'D ANM-610
PLAN, PGM, & CAP BR
AUG - 4 1995
ANM-610

AUGUST 1, 1995

DEAR MR. OSSENKOP:

R-5-4

RECENT CHANGES IN THE FLIGHT PATTERNS TO AND FROM SEA-TAC AIRPORT HAVE CREATED A NOISE LEVEL IN OUR CENTRAL DISTRICT NEIGHBORHOOD THAT IS INTOLERABLE. PLEASE RECORD MY OBJECTION TO THE CHANGES.

TO THE BEST OF MY KNOWLEDGE, NO ENVIRONMENTAL IMPACT STATEMENT WAS WRITTEN FOR THE CENTRAL DISTRICT NEIGHBORHOODS REGARDING THE NEW NOISE INTRODUCED BY REDIRECTED AIR TRAFFIC.

WE WOULD APPRECIATE BEING INCLUDED IN ANY FUTURE STUDY OF THIS ISSUE.

SINCERELY,

Craig A. Borgmann
CRAIG A. BORGMANN
1102 18TH AVE.
SEATTLE, WA. 98122

224

REC'D ANM-610
PLAN, PGM, & CAP BR
AUG - 4 1995
ANM-610

Ruth Catherine West
10746 Glen Acres Dr. S.
Seattle, WA 98168
(206) 242-0636
FAX (206) 246-1695

June 21, 1995

Dennis Ossenkop
FAA Airports Division
1601 Lind Ave S.W.
Renton, Washington
98055-4056

RE: Seattle Tacoma International Airport Proposed Third Runway

Dear Mr. Ossenkop

R-4-4

We own a condominium located in Glen Acres which represents 341 residents and owners. We are located a tad north/west of 112th South, primary described as Boulevard Park. Our condominium complex parallels the Glen Acres Golf and Country Club which is directly under the Sea/Tac flight path.

My first request will be directed at a more concise plan for your Committee to view very closely at thereby utilizing - other (less used) Airports presently existing in the Washington State vicinity, i.e., Bellingham, Paine Field, McCord, and mostly well equipped Moses Lake Airport - which could be operated for all International Flights. However, this would involve developing a fast rail system - such as the Bart Rail System used in San Francisco - to transport International Passengers to and from Moses Lake. I am certain the calculated costs involved would be a great deal less than the extreme costs of both purchasing and/or soundproofing residential dwelling involved. All parties involved are aware that the existing Sea/Tac Airport is located in a very congested area with absolutely no room for expansion. Another suggestion, a second Airport to be built and located somewhere on the Peninsula - which holds a vast area for expansion.

The Boeing Company or their competitors could design and build - small, quite, fast commuter planes to transport passengers to and from Satellite airports throughout Washington State.

R-18-29
R-5-4

My second attempt is to convince your Committee against a third runway and /or expanded air flights. This is from the Human Health aspect, which relates to; 1) Noise - which is evidenced to cause - hearing loss, impact on speech communication, sleep interruption and believe me at 4:00 a.m. - when one or more of the overloaded, under powered cargo planes - skims your roof top - rattling both your dwelling and your brain -

224

R-18-29
R-5-4

not only do you lose sleep - it can cause one to experience physiological paranoia. Also, when a plane - lets say several planes - they are spaced just moments apart - never mind talking or listening to a phone call. 2) Air Quality - Toxic air contaminants are a significant concern to citizens in the vicinity of the Airport and after careful study of the 1995 Sea/Tac International Airport Environmental Impact Statements (3 volumes) - I discovered the measures of Sea/Tac Airports Air Quality Standards appear higher than the average level for human consumption. Particularly measured high were Benzene, Butadiene and Formaldehyde. Not to mention the added measures of the remaining fifty two additional pollutants that are also, generated from Air Traffic. The Impact Statements clearly state and validate the high risk of cancer to residents residing in close proximity of both Airport and Flight Paths who inhale these pollutants. 3) Water Quality - It is also, documented the great potential risk to human health involving ground water from aircraft pollutants into the drinking water supply (i.e., from the Highline Aquifer wells). There is a risk of aircraft pollution to the deeper Highline Aquifer from leaking fuel distribution systems or fuel spills at the Sea/Tac Airport. Significant contamination of this drinking water supplies can occur from accidental and uncontrolled release of pollutant to the soils in areas of permeable strata (e.g., advance and recessional outwash). This holds extremely true here at Glen Acres Golf and Country Club and residences - due to the poor drainage from both antiquated sewer systems and many underground streams - that causes stagnate water to collect up to seven winter months of each year. 4) Aircraft Accidents - Fully realizing that when you purchase a residence under a flight path - you will experience a fear of an accident occasionally - however, with the proposed third runway and/or additional flight already proposed - this concern of accidents becomes more prevalent.

Not only are we concerned with the safety and success of the Sea/Tac Airports future - we are equally concerned about our personal health, safety and comfort of our abode.

Ruth Catherine West
Ruth Catherine West

William J. Clymer
William J. Clymer

225

REC'D ANM-610
PLAN, PGM, & CAP BR
AUG - 4 1995
ANM-610

Aug. 1, 1995

Mr. Dennis Ossenkop ANM611
FAA Airport Division
1601 Lind Ave. S.W.
Renton, WA 98055-4056

Dear Mr. Ossenkop,

We are against the Third Runway. We'll tell you why.

Twenty-four years ago, we moved from our house in Des Moines because of the airplane noise. It was so loud and occurred so often, our nerves were affected. We spent as little time as possible in our own home!

We moved to our present home in the North Hill area of Des Moines. We relished in the quiet neighborhood. We saw and occasionally heard an airplane, but the noise was minimal. Over the years, the noise level has increased tremendously, the airplane traffic has increased, and the air pollution has increased. We shutter to consider what the noise-traffic-pollution levels will be if the Third Runway is built.

In all the articles and editorials we've read, we haven't seen anything written concerning the impact on the PEOPLE that live in the neighborhoods around the airport. You don't know what it is like to walk outside and have the air smell foul from the airplane fuel! You don't know how irritating it is to try to clean the black film off from outdoor furniture. (It doesn't come off!) You can't imagine how disruptive the noise from the airplanes can be!

I repeat. We are totally against the Third Runway.

R-5-4

Sincerely,

John & Rose Saladis

226

July 1995

Federal Aviation Administration
Dennis Ossenkop
Airports Division, ANM-611
1601 Lind Ave. S.W.
Renton, WA 98055-4056

Dear Sir:

As a part of the ongoing debate on the third runway issue and Environmental Impact Study comment period, I wish to register my objection to the change in air-traffic patterns over Southeast Seattle in advance of the final decision on the third runway.

Recent changes in air-traffic patterns are adversely affecting our way of life. Noise levels are increasingly oppressive. It is our understanding that changes in air-traffic patterns are prohibited without an Environmental Impact Study. We are concerned that our community was not included in any study of the air-traffic patterns current or future. R-5-4

Please record my objection to the change which has occurred in air-traffic patterns and which is adversely affecting the quality of life in and around the communities of Southeast Seattle. R-5-5

Respectfully,

Joyce E Karlinsey
Signature

JOYCE E. KARLINSEY
Name

3521 S. FERDINAND ST
Address

Seattle, WA 98118
City, State, Zip

227

July 1995

Federal Aviation Administration
Dennis Ossenkop
Airports Division, ANM-611
1601 Lind Ave. S.W.
Renton, WA 98055-4056

Dear Sir:

As a part of the ongoing debate on the third runway issue and Environmental Impact Study comment period, I wish to register my objection to the change in air-traffic patterns over Southeast Seattle in advance of the final decision on the third runway.

Recent changes in air-traffic patterns are adversely affecting our way of life. Noise levels are increasingly oppressive. It is our understanding that changes in air-traffic patterns are prohibited without an Environmental Impact Study. We are concerned that our community was not included in any study of the air-traffic patterns current or future. R-5-4

Please record my objection to the change which has occurred in air-traffic patterns and which is adversely affecting the quality of life in and around the communities of Southeast Seattle. R-5-5

Respectfully,

Viola Marshall
Signature

Viola E. Marshall
Name

4210-34th Ave S
Address

Seattle, WA 98118
City, State, Zip

228

July 1995

Federal Aviation Administration
Dennis Ossenkop
Airports Division, ANM-611
1601 Lind Ave. S.W.
Renton, WA 98055-4056

Dear Sir:

As a part of the ongoing debate on the third runway issue and Environmental Impact Study comment period, I wish to register my objection to the change in air-traffic patterns over Southeast Seattle in advance of the final decision on the third runway.

Recent changes in air-traffic patterns are adversely affecting our way of life. Noise levels are increasingly oppressive. It is our understanding that changes in air-traffic patterns are prohibited without an Environmental Impact Study. We are concerned that our community was not included in any study of the air-traffic patterns current or future. R-5-4

Please record my objection to the change which has occurred in air-traffic patterns and which is adversely affecting the quality of life in and around the communities of Southeast Seattle. R-5-5

Respectfully,

Marcelle Amelia
Signature

MARCELLE AMELIA
Name

2648 S. HUDSON St
Address

Seattle, WA 98108
City, State, Zip

229

Prince of Peace Lutheran Church

19030 - 8th Avenue South (at 192nd)
SEATAC, WASHINGTON 98148
(206) 243-0987
FAX (206) 241-0369

Pastors
Stephen W. Grumm
Conrad E. Tollefson
Norman L. Orth
Pastor Emeritus

REC'D ANM-610
PL·:N, PGM, & C/^ ^R
AUG - 4 1995
ANM-610

August 1, 1995

Dennis Ossenkop
ANM-611, FAA
Northwest Region, Room 540
1601 Lind Ave S.W.
Renton, WA 98055-4056

Dear Sir;

The following is presented in response to the Draft Environmental Impact Statement (EIS) for Proposed Master Plan Update Development Actions at Seattle-Tacoma International Airport.

Prince of Peace Lutheran Church has been located at the corner of 8th Ave. South and South 192nd for the last 39 years. Over that time period we have seen Sea-Tac Airport progress from a single runway servicing only propeller aircraft, to the current two runway configuration which services everything from commuter aircraft to jumbo jets.

We have always seen ourselves in relationship to the airport as well as the neighborhoods that surround the airport. We financially and prayerfully support the chaplaincy ministry at the airport, have members volunteer to serve in the USO and Travelers Aid, and have many members holding down jobs at the airport. It is with this interdependent relationship with SeaTac Airport that we share these concerns.

R-5-4

The biggest discernible negative impact over the years has been the noise. Noise, as defined in the EIS (page C 1) is "unwanted sound." This "unwanted sound" has steadily grown in number of occurrences and magnitude. The introduction of Stage 3 aircraft has reduced the magnitude of some of the peak noise occurrences, but the actual interruptions in our worship services, educational classes and community functions has continued to increase since our church was constructed in 1956. The measurement of noise and the evaluation of its impact on people is not as simple and straight forward as one would desire. This is evident from the EIS, in that four different methods are used to evaluate noise exposure, DNL, SEL, Leq and TA. The EIS data indicate that the added noise resulting from the addition of a third runway will basically be offset by the then required Stage 3 aircraft. So, if these predictions and computer noise models are correct and the requirement for Stage 3 aircraft is not delayed or waived, then we should not be any worse off, from a noise standpoint, than we were in 1994. The trouble with this is that the noise disruptions in 1994 had grown to a level that was unacceptable.

229

R-6-27

Prince of Peace Church is located within the area where Custom Remedial Measures are to be accomplished (Exhibit IV.2-3 of the EIS Executive Summary), however, we have not received any soundproofing in the past and are not scheduled for any in the future. Considering that (1) there is an average of 280 people at services each Sunday morning, (2) there is an average of 100 people attending educational classes each Sunday morning, (3) there are approximately 20 meetings at the facility each week, and (4) several community groups, such as AA, Child Birth Instruction, Al-Anon use the facility during the month; we think some remedial measures to reduce the noise would be appropriate. The people coming to our facility are generally from this immediate area and have been exposed to the added noise the airport has brought during its growth. We think it is appropriate to provide some relief from the noise, by soundproofing our facility, so that the disturbances generated by the airport are reduced when our congregation gathers for worship, education and community functions.

R-11-4

A second concern we have involves the construction phase of the proposed third runway. As stated earlier, Prince of Peace has been a part of this community for almost 40 years and has become part of the fabric that forms the neighborhood. Many of our members live within the area of the airport and use the local streets daily for transportation to school, shopping, etc. We feel the addition of 82 trucks per hour on the local streets (EIS, Appendix J, page 2) will have a devastating effect on the neighborhood. These 82 trucks per hour, 16 hours per day, 6 days a week, for 2 1/2 years will jeopardize the integrity of the neighborhood, putting children, adults and senior citizens at additional risk and extreme inconvenience. The transport of fill from the on-site borrow areas 1, 2, 3 and 4, and the resulting one thousand nine hundred eighty four truck trips per day in the neighborhood south of the airport, is a major concern of ours. Not only will this have a major impact during the 2 1/2 years of fill truck operation, it will also alter the neighborhood by driving many people from the area, reducing property values and forever changing the character of the neighborhood. We recommend that these on-site borrow sources for fill (areas 1, 2, 3 and 4) not be used because of the devastating effect it will have on our neighborhood.

We welcome the opportunity to dialogue with you about our concerns so that we might more clearly understand your process for including a third runway and you might more clearly understand our concern of the import this change will make in our quality of life. Thank you.

Pastor Stephen Grumm
Lead Pastor

Robert Ozgon
President of the Congregation

230

REC'D ANM-610
PLAN, PGM, & C[illegible]R
AUG - 4 1995
ANM-610

July 31, 1995

Mr. Dennis Ossenkop
Federal Aviation Administration
Airports Division ANM-611
1601 Lind Ave SW
Renton, WA 98055

RE: Draft Environmental Impact Statement - Sea Tac Airport

Dear Mr. Ossenkop:

Due to time restrictions, I was only able to read the Summary document, but even in this condensed form I have never read such a self-serving document. I was going to cite the inconsistences instance by instance, but in the interests of brevity, I will just comment on my biggest concerns.

R-4-4

First, is that the PSRC entirely abdicated its responsibility in the face of minimal opposition by powerful people. There are other sites in the area that can handle an air port as has been proved - there has to be since this runway is only an "interim solution".

Second, has anyone ever considered that since the weather plays such a big factor in the decision that a third runway is needed, that perhaps the airport is in the wrong place. Just a few miles away is King County Airport which does not have the same weather problems.

R-12-24

Next is Page xvii, Section 21, Hazardous Waste. I cannot believe that *fifty-one* known or potential sites exist on this property and that the EPA has not stepped in and demanded a clean up. *Eleven* of these sites are located in the area they intend to install this new runway. So, has this soil been tested for contaminants? Is it going to be tested? If found to be contaminated, how is it going to be addressed? Does this mean that in addition to the estimated 23 *million* cubic yards of

230

R-17-6

fill, that this soil would have to be removed and more soil trucked in? Or does the Port just want to put new dirt on top and hope the problem goes away? I'm sorry but developing a SPCCP for future construction does not address the problems that presently exist. In the real world the whole project would be put on hold until the contamination issues are resolved.

Finally, is a comment about the Port's much touted "Insulation Program". In the past few weeks we have experienced some very hot weather. Would you really want to live in a house where you had to choose between opening your windows for some breeze in order to get some sleep. Or knowing that with the windows open you won't be able to sleep anyways because of the aircraft noise. It seems to be a choice of the Lady or the Tiger. Let's start thinking of the people who live as neighbors to the airport as people not just numbers and statistics.

Linda F. Bittenc

Linda F. Bittenc
10450 - 16th Ave. S.
Seattle, WA 98168

231

COMMENT SHEET

REC'D ANM-610
PLAN, PGM, & CAP BR
AUG - 4 1995

Public Hearing
June 1, 1995

SEATTLE-TACOMA INTERNATIONAL AIRPORT

Draft Environmental Impact Statement for the Master Plan Update

R-5-4

I am opposed to the addition of a third runway at SEA-TAC airport. As a resident / property owner on Beacon Hill, I feel that we have taken the brunt of noise created by Sea-Tac. It is time to share the burden with other neighborhoods.

R-8-18

It is unethical to route traffic based upon class / wealth of an area. It is time to return some flights over water & not burden us so heavily.

(Please Print) Name: Saya Moriyasu
Address: 2117 19 Ave S
City: Seattle Zip Code: 98144-4409

Please return comments by August 3, 1995 to: Mr. Dennis Ossenkop, Federal Aviation Administration, Airports Division, ANM-611, 1601 Lind Ave SW, Renton, Washington 98055-4056 or leave in the box as you leave the meeting.

232

REC'D ANM-610
PLAN, PGM, & CAP BR
AUG - 4 1995
ANM-610

5011 S. Brandon
Seattle, WA 98118
July 31, 1995

Mr. Dennis Ossenkop
FAA - Airports Division - ANM611
1601 Lind Avenue SW
Renton, WA 98055-4056

Dear Mr. Ossenkop;

R-1-5

I write urging you to extend the August 3rd deadline for comments on the Draft Environmental Impact Statement for Proposed Master Plan Update Development Actions at Seattle Tacoma International Airport.

R-5-5

First, to begin, my story: I moved to southeast Seattle in October, 1993. I marveled then at the quiet of the neighborhood. While I could see airplanes taking off from SeaTac, they were distant and I could hear them barely, if at all. In the past year this has changed considerably. Daily, there are airplanes arriving and departing and I see and hear them in ways I never did before. They are much closer than they were when I first moved to the southend. And they are much noisier.

I bring my story to your attention to add to the reports of numerous others in the Rainier Valley and Beacon Hill areas who have noticed similar changes in flight activity.

The FAA and the Port of Seattle deny that any shift in Sea-Tac flight patterns has occurred, and yet there are many responsible southeast Seattle residents who will attest to the fact that they have experienced a marked increase in air traffic and noise during the past several months.

Southeast Seattle and particularly the Rainier Valley has not been an area that has ever considered itself to be seriously affected by air traffic. And because of that fact, for much of the time we have given only minimal attention to the ongoing 3rd runway controversy. The past few months' increase in air traffic noise and shifts in flight patterns has changed all that. It has become clear that southeast Seattle must now consider itself a community in the path of a large portion of Sea-Tac arrivals and departures.

R-1-5

Because this awareness is so recent, there has been insufficient time to fully understand, evaluate and respond to the proposed changes and impacts a third runway presents for our communities. Southeast Seattle citizens have many questions which need to be answered. An extension of the comment period

232

beyond August 3rd would provide community residents much needed time with which to study the EIS and frame those questions. Attached to this letter you will find a list of but a few of the questions that I have. R-1-5

Secondly, there is some question as to whether or not our communities in southeast Seattle have been adequately informed about the EIS time line and the response process. I, and others with whom I have spoken, have not received any notice or seen any announcements in our local community papers regarding the EIS. Given the ethnic diversity of southeast Seattle it is particularly important that notice of the EIS and its comment period should have been published in papers which serve the different ethnic populations of our area. I question whether or not this has occurred and this leads me to ask: R-1-2 R-1-4

- In what ways has the FAA communicated with southeast Seattle residents about the EIS process and time-line....particularly as it applies to the ethnically diverse residents of southeast Seattle?
- Have notices been placed in local publications/newspapers? If so, in which ones and when?
- Have notices been placed in foreign language papers of the communities? If so, which ones and what dates? What message?
- What other means of notification have been used? (radios announcements, flyers, etc.)? When? What message?

Finally, in order for people to respond to the EIS, it is important for them to have had relatively easy access to the EIS. To my knowledge this has not occurred. As far as I know, the only southeast library to receive copies of the EIS was Beacon Hill library. There were none at the Columbia City Library - a library located on a major arterial with extensive bus transportation available - until last week (when a copy was transferred from Beacon Hill Library at my request). R-1-2

- Did any of the remaining southeast Seattle libraries receive copies of the EIS:
  Douglas Truth?
  Holly Park?
  Rainier Beach?
- If yes, when?
- If not, why not?

To summarize, there has been very little time for southeast communities - newly awakened to the impact of present and future flight patterns on our neighborhoods - to study and begin to understand the EIS. Further, it appears that the ethnically diverse communities of Beacon Hill, Rainier Valley and southeast Seattle may not have been sufficiently informed about the EIS comment period and process. And finally, the distribution of the EIS appears to

232

have been extremely limited in the affected communities. To conclude, it would appear that those communities likely to be among the most significantly impacted by a 3rd runway - have effectively been excluded from the process.

I find it sad, but not surprising, that Seattle could well be following the path of Los Angeles which, when expanding its number of runways, shifted its flights away from the wealthier, more politically powerful areas such as Bel Aire and Santa Monica and directed them over south central LA where the population is ethnically diverse, poor and disenfranchised. R-1-2 R-1-4

Could it be that southeast Seattle residents are to suffer the same fate?

Seattle's south end represents the most ethnically diverse portion of the city: equally divided among Asian, African American and white. The recent increase in air traffic over Rainier Valley and Beacon Hill to present levels has resulted in a diminished quality of life for its residents...an increase in pollution and noise and corresponding decline in quality of life for a large population of people who are already burdened with low incomes and with the challenges and responsibilities of caring for the largest number of elderly and young in the city. It is the area whose population is least likely to fly often for business or pleasure, and yet today is disproportionately burdened by an extraordinary number of flights overhead. R-8-18

I am hopeful that in the spirit of equity and fair-mindedness you will extend the EIS comment period beyond August 3rd and so ensure the inclusion of southeast Seattle communities in the EIS comments process. I consider it important. I hope you agree. R-1-5

I look forward to receiving your response. Thank you.

Sincerely,

Angela W. Ford

Angela W. Ford

attachment
cc: Mayor Norman Rice
Seattle City Council Members
King County Executive Gary Locke
King County Council Member Ron Sims
King County Council Member Larry Gossett
Senator Dwight Pelz
Representative Dawn Mason
Representative Kip Tokuda
Representative Jim McDermott
Senator Patty Murray
Senator Slade Gorton

232

QUESTIONS RELATING TO THE DRAFT EIS on the 3rd RUNWAY

There are many questions which remain unasked and unanswered. I will focus on one area of key concern which is the degree/extent to which the impact of the increased number of flights in our area is or is not reflected in the EIS. The following questions relate to this concern:

- Existing Departure Flight Tracks (Exhibit C-9) and Existing Arrival Flight Tracks (Exhibit C-8) show existing "tracks" on paper. Do they in fact reflect the actual August, 1994 flights upon which the environmental impacts were based? If not, will you please provide me with maps which reflect the actual flight tracks upon which the environmental impacts were based?
- According to Chart C-8 (Existing Arrival Flight Tracks) there are a large amount of numbers on one track: HA10, HA12, HA30, HA32, JA32, JA36, PA20, PA12, PA30, PA32. This track goes south directly down the west-edge of Rainier Valley. What do the numbers on this track represent?
- Is it possible that the marked increase in air traffic that we have been experiencing recently may be related to the increased use/"opening" of this track?
- What has been the frequency and pattern of use of this flight track in the past 18 months?
- What was the frequency/pattern of use of this flight track during August, 1994?
- How does current frequency/pattern of use of this flight track relate, if at all, to frequency/pattern of use in August, 1994 when the flight pattern used to assess environmental impacts was determined?
- How, if at all, did the computer models and other forms of environmental assessment take this track into account in August, 1994?
- How was southeast Seattle, and more specifically - Rainier Valley/Beacon Hill areas - factored into the environmental assessment? What was the placement of noise monitors, etceteras in this region?

R-6-14
R-6-15

233

King County
Department of Development
and Environmental Services
3600 - 136th Place Southeast
Bellevue, Washington 98006-1400

FAXED 8-3-95

REC'D ANM-610
PLAN, PGM, & CAP BR
AUG - 7 1995
ANM-610

August 2,1995

Dennis Ossenbop
Federal Aviation Administration
Northwest Region
1601 Lind Avenue Southwest
Renton, WA 98055

Dear Mr. Ossenbop:

On behalf of King County Executive Gary Locke, thank you for forwarding the Seattle-Tacoma International Airport Master Plan Update Draft Environmental Impact Statement (DEIS) to King County for review and comment. Staff review is now complete and we have the following comments for your consideration.

Overview of Comments
Given the overall complexity of this project we find the analysis and content of the DEIS to be accurate, well organized and clearly written. Our major concerns center around two topics: 1) noise from the 3rd runway and, 2) the 23 million cubic yards of fill related to the construction of the runway and other airport expansion. Although the document discusses the potential for impacts associated with noise from the 3rd runway and the 23 million cubic yards of fill, the significance of the impacts of these two activities appears to be minimized.

We also have recommendations for additional analysis and alternative mitigation for Chapter IV, Sections 1, 3, 10, 11, 15 and 23. We have noted some inconsistencies in the document, especially related to surface transportation and water quality that should be clarified. Our more specific comments are organized by chapter in the following text. We hope they are helpful in furthering your analysis.

Specific Comments by Chapter/Section

Executive Summary
- The process for selection of the alternatives to be considered needs to be more clearly stated. The chart on page v needs further explanation.
- The narrative on Alternatives Considered, page ix, should give more detail on other proposed facility needs for Alternatives 2 - 4.
- We suggest that you add a chart that summarizes the impacts.

R-2-15

Chapter I
- There is insufficient information about the forecast assumptions and methodology, and the forecasts themselves. What assumptions were made about annual changes in the U.S. and world economies that influence plane travel demand; how were particular SeaTac percent growth rates chosen?

R-3-7

Chapter IV, Section 1

- Outdoor-to-indoor noise levels representing the three areas defined by the Sea-Tac Noise Contours are accurately reflected in Table IV.2-1 on page VI.2-16D. This will allow for compatible land use planning in the vicinity of the airport.
- Noise impact from a new runway is real. The document text downplays the obvious by comparing future noise related to the 3rd runway alternative to 1994 noise levels. There should be comparison of noise impacts with and without the 3rd runway alternative, for the years 2010 and 2020. What are the relative noise impacts for all four alternatives during the same time period. Comparing the future 3rd runway to the existing condition downplays noise reductions that would occur under the do-nothing alternative for years the 2010 and 2020. R-6-1B R-18-27
- The EIS documents the impacts of noise on a variety of public facilities, including parks. The impacts are based on compatibility guidelines that are for Federal determination, but are not to be construed as acceptable or permissible levels by local authorities. (Chapter IV: Land Use, Page IV.2-16D). The study's acceptable level of noise is greater than those of the nearby local jurisdictions. Efforts should be made to identify and mitigate noise based on the local noise level criteria. R-6-31C

Chapter IV, Section 3

- Although very little of the affected area is located in unincorporated King County there are many historic resources within incorporated areas that may be adversely affected by the actions proposed.
- Although the DEIS uses historic resource information provided by King County and the State Office of Archeology and Historic Preservation, much of the available data are out of date. This was stated very clearly in a personal communication from Charlie Sundberg, King County Historic Preservation Planner, to the consultant. The most recent information available is in the 1994 Survey of Historic Properties within the Boundaries of the A.C.C. Cities, commissioned by the Airport Communities Coalition. This survey covers properties within Burien, Des Moines, Normandy Park and Tukwila. Several properties listed in this inventory may be eligible for National Register listing. The DEIS did not use this information and should be revised to incorporate it. R-7-14
- The field survey and evaluation for the DEIS was conducted only within potential acquisition areas and only for resources constructed before 1945. It is not clear whether all types of historic resources, including historic landscapes, were surveyed. The 1945 cutoff fails to recognize that full implementation of the project will not occur for several years and that significant and extensive construction occurred within the years immediately following 1945 which may be considered as "historic" by the time implementation takes effect. Properties listed in the 1994 inventory, including those constructed between 1945 and 1950, should be evaluated if they would be affected by the proposed undertaking, either directly or indirectly.

Chapter IV, Section 6

- This section states that approximately four percent of all housing in the city of SeaTac would be displaced. It also states that there is a 3.8 percent vacancy rate. Are these single family or multifamily units? We recommend additional clarification in the type and cost of housing displaced and available, including the extent to which affordable housing, both single and multifamily is affected. R-8-19
- We would also like to recommend language for Mitigation:

  All acquisitions associated with the Master Plan Update will comply with the Department of Transportation's Uniform Relocation Assistance and Real Property Acquisition Regulations for Federal and Federally Assisted Programs, 49 CFR Part 24. The Port will establish an amount it believes is just compensation for the real property. R-7-38

The amount will not be less than the approved appraisal of the fair market value of the property. The owner will be given reasonable opportunity to present materials which the owner believes is relevant to determining the value of the property Relocation benefits, available to tenants and homeowners, could include referrals to comparable housing, replacement housing payments, payment of moving costs, and advisory services. No one will be required to move with less than 90 days notice. R-7-38

Chapter IV, Section 10

- Information associated with the background history checks have identified potential risks to groundwater from petroleum products and from fill material. Specifically, there are known releases from underground storage tanks and associated hardware to the shallow and intermediate aquifers in the vicinity of the site. Also, the quality of the fill used at the north end of the runways is unknown, which is considered a potential source of contamination. We assume the Port of Seattle is working with the Washington State Department of Ecology to mitigate these concerns and encourage adjacent property owners not to cause impacts to the Port of Seattle's property. R-17-14
- We note that the DEIS uses the non-quantifiable term "significant" when describing pollutant loading effects on surface and groundwater. We would recommend that this term be defined. R-13-2
- Page IV.10-2, para. 4 - Comparison of Alternatives 2 through 4 against Alternative 1 (Do Nothing) may provide an indication of potential changes in the channel erosion potential of affected streams from the status quo. A relative comparison such as this will not provide any indication of the overall steam channel erosion potential without some other measure of existing erosion. R-13-18
- Page IV.10-5, para. 2 - This paragraph makes reference to three historic fuel spills into Des Moines Creek, but only describes two spills. A comparable description of the third spill should be included. R-13-2
- Page IV.10-5, para. 3 - This paragraph states that shallow groundwater is a likely contributor to stream base flows (we concur) and that shallow groundwater beneath the airport is contaminated with aviation fuel. What actions are being taken to prevent this contamination from reaching Miller and Des Moines Creeks? R-13-19
- Page IV.10-6, para. 3 - The Highline Aquifer is described as having excellent water quality, yet the Seattle Water Department, which utilizes the Highline Aquifer for conjunctive use storage, must blend the recovered water with existing surface sources in order to improve water quality. We suggest you contact the Seattle Water Department to clarify this apparent contradiction.
- On Page IV.10-5 of the DEIS, you state that "there is no known use of shallow groundwater..." however, shallow groundwater often recharges the intermediate and deep aquifers. We appreciate the Port of Seattle's commitment to attaining "no net loss" of wetlands as they are useful for infiltrating and naturally filtering stormwater. The DEIS states the Highline Aquifer extends beneath the airport and must be protected by law. It would appear that the DEIS does not fully address the potential impacts to Water District 75 and the Highline Water District's water source. We did not see any provision to address the results of the Wellhead Protection Plans of these water systems when they are finalized. R-13-5 R-13-21A
- Page IV.10-8, para. 4 - The statement indicating that spilled petroleum products and other substances are unlikely to reach or contaminate surface water or groundwater appears overly optimistic, and consistent touch with current regulatory treatment of hazardous material spills. The likelihood of contamination of surface or groundwater greatly depends on individual circumstances, the specific substances and the quantities involved. Appropriate mitigation for potential spills of hazardous material should include contingency planning and regular spill response drills, in addition to the BMPs and contractual measures mentioned.

- Page IV.10-8, para. 5 - Phase I construction activity is said to be impacting 193 acres (line 12), while runway construction is said to impact 249 acres (line 21). We presume that one of these numbers includes impacts in the borrow areas and one does not. We suggest that construction activities should always include impacts in the borrow areas when estimating the impacted area. R-13-3
- Page IV.10-9, para. 1 - Paragraph 1 asserts that Phases 2 & 3 will impact approximately 80 acres, and will increase suspended solid levels, but will not impact water quality. It appears to be more accurate to state that these phases will not have a significant impact on water quality. Sedimentation continues to impact aquatic habitat in both Miller and Des Moines Creeks.
- Page IV.10-9, para. 4 - This paragraph should acknowledge, that in addition to glycols having the potential to depress dissolved oxygen levels, that dissolved oxygen levels are occasionally a concern in these creek systems. It may be that dissolved oxygen levels are not a concern during the season when glycol contamination is most likely. R-13-2

Chapter IV, Section 11

- Throughout this section references to impacted wetlands do not make clear to what extent the wetlands will be impacted. In many cases, the wetlands will be destroyed through filling. In some cases the wetlands will be impacted through changes in their hydrologic regime, through alteration of the surrounding land uses or through partial filling. Efforts should be made to distinguish between wetlands which will be destroyed through filling, wetlands impacted by partial fill, and wetlands which will be impacted through some other mechanism. R-14-1
- Page IV.11-4, para. 3 - There appears to be an inconsistency in the first sentence, which states that impact from development of the SASA will occur to four forested wetlands but only enumerates two wetlands. R-14-2

Chapter IV, Section 12

- **Page IV.1-2, para. 3 - This paragraph references historic flooding between SW 150th and SW 152nd Street, west of 1st Avenue. Our information indicates that flooding between SW 150th and SW 152nd occurs west of Des Moines Memorial Way South, not 1st Avenue as stated.** R-13-26

Chapter IV, Section 15

While Sea-Tac Airport and its immediate environs are no longer in King County's jurisdiction, King County has been involved as a partner in many of this area's regional traffic studies since the City of SeaTac incorporation.

In general each of the study alternatives results in the same overall traffic generation but some of the area roadways are affected differently, depending on where the proposed alternative's facilities are located. Localized traffic is the concern of the individual jurisdictions, but King County is greatly concerned with how the traffic reaches the regional transportation facilities.

- The Master Plan study assumes the construction of several programmed transportation facilities including the RTA and the SR 509 extension by year 2020. These facilities are extremely important to ensure expected traffic from the Airport plan can be accommodated. R-8-12 R-8-16
  1. In light of funding shortages from all sources, can these facilities really be expected to be in place by year 2020?
  2. Is it possible to estimate what the impact to the area system would be without the two major facilities?
  3. Is there a way to delay the facilities or growth of future air travel until these facilities are guaranteed?

We also question why Alternative 3 does not impact the surface transportation system in comparison to the other alternatives? It would seem that since this alternative has the same growth assumptions that it would have nearly similar impacts and mitigation. R-8-7

Section 16

- Page IV.18-8, para. 2 - Impacts to amphibians from the proposal may be greater than those predicted. Recent research in the Puget Sound area indicates that amphibians are particularly susceptible to impacts from changes in the hydrologic regime of wetlands. This paragraph should acknowledge that amphibian impacts may occur due to hydrologic changes as well as to changes in water quality. R-15-9
- Exhibits IV.16-1 and IV.16-2 - There appear to be a number of areas, particularly on the west and north sides of the airport, which are not classified in the vegetation communities map and which do not appear to be private property where access was limited. Our knowledge of the area indicates that these areas are vegetated, rather than impervious. It appears that some of these are mixed riparian and/or wetland areas. Some explanation of these unclassified areas, or perhaps the addition of another classification, should be added to this exhibit. R-15-10
- Appendix P-A, Wetland Conceptual Plan - We strongly disagree with the proposal to perform wetland mitigation outside of the affected stream basins. The argument that the FAA will not certify airports with wildlife attractor within 10,000 feet is specious. Existing wetlands occur under the northern approach, immediately adjacent to the fill for the runway and well within the 10,000 foot buffer specified in the FAA circular, yet the airport is currently certified for operation by the FAA. These existing wetlands have substantial bird use and do not appear to be creating safety concerns for aircraft operation, probably due to the large elevation difference between the aircraft operation area and the natural ground level on which the wetlands occur. R-14-7

  Miller and Des Moines Creek have had most of their pre-development wetland areas eliminated over the years with resulting impacts to their water quality and hydrology. Numerous opportunities to perform wetland creation or enhancement exist within these basins and could be sited in a manner which would not increase the risk of aircraft/bird collisions above the existing level. Opportunities for safe siting of mitigation exist all along the west side of the airport, where potential sites would be significantly below the aircraft operation area, would not be under any flight or approach lines, and where they could provide significant improvements to water quality in Miller Creek. Much of this area will be acquired by the Port for the proposed development creating the possibility for outright ownership of the mitigation sites.

  It would also be possible to create or enhance wetlands to focus improvement on water quality on the creeks while minimizing the attraction for wildlife. These small urban streams would benefit, proportionally, to a much greater degree from wetland mitigation than the proposed off-site mitigation on the Green River. We strongly encourage the Port and FAA to site wetland mitigation efforts within the affected basins.

Chapter IV, Section 23

- We believe the EIS has not adequately addressed the impacts associated with the extraction and transport of fill material. While the EIS states that off-site borrow sources for fill material have already been documented, it would be helpful to have a listing of those locations, potential routes and transportation modes and reference previously prepared environmental documents. Impacts associated with the off-site sources needs to be incorporated into a discussion of the cumulative impacts associated with extraction and transport of material, as well as a discussion of the potential impacts on the region's earth resources for other development needs. R-12-7

233

Dennis Ossenbop
August 2, 1995
Page 6

- Missing from the document is adequate analysis of the impact of the extraction and transport of up to 14 million cubic yards of soil from Maury Island. Table C-2 does not indicate the specific location on Maury Island, nor does Table C-6 specify truck routes or route criteria. Also, the evaluation criteria are not described. Further, page 11 states that "construction traffic necessary to supply the off-site material" is not predicted to cause adverse impacts. However, without a specified location and functional use of the roads or other transportation systems from Maury Island to the mainland, the statement is highly questionable. Moreover, an average day of truck trips ranging from 1494-1952 would suggest negative impacts on a tranquil, rural environment. King County recently purchased a former gravel mining site on Maury Island for park and open space purposes. We would have serious concerns and comments if the source site on Maury Island had impacts on this or other parks on the island. On page 17, Table C-7 asserts that traffic impacts at all levels--on residential, roadway classification and conditions, etc.--are "satisfactory". We question how it is possible to arrive at this conclusion when the site location, routes, and transportation method (trucks or barge) have not been determined. R-12-13 R-12-15
- Within the Environmental Site Assessment Appendix, Shapiro & Associates' source for Table 1 does not appear to include all of the suspected contaminated sites that are listed in Ecology's Toxic Clean-up Program Confirmed and Suspected Contaminated Sites Report. On page 70-72 of that report, there are *eight* listed sites on the Seattle-Tacoma International Airport, not just the two as listed in Table 1. R-17-15

Thank you again for the opportunity to comment. If you have further questions or concerns, please do not hesitate to call Kathy Creahan, Interim Chief of the Regional Planning Section, at 296-7129.

Sincerely,

Robert S. Derrick
Director

RD:sb

cc: Gary Locke, King County Executive
David Masters, Basin Planner, Public Works Department, Surface Water Management Division
Dan Burke, Transportation Planner, Public Works Department, Transportation Planning Division
Charlie Sundberg, Preservation Planner, Parks/Cultural and Natural Resources Department
ATTN: Sharon Claussen, Planner, Parks Division
Pam Blanton, Relocation Specialist, Housing and Community Development Division
Ikuno Masterson, Manager, Environmental Division
ATTN: Klaus Richter, Senior Ecologist, Regional Planning Section
Chandler Felt, Demographer, Area Planning Section
Betty Capehart, Community Planner, Community Planning Section

234

State Representative
37th District
DAWN MASON

State of Washington House of Representatives

Higher Education
Assistant Ranking Minority
Trade & Economic Development
Finance

REC'D ANM-610
PLAN, PGM, & C[illegible]R
AUG - 4 1995
ANM-610

August 2, 1995

Dennis Ossenkop
FAA N.W. Mountain Region
Airport Division
ANM-611
1601 Lind Ave. S.W.
Renton, WA 98055-4056

Dear Mr. Ossenkop:

I represent the 37th District in Seattle, which is one the most diverse and populated districts in the state. Due to various community groups and individuals, I have become recently aware of excessive noise levels in Columbia City and throughout the Rainier Valley area. R-5-4

It appears as though jets are flying on future proposed flight tracks according to the Draft Environment Impact Statement for the Master Plan Update for Sea-Tac International. The current flight paths have a significant impact on the community beyond what is indicated by the EIS. The flight paths which are operating over the Rainier Valley are farther East than in recent years. R-5-5

I am concerned that my district has not had a voice regarding any significant shift in air flight patterns over the communities of Southeast Seattle. It is glaringly evident that the EIS Draft has not been readily available to the Southeast Seattle community. In addition, it is inconceivable that a plan of this magnitude and impact would not be published in any language other than English. My district has more than 70 Asian dialects and Spanish is also widely spoken. R-1-4

It is obvious that the draft EIS has not carefully accessed this issue. I would expect that you will continue the EIS review period to address these concerns and expand the study.

Legislative Office: 324 John L. O'Brien Building, PO Box 40600, Olympia, WA 98504-0600 • (360) 786-7814
Hotline (Legislative Information): 1-800-562-6000 • TDD: 1-800-635-9993

Printed on recycled paper

234

Ossenkop 2

In order that the communities I represent are informed of the proposed flight changes, I would like to request that the following things be done:

R-1-4

1. A more in depth study is done on noise and environmental concerns of fuel dumping. R-10-9

2. Information is made available in community centers, schools, and libraries throughout Southeast Seattle.

3. Provide the study and information in multiple languages.

I would appreciate a response from your office within two weeks so that I may respond to my concerned constituents.

Sincerely,

Dawn Mason

Dawn Mason
State Representative
37th District

DM:acf

235

3920 SW 109th Street
Seattle, Washington 98146
Telephone: 243-6768 Fax: 727-8728
August 1, 1995

RECD ANM-610
PLAN, PGM, & ... DR
AUG - 4 1995
ANM-610

Mr. Dennis Ossenkop, ANM-611
Federal Aviation Administration
Northwest Mountain Region
1601 Lind Avenue S.W.
Renton, Washington 98055-4056

Dear Mr. Ossenkop:

This letter is to comment on the Draft Environmental Impact Statement for the Master Plan Update at Seattle-Tacoma International Airport.

R-1-2

Like most Puget Sound residents, I've been hazily aware of the proposed third runway but, I figured, that's Burien's problem. Two weeks ago, I received a wake-up call in the form of a newsletter from State Senator Mike Heavey. Only then did I realize that the third runway would heavily impact Seattle residents, and West Seattle residents most particularly. As a result of that newsletter, I have spoken with Rachel Garson, Community Relations Manager in Aviation Communications at the Port of Seattle and with a representative of RCAA.

The results of my research have been contradictory and confusing. Because I've discovered the impact of the third runway at the eleventh hour, I hastily submit the following thoughts:

- R-1-4 Seattle residents have been poorly apprised of the impact the third runway will have on them. It's obvious that the Port did not go out of its way to notify any of us. This is particularly galling to those of us who live close to Seatac. Thank God for Mike Heavey's newsletter. (I could also point a finger at other so-called "representatives.")
- R-4-12 In the EIS, the third runway is blithely assumed as a given, with choices only as 7000, 7500 and 8500 feet. If the third runway will only be used as an arrival runway for small commuter planes (as I was told by Rachel Garson at the Port), why is the 8500 foot option even being considered?
- Putting aside self-serving considerations (noise, lower property values), the environmental issues raised by the third runway are outrageous and indefensible.
- R-4-4 Why isn't the Payne Field option being seriously considered? I understand it was tabled because the politicos wanted Snohomish County support for the RTA. Maybe it's time to revisit that brilliant piece of decision-making.

Here's one Seattle resident who is mighty concerned - this is not just a Burien/Seatac problem. Please put my name on your mailing list.

Sincerely,

Laurie Taylor

Laurie Taylor

236

July 1995

RECD ANM-610
PLAN, PGM, & ...R
AUG - 4 1995
ANM-6...

Federal Aviation Administration
Dennis Ossenkop
Airports Division, ANM-611
1601 Lind Ave. S.W.
Renton, WA 98055-4056

Dear Sir:

As a part of the ongoing debate on the third runway issue and Environmental Impact Study comment period, I wish to register my objection to the change in air-traffic patterns over Southeast Seattle in advance of the final decision on the third runway.

Recent changes in air-traffic patterns are adversely affecting our way of life. Noise levels are increasingly oppressive. It is our understanding that changes in air-traffic patterns are prohibited without an Environmental Impact Study. We are concerned that our community was not included in any study of the air-traffic patterns current or future. R-5-4

Please record my objection to the change which has occurred in air-traffic patterns and which is adversely affecting the quality of life in and around the communities of Southeast Seattle. R-5-5

Respectfully,

Patricia A. Spears
Signature

PATRICIA A SPEARS
Name

3240 So Ferdinand ST.
Address

Seattle, WA 98118
City, State, Zip

237

H+H
HIGHLINE COMMUNITY HOSPITAL
HEALTH CARE NETWORK

August 3, 1995

RECD ANM-610
PL..., PGM, ...
AUG - 4 1995
ANM-610

Mr. Dennis Ossenkop
ANM-611
Federal Aviation Administration
1601 Lind Avenue SW
Renton, WA 98055-4056

Dear Mr. Ossenkop:

I am submitting comments on behalf of Highline Community Hospital regarding the draft "Environmental Impact Statement on SeaTac Airport Master Plan Update". As the major provider of health care for the communities surrounding SeaTac Airport, we find the analysis given to health impacts to be grossly inadequate. We respectfully request that your agency require SeaTac Airport to commission an independent, epidemiological health risk assessment. This assessment should be overseen by a panel of qualified environmental epidemiologists. R-6-32

Furthermore, we believe the short comment period violates fair and due process. The draft EIS does not provide any data in support of the conclusion that the health of area residents is not being harmed. Highline Hospital has commissioned a preliminary review with the University of Washington Department of Epidemiology to recommend areas requiring further study. This review will be completed by September 15, 1995. A properly designed study and analysis by independent, professional environmental epidemiologists is necessary. We do not have either the financial resources or the time to perform a scientifically valid study. R-1-5

Considering the importance of public health, the need for a scientifically based, health risk assessment cannot be disregarded. The Port of Seattle must be required to demonstrate that proposed airport expansion will not harm the health of the residents of Southwest King County.

I look forward to your response.

Sincerely,

Mark Benedum

Mark Benedum
Chief Operating Officer

MB/pmo
MB95.2

16251 Sylvester Rd. SW   Burien, WA 98166   (206) 244-9970
The Choice in Southwest King County.

238

August 2, 1995

REC'D A... PLAN, PGM, & ... AUG - 4 1995

Mr. Dennis Ossenkop
Federal Aviation Administration
Airports Division
1601 Lind Ave. S.W.
Suite 540
Renton, Washington 98055-4056

Dear Mr. Ossenkop,

On behalf of the Des Moines Salmon Chapter of Trout Unlimited, we are pleased to offer you our comments as follows to the Draft Environmental Impact Statement for Proposed Master Plan Update Development Actions at Seattle-Tacoma International Airport.

Our comments are organized around the following specific areas:
1) Surface Water Runoff and Management
2) Subsurface Water Seepage into Miller and Des Moines Creeks
3) Water Quality
4) Stream Movement
5) Wetland Loss and Substitution in the Green River area
6) Habitat Loss
7) Protection of the environment during any construction phases

1) Surface Water Runoff and Management

R-13-7

The report states that surface water runoff volumes would increase annually by 5-11% to Miller Creek and by 2% to Des Moines Creek. We request that additional flow controls and detention be established at more than currently planned legal minimum in order to better manage the flow impacts to these streams. While the impacts may appear small due to the small percentage values, these impacts are in fact further exacerbating a delicate situation in the two streams where restoration efforts are continually fighting the effects of impervious areas on the stream water flow pulsing and the accompanying loss of habitat due to perennial high water flow pulses. Actually a 5-11% increase in Miller Creek is appallingly high due to the additional deleterious effects of additively high water flow pulsing and shall be reduced by better surface water management. The approach taken in this draft EIS is too focused on accepting higher water flows without adequate water management controls.

2) Subsurface Water Seepage into Miller and Des Moines Creeks

R-13-11

Further, the loss of infiltrated waters into the watershed is expected by us to be additively damaging to the Miller and Des Moines Watersheds since both of these streams receive unquantified but substantial amounts of their low water flows (particularly in the summer

238

months) from multiple small seepage sources. The lack of proper infiltration could cause loss of these seepage sources with the resultant substantial degradation in over-summer habitat suitability vis a vis water temperature and dissolved oxygen which would have deleterious effects on the young coho salmon and searun cutthroat trout using the streams. The plan update shall include additional planning and mitigation in the watershed for the seepage sources into Miller and Des Moines Creeks.

3) Water Quality

R-13-11

Despite the Draft EIS assurances, we do not believe that the effects of the increased water pollutants have been adequately addressed. We are concerned with the acceptance of increased pollutant loading associated with the stormwater runoff due to the "With Project" alternative. In particular, we remain concerned about the management of chemicals unique to the airport operations involving airplane deicing operations, i.e. ethylene and propylene glycols and associated constituents, as well as pollutants associated with transportation equipment such as oils and hydrocarbon fuels. The draft EIS is too broad about possible alternatives and promises actions with which the Seattle-Tacoma International Airport simply has not had a track record of compliance despite their historic assertions. We believe the draft EIS should be revised to more specifically address the management of pollutant loading leading to less pollutant loading into Miller and Des Moines Creeks (and not more!) and better define acceptable management processes with checks and balances on how that would be achieved.

4) Stream Relocation

R-13-32

As part of the proposed plan, sections of Miller Creek (3700 feet) and Des Moines Creek (200 feet and 2200 feet in separate actions) would be relocated. Stream relocations and restorations can be successfully achieved with a net benefit to the stream. The relocation plans for Miller Creek in particular offer an improvement over existing habitat. However, the draft EIS must be amended to add protection and special considerations to lengthen and protect smaller tributary streams to the Creek as well. This should also be done for Des Moines Creek. For Des Moines Creek, we are concerned about the blockage of underground to surface springs which are a large component of the Des Moines Creek flows. We did not see clearly in the draft EIS those specific items to protect those flows into Des Moines Creek nor any system for assuring that those flows would be protected after any stream re-location or construction activities. There would have to be a multi-year stream monitoring action with agreed to corrections and consequences by the Port of Seattle if deficiencies were identified. Every effort should be made to restore these reaches to as pristine and usable habitat for the biota as possible.

5)Wetland Loss and Substitution in the Green River area

R-14-7

We are appalled and shocked by this proposal to eliminate key habitat features for the Miller watershed by offering to do some (in our opinion) irrelevant restorations in the Green River area. The proposed Green River work has no benefit to the Miller Creek watershed and may as well represent restoration of some obscure river in Connecticut for all of the good it will do for these West Side Puget Sound drainages. It would be of substantially more benefit for the Port of Seattle to acquire additional property and create wetlands in the drainage and/or for the Port of Seattle to work with the local jurisdictions on mitigation actions within the watersheds affected. For example, the Miller Creek Management Coalition (comprised of the cities of Normandy Park, Burien, Sea-Tac, and Des Moines, Trout Unlimited, Normandy Park Community Club, King County, and the Port of Seattle as discussed and referenced in the draft EIS) has a list of mitigation candidates for Miller Creek that could be used more effectively both socially and biologically for mitigation actions. These candidate actions include silt removal and control, culvert repairs for fish passage, in-stream structures, gravel cleaning and restoration for spawning, fencing of livestock from the streambank, streambank revegetation and restoration, and re-establishment of a salt marsh at the mouth of Miller Creek. These actions would increase the habitat usable by returning adult salmonids for spawning ranges and the habitat useful for juvenile salmonids for growth. In our opinion, this would be a far superior mitigation approach from a biological perspective relative to the damage that would be done in Miller Creek. In addition, these mitigation actions are more likely to receive broader based community support as being relevant to the communities affected by the expansion of the Port of Seattle Airport activities. Taking the restoration work to some other remote region is illogical from a community benefit perspective and is biologically nonsensical if the mitigation is supposed to "heal" damage done by other actions. THIS WETLAND MITIGATION OF A REMOTE AREA MUST BE CHANGED TO BENEFIT THE AFFECTED WATERSHEDS!!

R-14-7

6) Habitat Loss

The current plan in the Draft EIS discusses habitat loss in the Miller and Des Moines Creek watersheds. We believe that the Port should better account for the losses by emphasizing stream and bank restoration efforts along the existing stream zones. Port of Seattle participation with the Des Moines Creek planning group and the Miller Creek Management Coalition is laudable. However, the Port has unique resources and capabilities to work with the cities and assist in additional stream and habitat loss recovery efforts (e.g. see above Item 5 for specific alternatives). We believe those items should be added to the draft EIS to further help in offsetting habitat loss within the affected watersheds.

Further, we are concerned about the perception that stream restoration efforts may cause a decrease in air safety due to fear about increased probabilities of engine ingestion of birds or airplane collisions with birds during take-off and landing. We believe that there have been few, if any, aircraft takeoff or landing difficulties associated with engine ingestion of large raptors or collisions with such birds in locations which have them in proliferation such as Alaska. Accordingly, we request that the draft EIS be modified to account for the entire ecosystem range of wildlife including raptors. If that proves unworkable based upon documented data of events in a believable probability assessment, then use of items such as netting or alternatives to keep the raptor population restricted

from the stream may be an acceptable alternative. This is essential to keep the stream habitat restoration at a high priority in light of the other degradations the Port is proposing. In no case would we accept that stream restoration of Miller Creek or Des Moines Creek should not be done because they are proximal to the airport and because of a broad generalized and not well thought out application of FAA "guidance". R-14-7

7) Protection of the environment during any construction phases

We, along with others, are quite concerned about the protections to be used during any possible construction phases of the modified airport. While the draft EIS discusses various technical alternatives, we did not see any evidence of a plan for independent monitoring and validation of plan execution. The draft EIS shall be modified to have independent monitoring of the actual preventions used and their execution by disinterested groups from the State and City Governments and by independent Citizens Groups. Only be having close attention to detail and independent monitoring will the proposed plan have any likely chance of success. As written, it is an incomplete plan on how to manage the construction phase of the project, if that should occur. R-12-26

Sincerely,

Alan Miller Aug 2, 1995

Alan G. Miller
President, Des Moines Salmon Chapter of Trout Unlimited
P.O. Box 98642
Des Moines, Washington 98198

cc: Mr. J. Kramer King County Surface Water Management
Mr. D. Masters, King County Surface Water Management
Mr. Clark Dodge, Normandy Park City Council
Ms. Mary Davis, Planner, City of Normandy Park
Mr. Arun Jahveri, Mayor, City of Burien
Mr. Art Maronek, City of Burien
Mr. Bruce Rayburn, City of Sea-Tac
Mr. Richard Kennedy, Mayor, City of Des Moines
Mr. Robert Wells, Port of Seattle
Ms. Marcia Holbrook, Port of Seattle
Mr. Shawn McEvoy, President, Normandy Park Community Club
Mr. Dale Cap, Southwest Suburban Sewer District
Mr. J. Wilcox, President, Washington State Trout Unlimited
Mr. William Robinson, Executive Director, Trout Unlimited
Mr. Steve Moyers, Government Affairs, National Trout Unlimited
Mr. Bob Turner, Director, Washington Department of Fish and Wildlife

239

COMMENT SHEET

Public Hearing
June 1, 1995

SEATTLE-TACOMA INTERNATIONAL AIRPORT

Draft Environmental Impact Statement for the Master Plan Update

see attached

REC'D ANM-610
PLAN, FCM, & C... SR
AUG - 4 1995
ANM-610

(Please Print) Name: Ray + Judy Voeller
Address: 20114 3rd Ave S.
City: Seattle, WA   Zip Code: 98198

Please return comments by August 3, 1995 to: Mr. Dennis Ossenkop, Federal Aviation Administration, Airports Division, ANM-611, 1601 Lind Ave SW, Renton, Washington 98055-4056 or leave in the box as you leave the meeting.

239

20114 3rd Ave. S.
Seattle, WA 98198
August 1, 1995

To whom it may concern:

We are very concerned about the impact of the Third Runway in our neighborhood. Sea Tac airport has already diminished the quality of life in our community. Adding an additional runway at the airport will severely damage our schools and neighborhood. We feel there are some factors that have not been adequately addressed by the Port of Seattle and the Environmental Impact Statement.

First of all, we want to be recognized as important people in our neighborhood with needs, desires, and concerns that need to be addressed. We are concerned about our air and water quality. Often the air we breathe is full of airplane fumes and very obnoxious. We like to walk in the early morning hours but there are times we do not walk because air is so bad. We are also concerned about the water quality. We know that the ground water can and has been polluted by oil, gas, spills from the airport, and the dumping of jet fuel. Our area deserves clean water - rivers, creeks, Puget Sound - that are not polluted by the airport so fish, birds, wildlife, and people can enjoy clean water. The answer is not moving creeks and animal habitats to other locations but keeping this area clean.

The noise is another concern that we have. We have our windows open most months so we get some fresh air. (Some days it is not very fresh.) There are still some very noisey airplanes that take off day and night. It is difficult to carry on telephone conversations, visit, rest, and sleep when the windows rattle and houses vibrate. It is very noisey during our Sunday morning worship service at our Church, making it difficult to concentrate. R-5-4

Another concern is the trucking of all of the dirt needed for fill to prepare for a third runway. The freeways and local roads are already very crowded and how do you expect to add volumes of trucks to the existing congestion for the next 2½ years? Who will pay for the road repairs once the trucking is finished. The tax payers have had enough! Is anyone concerned for the safety of all of us that drive these streets each day? R-12-11 R-12-15

The safety of our children is another concern. The streets will not be safe for children to walk when all those trucks start pouring into our area. The noise from the airport has very seriously affected the learning at the schools in the Highline School District. The classrooms vibrate, teachers have to stop teaching, and students R-7-9 R-12-19

239

tune-out many times a day now. If more flights are added that will magnify the teaching and learning problems. Our children need a good education as they are the future of our country.

We want to ask the question, "Is the third runway really necessary?" We would like you to check out the density of flights - how many flights leave Sea Tac with empty seats? Can some equipment be updated to allow better access in inclement weather? Most flights at Sea Tac are on time, contrary to what many Port officials claim. R-12-10

We do not feel a third runway is necessary. It is time now to build another airport because this third runway would only be a temporary solution. Let's be realistic about the future of this area before the entire area is destroyed.

Sincerely,

Raymond F. Voeller
Judy A. Voeller
Ray Voeller
Judy Voeller

240

COMMENT SHEET

RECD ANM-610
PLAN, PGM, ...
AUG - 4 1995
ANM ...

Public Hearing
June 1, 1995

SEATTLE-TACOMA INTERNATIONAL AIRPORT

Draft Environmental Impact Statement for the Master Plan Update

Gentlemen,

That a third runway is needed at Sea-Tac there can be little doubt. That the construction itself will be a major disruption is a given. That there is a worthy alternative is fortunate.

I have looked over the Draft E.I.S. and was astonished to learn of the number of truck trips that would be involved just in bringing in the 17 million cubic yards of fill material.

I'm told there is a conveyor belt system that would eliminate those trips, thereby being less damaging to the environment and using much less of our fuel supply. I suspect the overall cost to the taxpayer would be quite a bit lower.

Cheaper, less truck traffic and damage to roads, less noise and air pollution. I believe that is what these days is called a no-brainer. Please use your collective brains to carefully and positively consider the conveyor belt alternative. And let's get on with this overdue project.

R-12-22

(Please Print) Name: Don Riggs
Address: 234 W. Lk. Samm. Blvd. S.E.
City: Bellevue WA Zip Code: 98008

Please return comments by August 3, 1995 to: Mr. Dennis Ossenkop, Federal Aviation Administration, Airports Division, ANM-611, 1601 Lind Ave SW, Renton, Washington 98055-4056 *or leave in the box as you leave the meeting.*

241

RECD ANM-610
PLAN, PGM, & C/..R
AUG - 4 1995
ANM-610

Kris Webb
RCAA
13511 2nd Street East
Sumner, WA 98390

I have a few points to bring up regarding the proposed third runway at Sea-Tac.

R-3-26

1. Length of runway. On Page 6, Chapter II, Item (B) of the Sea Tac Airport Master Plan Update Draft EIS you site that a B747-200B, fully loaded requires a 12,500' runway to fly non-stop to Hong Kong or Shanghai at 76 Degrees F. Currently the existing runways are 9425' and 11,900'. These runways now will not accomodate this take-off - what deviation from this requirement will be allowed by the FAA to ensure take-off for Boeings most celebrated plane, the 747, on the proposed 8500' third runway? As the 4300' separation requirement between runways applies, there appears to be no justification for this additional third and still not long enough runway, as the airport would still be reduced to utilizing just two runways at any given time. Does Sea Tac not intend to provide the airlines' that service these two important destinations in the Far East with a runway capable of this type of take-off? There are two runways available now - Paine Field and Moses Lake.

R-12-6
R-12-7

2. Earth. I question a number of your estimates on fill requirements to "make" a hill out of a valley for this proposed runway. Port estimates are approximately $3.56 per cu. yd., with an estimate of 23 million cu.yds. of fill required for a total of approximately $81,000,000 for fill material costs alone. A fully loaded dump truck with trailer weighs 105,000 lbs and carries 23 yds of fill material, therefore the Port must be estimating that 1 million loads of fill carried from state certified pits in the area to the site. Can the Port identify these certified pits at the present time? If 1,000 trucks are used, making 2 trips per day, it will take 500 days or approximately 2 years to complete just hauling the fill, not including compacting or grading, given that the fill comes from pits that are located in a 30 mile radius from SeaTac, or does the Port intend to run more than 1,000 trucks, or possibly run dump trucks and trailers 24 hours per day 5-7 days per week, non-stop? Should the pit sites that comply be located farther than 30 miles from SeaTac, the number of trips per day, per truck, will be reduced, thereby increasing the number of trucks hauling fill or extending the period of time required to fill the site. Since the Port wants to use its own sites and off-site burrough sources referring Chapt. 4, Subtitle 19 (Earth) paragraph 3 please identify the location of these sites and are they approved by the Corps of Engineers? This information should have been gathered and made public long ago. It does affect the environment, the roads and the <u>true</u> cost of the third runway construction.

R-12-10

241

R-12-15

To comply with the FAA requirement of runway spacing, the amount of fill required is closer to 50 million cu.yds. at a more realistic price of $7.00 per cu. yd or $350,000,000 for the cost of material.

R-10-40

Not only has the cost of fill not been adequately addressed at this point in time, but the wear and tear on the roads to and from the borrow sites and the site, the traffic congestion, dust and noise pollution are sorely lacking in answers to questions on these subjects that the public needs to know.

Truck Weight and Wear on Roads:The tables in the Draft EIS (Table C-4) Appendix J, list Access Routes that are all proclaimed "satisfactory". If these existing roads are not satisfactory to handle the commute traffic they bear now, how can they be used day in and day out by 105,000 lb. trucks and not be impacted throughout this 2.5 year project? Has road closure for repairs (which will be necessary in 2.5 years) been analyzed for impact on traffic congestion?

Truck Exhaust and Air Pollution: Dump trucks burn diesel fuel. Combined with the jet fuel pollution already in existence and 1,984 trucks per day, impacted neighborhoods are going to have a permanent exhaust cloud surrounding them for 2.5 years!

Truck Length and Traffic Congestion: The length of the dump truck and trailer fully stretched (which is required if truck is fully loaded) is 74.9 lf. The EIS on Pg. 2 of Section II, Appendix J calls for an average of 1984 truck trips per day or 82 truck trips per hour. Without any other traffic (like taxpayers in their cars going to and from work) the backup can be projected to be 28 miles. The two streets I am going to refer to regarding this impact, are the streets I am the most familiar with, NE 8th Street in Sumner and Des Moines Memorial Drive from S. 216th at Marine View Dr. to S. 188th St. south of the airport. Both of these avenues are STREETS, not access routes, roads or even 4 lane boulevards. They are NOT in satisfactory condition, being narrow, patched, no shoulders and in the case of Des Moines Memorial Dr. lined with residences. Recently NE 8th Street was re-paved, but it still does not have shoulders and does not have any traffic signals from Hwy. 167 east to the Eaast Valley Hwy. NE 8th is lined on both sides right now with commercial truck carrier companies, i.e. Gordon Trucking, Metro Hauling, City Transfer, to name a few. Add 82 trucks @105,000 lbs. that measure 74.9 lf and you have an overload of truck traffic. Safety concerns are not addressed in the EIS, damage to motorists windshields from flying debris off these trucks has not been addressed, damage to roads from the weight of these trucks all has been glossed over in this report as "satisfactory". Highway 167 is showing so much noticeable wear from existing truck traffic that ruts are forming in the asphalt from Kent to Sumner. Much of this existing truck traffic has increased in the past two years because many companies are using Hwy

241

167 instead of I-5 to travel from Renton south to Tacoma because I-5 has become so rough from overloaded truck traffic. R-12-15

3. Alternatives. Referring to Chapt 2, Page 5 under Alternatives #5, the Port uses the word "technology when it suits their purpose for argument. Use of Air Traffic and Flight Technology is not being considered because no technolgies currently exist or are planned to address poor weather operating constraints at SeaTac, but the Port states on Chapt. 4, Pg 13 Subtitle 7 (Human Health Impacts) that noise and air quality and environmental impacts are expected to decrease in the future as "technology" results in lower noise, air and water pollutant emissions. Technology is only working on pollution, nobody can make a buck on advanced technology to curb or eliminate poor weather landing problems? R-4-9

4. Referring to Chapt 2 Pg 6 Subchapter B, the port is concerned with an economic loss to the airlines of $1.2 million per year and by the year 2000, $2 million per year without expansion. This statement is vague. Does this mean per airline which the Port says are now 60 airlines at SeaTac, or the combined airlines? If it is the combined airlines from Mark Air to United, the most cost effective method would be to pay-off the airlines at 1.2 million per year, much the same as King County does when the roof leaks at the King Dome and the Mariners and Sea Hawks sustain an economic loss and are duly compensated by the taxpayers. Either way, combined total or individual airlines, the cost will be substantially less than the cost of construction of a third runway. R-3-21A

5. Chapt 4 Subtitle 3, pg 12. This statement by the Port is a lie. DOT Section 4F provides protection of certain publicly owned resources, including public parks, recreational areas, wildlife and waterfowl refuges of federal, state or local significance, etc. The Port states there are historic sites and archaeological sites in the airport area but none would be adversely affected. Screaming jets overhead, jet fuel pollution and thousands of trucks hauling dirt and the accompanying dust is not going to adversly affect these areas? I suggest this be further examined for violation of this act. Possibly the Port has set up a fund to pay the fines to the US Dept of Transportation for violations of this act? R-7-14

I consider all these points to be valid issues that have not been addressed satisfactorily. The questions I have raised to the Port of Seattle at various meetings I have attended have never been answered unequivocally "yes" or "no" as to how this construction of the third runway will affect my life, my property value or my environment and health. I have always been given an answer that "they (the Port) are still studying it or that that study has not been released yet, or that subject will be addressed at a later date.

241

Time does not allow me to make further comment on the draft EIS. Hopefully some of these concerns I have expressed will be thoroughly investigated before a decision is made.

Sincerely,

Kris Webb

Kris Webb

242

July 1995

REC'D ANM-610
PLAN, PGM, & CAP BR
AUG - 4 1995
ANM-610

Federal Aviation Administration
Dennis Ossenkop
Airports Division, ANM-611
1601 Lind Ave. S.W.
Renton, WA 98055-4056

Dear Sir:

As a part of the ongoing debate on the third runway issue and Environmental Impact Study comment period, I wish to register my objection to the change in air-traffic patterns over Southeast Seattle in advance of the final decision on the third runway.

Recent changes in air-traffic patterns are adversely affecting our way of life. Noise levels are increasingly oppressive. It is our understanding that changes in air-traffic patterns are prohibited without an Environmental Impact Study. We are concerned that our community was not included in any study of the air-traffic patterns current or future. R-5-4

Please record my objection to the change which has occurred in air-traffic patterns and which is adversely affecting the quality of life in and around the communities of Southeast Seattle. R-5-5

Respectfully,

Bethany Woodward
Signature

BETHANY WOODWARD
Name

3521 S. FERDINAND
Address

SEATTLE WA. 98118
City, State, Zip

243

REC'D ANM-610
PLAN, PGM, & CAP BR
AUG - 4 1995
ANM-610

COMMENTS OF SEATTLE COMMUNITY COUNCIL FEDERATION TO THE DRAFT ENVIRONMENTAL IMPACT STATEMENT ON THE SEATTLE-TACOMA AIRPORT MASTER PLAN UPDATE

August 3, 1995

Identity of commenter

Seattle Community Council Federation is a not-for-profit Washington corporation, made up of community clubs, councils and associations in the City of Seattle. It is the only city-wide organization of its type. The Federation submitted scoping comments at the start of this particular exercise, and has been continuously active in Airport affairs since the days of the Joint Overflight Committee. Noise from aircraft operation, including noise due to Sea-Tac, has long been a concern of many of our member groups. It had a special task force on aircraft noise, the Aircraft Noise Group, since 1989.

General impact of Sea-Tac on Seattle.

Our principal interest is in matters directly affecting the people and the neighborhoods of Seattle. Noise and other impacts from Sea-Tac (particularly air pollution) have become problems in every corner of our city, from Broadview, on the extreme northern border, to Seward Park in the south east, from West Seattle, Queen Anne and Magnolia across to Beacon Hill and the Rainier Valley, in the lower-income areas, in mixed neighborhoods, in the most prosperous residential areas, in the health-care district on First Hilll -- everywhere. R-5-4

Meaningless Noise Impact numbers

We are quite aware, even without the current DEIS, that the F.A.A. likes to aver that there is no noise outside its oddly-drawn 65 Ldn contours. This comment says that the F.A.A. is wrong. The agency's activities and the activities that it sponsors, that it is supposed to control but does not, produce plenty of annoying, bothersome, anger-producing noise, day and night, in areas far removed from any that the agency recognizes as being impacted. The noise discussion in the present DEIS is utterly unrealistic. The noise metric of 65 Ldn is essentially useless in determining where in Seattle there is unwanted, undesirable noise from Sea-Tac operations. If noise wasn't a problem, we wouldn't be complaining. We're complaining. It's a problem. The F.A.A. starting with the FEIS, needs to come up with more realistic, R-6-0

243

more honest, ways of measuring noise and its adverse impacts. Hiding behind its own archaic, unscientific, and self-serving regulations may be a legal justification for bureaucratic indifference, but it is not a proper excuse.

Socio Economic Impacts of Noise

Noise harms our neighborhoods. We know it, even if the F.A.A. and the Port are locked into states of denial. It causes direct stress, it causes anger, it causes distrust of government, cold, callous, indifferent, and even hostile government, agencies that seem to be in the pocket of large corporate interests. Noise diminishes property values. Noisy neighbors harm property values; noisy streets and freeways the same. Seaplanes, helicopters, and most of all, Sea-Tac jet aircraft, make properties and neighborhoods less desirable.

R-8-18

Big-city neighborhoods are under a lot of stress at this time. New zoning regulations from every level of government seem indifferent to preservation of family-oriented neighborhoods, indifferent to private home ownership. Problems in the education system (once the most admired in the State) make city living look less attractive to many. Sudden and large shifts in neighborhood and all-city demographics are disturbing. Ground traffic volumes are up, street conditions are worse. Taxes seem to head to ever-new heights. We are endeavoring, sometimes against what seem great odds, to hold together an important social unit, the neighborhood. Massive doses of unnecessary overflight noise is another and serious strain on the neighborhoods and on the social fabric generally.

We lived through, and worked against 'white flight' we worked against considerable opposition to keep some neighborhood connection and parental involvement in the common schools, we've worked for and achieved neighborhood-based, pro-active policing. But the city still suffers from the devastation of the urban-renewal days, with seemingly desirable, large, tracts of land lying empty in the heart of the city. How easy will it be to secure desirable development on ground just under the ever-noisy flight paths that go down the mid-line of our city? The FEIS needs to address overflight noise and air pollution as disincentives to reasonable and orderly property development in Seattle.

243

R-8-11

The FEIS needs to consider the impacts on neighborhoods of this unwanted, undeserved, intrusive noise. For some, the unabated, uncontrollable noise will be the last straw. How many people will be driven out by this nuisance? What are the demographic implications of noise displacement? Will the city continue to attract and to hold at least some of the best and brightest, despite this newest device to make urban living unattractive? Where will people go, if they can afford to go, to escape? Not to some other neighborhood in the city, for none is immune from the overflights. Out to the county? But it seems that all the densely populated centers receive overflight noise, and every time there is a juggling of flight paths, another area gets hit. Into the country? Growth management essentially cuts off this possibility. The implication is that people will be driven completely out of the Central Puget Sound region.

People working out of their homes, people whose work requires extreme mental concentration, they will suffer disproportionately. Retirees who are home all day, many of whom have looked forward for years and decades to gardening, golfing, and other outdoor recreation after retirement, find their enjoyment of life sadly diminished by noise from overflights in their back yards. People will start to think long and hard about remaining in such an environment. The prosperous may start to leave. The FEIS needs to look at this consequence of business-as-usual down at the airport. Consider the economic harm to the city as prosperous and highly productive people are essentially driven out.

In referring all these ills to our own city, we do not wish to seem to minimize the impacts on the social fabric of other parts of the vast affected area. Certainly many communities closer to the airport will suffer similar adverse impacts, and some will in time be sadly wrenched, with many of those who long provided leadership and stability finally leaving, some at considerable financial sacrifice, when it becomes clear at last that the Port and the F.A.A. are determined to induce all significant commercial-aviation activity to occur at Sea-Tac.

Mitigation Impossible

It is simply impossible to mitigate the harm here proposed. Our gardens and yards cannot be insulated. The home-insulation program is so narrowly circumscribed that tens of thousands of impacted homes are artificially denied assistance. The Port cannot afford to buy up the properties that it should acquire to have a decent separation between itself and those upon whom it is inflicting itself. It would have to buy out half Seattle. What would be the point? Destroy the urban centers that the Airport supposedly serves?

No Need Established

We cannot see any need for this project. It is patently obvious to anyone who has followed the Port's expansion activities for very long that the bad-weather delay argument is a fabrication. No-one in their right mind would spend this kind of money for the measly increase in flights that would follow. If that were the real concern, a modest amount of demand management would clear up the Airport for decades to come. Just get those space-consuming little commuter planes out of the way.

R-3-1

Diversion of even a small number of people from commuter aircraft to rail would also provide an indefinite relief to the facility. Many other ameliorative measures have been suggested, all to be rejected. Why? Because the bad-weather delay is not the real reason for the project. The Port wants a MAJOR expansion.

We have attached as our Appendix A our report at least some of the available alternative, and ask you respond to its points.

Alternatives Given the Brush

The EIS should have looked seriously at the two viable remote locations proposed for a true regional airport of realistic capacity, the proposed site down in Lewis County, presented to AIRTRAC, and the existing, operational site at Moses Lake. The purported difficulties of ground transportation, as we all know, can be solved with available technology -- except that the Port ardently blocks all realistic consideration of such alternatives.

R-4-4
R-4-7

Sea-Tac cannot possibly meet the projected air-travel needs of the future for this region. Maybe, maybe, if risky innovative techniques of flying in total fog, wingtip-to-wingtip, were instituted, but only then if the commuter craft are sent elsewhere, and certainly Sea-Tac will not support the bigger, faster planes of the future. Even if there were no noise impacts, just plain constraints of geography, the place will not work for the future.

Disproportionate Impacts

By obfuscating the noise impacts, the F.A.A. has so far successfully hidden the disproportionality of the impacts of Sea-Tac operations, impacts which we know from our knowledge of our city's neighborhoods, acquired over many years, to fall much more heavily -- though they are heavy on all -- on people of color, recent immigrants, low-income people, the halt, the infirm, the elderly. Sometime or other, honest noise measurements and honest noise maps will have to be produced. Let the FEIS be the place. Then our policy-makers can see the truth about the objectively racist character of this proposal.

Diminishing Noise ??

The DEIS makes a considerable splash about its predictions that noise from Sea-Tac will diminish in the future. The Port's noise regulations, adopted half-a-year after the Port terminated the noise mediation effort, are said to be so effective that there will only be half as much noise in a few years. Any gains arising from the regulations will, we believe, be negated by much-greater volume, as the commuter planes are pushed out in favor of heavy cargo aircraft, as the Stage 3 aircraft get older and noisier, and the newer ones get bigger and noisier (and fly from the extended easterly runway with greater loads), and as the user fleet becomes more and more East Asian. All who are knowledgeable about noise know that a reduction of half in total energy will be barely perceptible, if it ever occurred. Indeed the PSRC's Expert Arbitration Panel. The way a jet is loaded and flown makes more difference than Stage II or III for noise.

Absurdly, Seattleites are told to turn the Federal Way maps upside down to get an idea of the 80 SEL noise, which disturbs sleep. The FAA & the Port can't be bothered to produce complete maps.

R-6-1B
R-6-11

Flying the Duwamish

The DEIS talks about aircraft presently flying the old, abandoned Duwamish - Elliott Bay noise abatement route in large numbers, especially during South flow. We live under the noise, and we're here to tell you that this talk is bunk. The F.A.A. directs traffic all over the place, but mostly right down the I-5 corridor, so that the noise exposure on human populations in Seattle is maximized. This should be fixed in the FEIS. The DEIS also perpetuates the myth that planes quiet on arrival. Some are but a heavy jet makes more noise on landing than and old stage II on take off--and they make a lot of noise turning and adjusting as they line up for the runway.

R-6-14

243

Air pollution Not Measured

The section on air pollution, main text and appendix, artfully speaks of 'receptors' as having been used in the studies of Sea-Tac air pollution. Reading with care, we discovered that in fact NO receptors were used. The "receptors" are merely geographical co-ordinates fed into the computer model that was used to make educated guesses about air pollution. The FEIS should cure the deception, innocent or otherwise, and not talk about imaginary receptors as if they were real. And, we find it hard to believe that anyone will give any credibility to air pollution conclusions that are not based on any real measured data. The FEIS should not come out till real field work is done. And let us add that Sea-Tac's heavy contribution to air pollution should not be concealed by averaging it in with county-wide numbers, and by assuming that there is no air-pollution problem unless the pollution is so very bad that it violates statute law. On those bases, no-one's air pollution around here has any significance, which is absurd. The FEIS needs to get serious about this subject. Maybe the Port and the F.A.A. should hire some scientists to work on this subject, instead of the same old crew of professional airport apologists hired to write yet another EIS justifying yet another lousy airport expansion.

R-10-30

We associate ourselves with the comments of our member group, Ravenna-Bryant Community Association, and with the comments of our colleagues in the North-East District Council. We also adopt the comments of the Regional Commission on Airport Affairs.

Absurd Costs

The price tag for the third runway goes up with each passing year. First, it was $400 million (Flightplan); then it was $900 million with so-called mitigation. Now, we understand it's $1.2 billion, not including mitigation. Who is minding the till? Most other single (independent) runway estimates in other cities run $40 million to a maximum of $120 million.

Beth Means
EIS Comment Committee,
Beth Means, Chair ANG

Chas H W Talbot
Chas Talbot, Committee Chair

243

Appendix A:
The Need for the Third Runway and Alternatives Thereto

RCAA - Seattle
A task force of Seattle Community Council Federation
Affiliated with RCAA, Regional Commission on Airport Affairs
506 2ND AVE., #1214
SEATTLE, WA 98104
Phone 206-223-3622/Fax 206-223-1910

TO: Dennis Ossenkp, ANM-611
FAA, Northwest Region, Room 540
1601 Lind Ave, S.W.
Renton, WA 98055-4056

RE: Is there a need for a third runway and are there alternatives to building a third runway

A) INTRODUCTION AND EXECUTIVE SUMMARY

This report is divided into four sections. Section #I researches if a capacity/delay problem actually exists or can be expected. We have included the effects of high speed rail and teleconferencing on airspace demand under this category, since these are system management improvements over which the Port has very little control. They would therefore define the air capacity demand, that the Port or some other airports will have to satisfy. Section #II analyzes if a third runway is a good solution and section #III if a capacity/delay problem can be solved better with alternatives to building a third runway (including improvements to the existing airfield or a new airport). Finally, section #IV makes recommendations for criteria to use to decide the best solutions. The main criteria should be the requirement that any demand/system management option must be expected to obviate or defer the need to construct the third runway in order to be feasible[1].

It is clear that Transportation Secretary Federico Pena (exh. 5) and FAA[2] support the use of feasible high speed rail, new airspace technology, air traffic procedural changes and air traffic marketplace solutions before any expansion of existing or new airports take place. This supports our conclusion that it is ludicrous to spend a large amount of money (between $.5 - $2.0 billion depending on what you include) on the third runway expansion before all alternatives have been exhausted. This report will conclude that many demand/system management methods are feasible. Further, the use of underutilized existing alternative airfields (especially Paine Field and McChord) are feasible system management methods, which is also supported by FAA in a 1994 report[3]. A new airport is also feasible. Both these permanent solutions are more feasible than spending the largest amount ever in USA to squeeze in one more runway at the severely undersized SeaTac airport.

<u>To facilitate FAA answers to this report, we have underlined our questions and request for information, that we would like detailed answers to. However, we would also like detailed answers, either agreeing or disagreeing to all our points, even if they are not in the form of a specific question.</u>

I) <u>QUESTION: IS THERE OR WILL THERE BE A CAPACITY PROBLEM AT SEA-TAC DUE TO EXCESSIVE DEMAND OR DELAYS?</u>
<u>ANSWER: EXPANSION NOT NEEDED FOR A LONG TIME DUE TO SEVERAL FACTORS, INCLUDING: DELAYS HAVE BEEN EXAGGERATED BY THE PORT/DEMAND FORECASTS ARE UNRELIABLE/DEMAND WILL BE LESS DUE TO HIGH SPEED RAIL, TELECOMMUNICATION, ETC. AND</u> R-3-16 R-3-17 R-3-18

<u>WILL THEREFORE DEFER THE NEED FOR AIR CAPACITY INCREASES</u>

a) Many delay figures, but they all give different results. Please explain the reason for the differences and detail each and every input variable and formula/computer model that was used for each calculation? Please supply "metering" data for all years after 1991.

There is a great proliferation and confusion among both the current and future figures for measuring delay. During the current periods, the delays vary from 34 seconds to 15 minutes depending on the source. During the future periods (mostly around 2020), the delays vary from 3.5 minutes to 34 minutes. However, they show a decreasing trend.

b) ATOMS present average delays per operation of 21 seconds in 1994 refutes the Port's delay figures of 4.5 - 6.0 minutes according to the SIMMOD analysis and 5.6 minutes according to the ASQP analysis

The ATOMS delays at SeaTac have been decreasing from 3.05% of total operations 1990 to .61% 1994.

The ATOMS figures show 21 seconds average delays per operation for 1994. This can be easily calculated using the 40 minute average delays per delayed operation in 1994 reported by FAA in their official statistics. This includes an estimate of the delays caused by operations delayed 0 - 14 minutes based on the same 25% proportion of total delays as the 25% in the ASQP statistics. The 21 second average delay compares with the Port's estimate of 5.6 minutes of delays per operation based on the ASQP statistics (estimated from reports by airlines representing only 46% of total operations at Sea-Tac) and FAA's estimate of 4.5 minutes based on a SIMMOD analysis for 1994 presented in the 4/95 DEIS. The 21 second delay figure is supported by actual FAA measurements of delays both above and below 15 minutes during the 1990-91 period that resulted in average delays of 34 - 45 seconds. Therefore, the Port's latest computer estimate of 4.5 minutes average current delays do not match reality. Simulating reality is not as good as reality itself.

<u>Why the ASQP statistics show a 16 times (5.6 minutes per ASQP/21 seconds per ATOMS) larger delay than the ATOMS statistics?</u> To analyze this question, we also compared the reported ATOMS delays (above 15 minutes only) to the ASQP "late" operations (also above 15 minutes). ASQP shows 22 times larger delays than ATOMS (30,603 hours per ASQP/1,414 hours per ATOMS) and 24 times more operations delayed (50,171 ops per ASQP/2,121 ops per ATOMS). Thus, the discrepancy became even bigger between the two statistics when you compared the same reported numbers. This large discrepancy is mainly caused by the fact that ASQP records ALL reasons for delays, whereas ATOMS records the delays by reasons related to capacity, which EXCLUDES DELAYS CAUSED BY THE AIRLINES OR AIRPORT PERSONNEL. Thus, the ATOMS delays can be improved with airport improvements whereas the ASAP delays can only partly be improved with airport improvements.

The "taxi-out" portion make up 49% of the total ASQP delays nationwide according to Table 1-2 in the 1994 ACE plan. The "taxi-out" delays should not constitute a large portion of the Sea-Tac delays, since the Port claims that 89% of all delays are caused during arrivals. The "airborne" portion make up 29% of total ASQP delays nationwide and could imply such factors such as strong headwind, etc.. Most flights are held at the departing airport now instead of circling the arrival airport due to flow control, so poor weather at the arrival airport should not constitute a large portion of this category. The remaining 22% is made up of the "taxi-in" and the "gate-hold" categories. The "gate-hold" category probably includes the following delay reasons: plane not being able to take off on time due to an earlier late arrival, equipment failure or maintenance of a plane causing the plane to take off late, a tractor being R-3-16 R-3-17 R-3-18 late putting out a plane from the gate, re-fueling being late, crew arriving late, baggage being loaded late, plane held for a VIP person arriving late, etc.. These delays are not included in ATOMS, since they are caused by the airlines or the airport personnel. Please break down the Sea-Tac delays by these reasons separately for departures and arrivals and indicate how much of each delay would be eliminated by building a third runway and why?

Does the ASQP statistics allocate a "gate-hold" delay at Sea-Tac caused by bad weather at Chicago to the Chicago airport in a similar manner as the ATOMS statistics does? Further, the ASQP statistics has estimated the delays for 54% of the operations at Sea-Tac based on the delays for 46% of the operations, as reported by only 10 airlines. This will give a skewed picture, since the remaining 54% consist of many commuter planes that have less delays. Commuter planes fly at off-peak hours to a higher degree than the major carriers that are included in the reporting statistics.

Based on the above analysis, many of the delays reported by ASQP are therefore unrelated to airside capacity problems and will not be reduced by building a third runway. It is thus meaningless to quote the much higher ASQP delay statistics as a reason to build a third runway.

Similarly, the Port's SIMMOD model is overestimating the airside related delays by a factor of 13 (4.5 minutes in 1994 versus 21 seconds for ATOMS) due to input variables that do not agree with reality.

We therefore believe that the ATOMS statistics represent a more true picture of the actual airside related delays at Sea-Tac than either ASQP or SIMMOD.

c) ATOMS data for arrivals during bad weather shows only a 6 second delay/total operation

The Port claims that the main delay problem is during arrivals. When you break out only the arrival delays from the ATOMS data, the result is only a 8 second average delay. If this analysis is not correct, please indicate what portion of the 4.5 minute current delay in DEIS is due to arrivals and departures?

d) DOT ASQP delay statistics

ASQP does not separate the reasons for delays and therefore includes delays caused by other factors than the airside capacity at the airport. It further incorrectly allocates delays caused by the arrival airport to the departure airport. Also, only 10 airlines report this data, so it is inaccurate to estimate total delays from this small sample.

The ASQP national delay statistics show that delays were reduced from 14.9 minutes 1990 to 14.2 minutes 1993. ASQP data for 1994 show that 84.8% of all flights were either early or on-time. ASQP data for May 1995 rank Sea-Tac as #1 in on-time departures (90.0%) and #8 in on-time arrivals (84.6%).

e) Airline statistics

We would like an opportunity to critique the "block time" statistics kept by the airlines, if such information is provided to us.

R-3-18

f) Delay savings of building a 3rd runway have been overstated by Port

R-3-16

The Port has falsely increased the delay savings from building the third runway by 12% to a total of $270 million versus their 1991 estimates of $241 million by increasing the average hourly delay cost 48% to $2,130/hour while the delay hours saved have decreased 24% to 127,000 hours. Simultaneously, the delay hours for the "do-nothing" alternative have decreased 38% to only 149,000 due to capacity improvements already done at Sea-Tac. However, the Port has not increased the stated capacity for Sea-Tac above the 1988 maximum of 380,000 operations.

R-3-23

g) Passengers are ultimately paying any delay costs. Airport delays are considered minuscule by passengers compared to delays for ground access, etc.. The Port is trying to prevent market forces that dictate airlines moving to reliever airports

Delay costs are passed on to passengers, and should therefore be compared to other delays in our society that passengers are exposed to. Surveys prove that passengers are more concerned about delays during the surface access to the airport. Since the passengers are the ultimate customers of an airport, the criteria for airport expansion should therefore be when passengers want an expansion and not when airports or airlines want them.

Further, if delay costs was such a big concern to airlines as the Port claims, the airlines would already have considered moving to other nearby airports (Paine, Boeing, McChord, etc.). This has been proven by previous research.

h) SeaTac's delays are not bad enough yet to call for an expansion now, but rather year 2015 when operations are predicted to reach 425,000. The Port's SIMMOD computer model is not accurate to predict actual delays and time to expand

Sea-Tac's delays could quadruple from the present ATOMS delays of .61% of operations in 1994 until they reach the level of other airports in USA that have decided not to expand and whose economies have not suffered.

Based on the 1994 ratio between SIMMOD and ATOMS, SeaTac's ACTUAL delays are not bad enough yet to call for an expansion now, BUT RATHER YEAR 2015 AT THE EARLIEST, WHEN OPERATIONS ARE PREDICTED TO REACH 425,000. This is the level when ACTUAL delays will reach the Port's own maximum delay criteria.

i) Demand forecasts are so unreliable that the prudent strategy is to wait as long as possible with any expensive and irretrievable capacity expansion

R-3-9

Demand predictions are not reliable and "dynamic planning" should therefore be used to delay any implementation of an expensive and irretrievable solution, such as the third runway, as long as possible. The Port first dramatically increased the forecast 3/92 (reflected in the final Flight Plan report) to 563,000 operations 2020 from the previous Flight Plan report, since "the conversion to larger aircraft is less optimistic than (the original) Flight Plan." This was done just prior to PSRC passing the 4/93 A93-03 resolution to authorize the third runway, subject to some conditions.

The Port then changed their 3/92 forecast to the present one dated 4/94 so that Sea-Tac's maximum capacity of 460,000 would last to 2030 instead of 2007 previously, or an extension of 23 years. P & D Aviation also showed a decrease in operations between the same two forecasts from 563,000 operations in 2020 to the present 441,600, or a 121,400 decrease. This forecast was used October 1994 as one reason why PSRC decided that a new airport inside the 4 counties was not feasible, since the third runway could take care of our needs until 2030.

R-3-24 R-3-7

The conversion factors between passenger forecasts and number of operations are also utilized in the present 4/94 forecast to overstate the 2020 operations forecast in our opinion. Sea-Tac can handle the Port's 2020 passenger forecast of 38.2 million passengers with the present airfield with only a slightly higher increase in either load factors or airplane size than the Port has used in its 1993 - 2020 forecast. Even if the enplanement per departure trends of 1990 - 94 continue in a much slower fashion and the Port's 38.2 million passenger forecast for 2020 is correct, Sea-Tac WITHOUT a third runway can handle the 2020 passenger load. Enplanements increased 3.3 per year 1990 - 93 and jumped 7.6 1993 - 94 but the Port is only predicting a 1.3 per year increase 1993 - 2020. All that is needed to handle the load of 38.2 million in 2020 is an increase of 1.7 per year, which is considerably less than the existing trends for the last 4 years.

Instead of reflecting this ongoing trend of increased enplanements per departure, the Port is attempting to contradict this trend with its latest increase of the 2000 forecast from 379,000 to 435,000 operations based on a continuation of the 4% actual operation growth 1993 - 1994. This latest 4/95 forecast does not jibe with the Port's previous passenger projections and increased enplanements per departure assumptions but is only a simplistic extrapolation of one year's operation growth. The political purpose this time is to attempt to convince the decision makers that we must start building the third runway as soon as possible.

Thus, the Port has changed the forecast dramatically 3 times during the last 3 years (up 3/92, then down 4/94 and then up again 4/95) to achieve political goals. Please explain in a clear and simple chart the differences between the above four forecasts in terms of 2020 operations and when the 480,000 and 525,000 operations would be reached in each case. The Port has used these forecasts and conversion factors for a long time to "customize" their forecasts to accomplish political objectives in our opinion.

R-4-10

j) What demand decrease did the Port use for high speed rail in their demand projections?

A 1% decrease in number of passengers due to rail would decrease airline operations by 5% in 1993 since the rail will replace smaller commuter planes with a 45% load factor. Even the Port's own figures show that rail could draw "less than 5% of air passengers...by 2020", which corresponds to 90,000 less operations or 20% of all operations predicted for 2020. This falls well within the feasible range according to our 2,700 operation reduction threshold per item #III.a below.

Decrease in demand due to rail should be deducted from the Port's predictions. Please indicate SPECIFICALLY how much demand was deducted from the Port's demand generated by the computer equations? What are the all the assumptions in the demand equations, the output and the manual adjustments made for each factor? Please indicate the name and supplier of the computer program that was used and how a copy can be obtained of this program. The Port has admitted that no deduction has been made from their computer model output for any demand reduction due to rail.

k) What demand decrease did the Port use for "teleconferencing and electronic communications" in their demand projections?

Decrease in demand due to teleconferencing should be deducted from the Port's predictions. Please indicate SPECIFICALLY how much demand was deducted from the Port's demand generated by the computer equations? What are the all the assumptions in the demand equations, the output and the manual adjustments made for each factor? Please indicate the name and supplier of the computer

program that was used and how a copy can be obtained of this program. The Port has admitted that no deduction has been made from their computer model output for any demand reduction due to teleconferencing.

l) What demand decrease did the Port assume for other substitutes to air travel in their demand projections?

The other substitutes could include road transportation and competitive airports.

Conclusion:

Since there is no near term need for any airfield capacity increases based on delay and demand, it is not necessary to obviate or defer the need to construct the third runway. As a matter of fact, no need is predicted until approximately 2015. However, we recommend that all options that are cost/effective should also be declared feasible, since their are no implementation timing restrictions on feasibility. Based on the cost/effective criteria, even long term options like congestion pricing (due to leases not expiring until 2001), rail, teleconferencing and GPS are feasible. Short term options like gate control and technology, such as LDA, are even more feasible because there is even more time to fully implement these methods. Rail and teleconferencing options were discussed under section #I, since the Port has not control over these methods but they will act to define the demand that the Port will have to accommodate. All other alternatives are discussed under section #III.

R-3-7

II) QUESTION/SOLUTION #1: IS IT FEASIBLE TO SOLVE THE PROBLEM WITH A THIRD RUNWAY?

ANSWER: CAPACITY WITH THE 3RD RUNWAY WILL NOT INCREASE AS MUCH AS POS PREDICTS. THIS MAKES THE 3RD RUNWAY ALTERNATIVE EVEN LESS FEASIBLE THAN THE ORIGINAL LOW FEASIBILITY. USING OTHER EXISTING AIRPORTS OR BUILDING A NEW SUPPLEMENTAL AIRPORT IS A SUPERIOR SYSTEM/DEMAND MANAGEMENT SOLUTION AND WILL HELP REDUCE DELAYS PREDICTED BY THE PORT

R-3-24

a) There are several versions of the capacity increase with a 3rd runway

The Port's own figures show that Sea-Tac with a dependent runway can only handle 74% of the capacity expected with an independent runway.

b) Bogan report says 3rd runway will not increase capacity as much as Port predicts

The Bogan report makes concludes that the capacity with the third runway will not increase as much as the Port predicts, that the 44% Port bad weather figure is overstated and that capacity increases can be done more efficiently by improving the existing airfield. The reasons that capacity will not increase by the predicted 100,000 operations is due to many limitations such as air taxi and holding problems, inability to handle the next generation super-jumbos, etc..

c) Airlines are also unsure of claimed effectiveness of the proposed 3rd runway

The airlines might not support the third runway.

d) Only 100,000 operation capacity increase and big ticket for 3rd runway leads to low feasibility in comparison to a new airport and other alternatives, such as technological and procedural improvements

R-4-4

The third runway costs have already escalated to over $1 billion when you add in mitigation costs, terminals, baggage handling, etc., and it looks like the final cost will be closer to $2 billion. It would be the most expensive runway in U.S. history with a limited capacity increase of 100,000, that is much less than the 200,000 that is normally expected from an independent runway. Therefore, the $.5 - 1.5 billion for a third runway expansion is considerably less feasible than spending maybe $2 billion for a new airport with two runways that can handle 400,000 operations. Compared to using an existing airport, such as Paine, the cost benefit ratio would be even worse for the third runway.

e) The Port's claims that ALL additional forecasted flights would come to SeaTac even without a 3rd runway and would simply add to delays is false. Instead, reliever airports would be used by the airlines

The Port claims falsely that ALL additional forecasted flights would come to SeaTac even without a 3rd runway and would simply add to delays. Instead, the airlines would adjust to the new situation and schedule more flights during off-peak hours (the peaks would even out) and reliever airports would be used. This is already happening with all-cargo planes.

R-3-7

f) The expected future use of large aircrafts (seating 600 - 800 passengers) could not be handled efficiently at Sea-Tac

The region needs another airport that can handle these larger aircraft or the regional economy will suffer.

Conclusion:

The Port is attempting to have it both ways (see section #I.I). If the Port's slower forecast of 441,600 operations in 2020 comes true, the third runway will take care of air capacity until 2030. If the Port's faster forecast of 435,000 operations in 2000 comes true, we need a new airport besides the 3rd runway already in year 2003. However, we showed above that according to present trends, the slower forecast should actually be even slower and there is no near term need for more air capacity. If, on the other hand, the Port wants to promote the faster forecast, a new airport needs to be planned as soon as possible. If the trend in the faster forecast with 4% annual operation increases continues, Sea-Tac will reach 489,000 operations by 2003. The Port has made numerous promises that they will NOT be seeking the approval of a 4th runway. Therefore, the region will need another airport before even the concrete has been poured on the third runway and will be forced to start planning to use another airport right away, since it should be planned at least 10 years ahead. The third runway will be a band-aid, wasting federal tax subsidies on an alternative that is far less cost-effective (and disruptive to more people) than having planned for the new airport in the first place. Few business people would choose "to fix up an old outdated car (Sea-Tac) that has already reached its maximum economic usefulness." The high economic cost of the third runway will hurt the regional economy and make it difficult to get the additional federal subsidies needed for a new airport. This will prevent the state from becoming a player in the international economy.

III) QUESTION/SOLUTION #2: IS IT FEASIBLE TO SOLVE THE PROBLEM USING THE EXISTING

R-4-7
R-4-9

SEA-TAC AIRFIELD OR A NEW AIRPORT?
ANSWER: BOTH TECHNOLOGICAL/PROCEDURAL IMPROVEMENTS, PEAK PRICING AND GATE CONTROLS APPLIED TO THE EXISTING AIRFIELD AND USING A NEW AIRPORT ARE MORE FEASIBLE THAN BUILDING A 3RD RUNWAY.

The Airport Environmental Handbook, FAA document #5050.4A "includes the information essential to meeting .... the National Environmental Policy Act..." in its foreword. This handbook specifies that the alternatives "section is the heart of the EIS." (p. 80). It calls for a "simple explanation of why no further investigation was necessary" for any alternative that was dropped from further study. Please provide this explanation for each and every alternative below. The handbook specifies that the record of decision should base preferences between alternatives "on relevant factors including economic and technical considerations and agency statutory missions." (p. 102). Does economic considerations not include cost/benefit analysis? If so, please add this analysis to your EIS for the third runway and all alternatives below.

a) All technological and procedural changes should be considered

R-3-18

The above conclusion is supported by language in both MOU and the Implementation Steps that call for "at least" studying the "pricing mechanisms and the gate controls".

We recommend that a capacity increase of 2,700 operations, representing a 6 month "deferral", be used as the threshold limit to judge feasibility, instead of nebulous delay savings. We believe that a specific operation effect is much easier to measure and understand for the public than a reduction in delay. In addition, we believe we have proven that the FAA's SIMMOD delay model has some serious flaws that make it extremely unreliable and untrustworthy.

b) Bad weather/single stream percentage could be cut to 25% instead of the 44% claimed by Port now by using LDA

Many technological improvements can be used to reduce the single stream occurrence to maximum 25% instead of the 44% claimed by the Port, but foremost among them is LDA (other ones include MLS, GPS or FMS). Please provide the actual tower records that the Port's consultant Ron Ahlfeldt based some of his conclusions on (5/4/95 Expert Arbitration Panel hearing transcript, page 14). Please provide details exactly how FAA "actually ran capacities by hour through ten years of weather" (5/4/95 Expert Arbitration Panel hearing transcript, page 57) to arrive at delays that were 13% lower than if you had ran the SIMMOD model for 24-hour using straight annualization using those percentages, including all input, output, model name and version, supplier of model, etc.. We believe this data will prove that FAA has not studied the weather effect in the same detail as the recent June 26th report by G. Bogan & Associates. Also, please provide information regarding "how many aircraft are actually handled through the (SIMMOD) model" under the poor weather conditions (5/4/95 Expert Arbitration Panel hearing transcript, page 87). We have enclosed (exh. 5) the actual LDA approach being used presently at the San Francisco airport that will eventually allow SFO to have dual arrival streams with cloud ceilings as low as 1,600'. This could thus solve more than half the bad weather problems that Sea-Tac is claiming. We are very concerned that the Port has dropped this system management alternative from consideration that was one of three main alternatives in the 1991 capacity enhancement report. We have read RCAA's 6/26/95 LDA report by Bogan and believes that this report conclusively proves that LDA will refute the need for a third runway since LDA definitely will "obviate...the need to construct the third runway". This report clearly proves that single stream **percentage could be cut down even to 17%, instead of the 25% above, by using LDA.**

243

R-4-8

R-3-21B

c) Six improvements in 1991 SeaTac capacity plan would save approximately the same as a 3rd runway and are much cheaper to implement

These six improvements would eliminate 62% of all delays vs 69% by building a dependent third runway. Foremost among these 6 improvements are the in-trail separation that was implemented and the LDA and wake-vortex that have not been implemented yet. These 6 improvements would translate into a 425,000 maximum capacity for Sea-Tac instead of the 380,000 presently presented by the Port as the maximum.

d) All feasible technology/procedural capacity increasing methods in 1991 SeaTac capacity plan with updates should be implemented as soon as they are available

Five out of six options from the 1991 capacity study have apparently not been implemented, including the LDA and the wake vortex system that was predicted in 1991 to have a big effect. We already elaborated on LDA per item III.b above. The Port is underestimating the effect of the already implemented reduction in the in-trail separation, that was previously estimated to increase capacity by 15,500 operations. In addition, there are several more capacity increasing technologies and procedures options contained in FAA's 1994 ACE Plan, that could apply to Sea-Tac.

e) GPS

GPS will definitely have an effect on Sea-Tac capacity and the only question is when? FAA has told us that category III landings will be declared feasible this year and that partial implementation might start 2001. Both MLS and GPS were predicted to increase capacity by 6 operations per hour in 1992 AIRTRAC studies (possibly equivalent to 20,000 yearly operations).

R-13-24

f) Capacity of the present airport should be higher than the presently stated maximum 380,000 operations

The Port has underestimated the capacity of the already existing airport and it should be closer to 425,000 (reached in 2015 according to the Port's forecast) than the claimed 380,000 at this time based on our delay analysis in our section #I. The Port has also made several improvements already to the existing airfield capacity as outlined by the Port during the 5/3/95 hearings, including the reduced in-trail separation. Airport capacities are "stretchable" but the Port has not changed the 380,000 max. capacity since approximately 1989 in order to increase the necessity of building the third runway.

R-4-8

g) Technological and procedural improvements have a high feasibility, especially compared to building a third runway

The feasibility is very high from pursuing technology and procedural improvements, and building another runway should only be the very last resort after all other improvements have been implemented.

h) Airlines should be backing technological and procedural changes instead of a 3rd runway

The airlines may be paying in landing fees and other costs from building a third runway than

243

by implementing technology and procedural improvements at Sea-Tac and using a new airport somewhere else.

R-4-7

i) Congestion pricing incl. peak pricing

Congestion pricing is "feasible" using our criteria (section #III.a), but the Port needs to translate the effect into equivalent yearly operations. This conclusion is supported by experience elsewhere. The Port's claim that congestion pricing can not be implemented until 2002 only applies to 7 carriers that account for only 15% of all operations. It does not appear reasonable that 7 leases only representing 15/% of the operations would restrict a partial implementation at this time of any form of congestion pricing for the remaining airlines that represent 85% of the operations. If the seven airlines with long-term leases ending 2001 can not be convinced to implement congestion pricing now, the Port would simply implement the congestion pricing in 2001 for these seven airlines. The legal complications of implementing congestion pricing have been cleared up by recent FAA/DOT regulations. Peak pricing is prevalent in the rest of the economy and the Port's reluctance to implement peak pricing amounts to a conscious effort to not utilize the airport asset and scarce federal subsidies in the most efficient manner.

j) Gate controls

These method is "feasible", since it has been estimated to add 19 - 38,000 operations to the present 380,000 maximum according to studies.

k) Move some operations to reliever airports (detailed analysis in our 4/27/95 and 6/27/95 reports) and plan for a new airport

An area stretched out North-South as the Puget Sound area and with 73% locally originating passengers would be well served by an additional airport. The 3rd runway system management solution is less feasible than using already existing airfields (e.g. Paine) or than building a new supplemental airport due to many problems with this option. The 10/94 decision by PSRC to end studying a MSA inside the four counties was a political decision that has nothing to do with the RELATIVE MERIT of using another airport either inside or outside of the four counties.

l) Move all-cargo operations to off-peak hours

Presently, all-cargo operations constitute 8 - 11% of operations during certain peaks, even though all-cargo operations only constitute 4/7% of total yearly operations. This indicates a potential for improving overall peak capacity.

Conclusion:

During the 5/3/95 Expert Arbitration Panel hearings, Mr. Feldman stated that the Port would pursue a third runway even if delays stayed the same as presently. We believe that this statement illustrates the Port's unrelenting approach and bias. The Port's own figures even show delays below the FAA's limit of 7 minutes and the delays are far below the Port's figures according to our figures. Further, the third runway would only solve a peak hour problem (maybe 30% of the day) only existing during bad weather (44% of the time) during the peak months of the year (maybe 40% of the year). If you multiply these figures, the third runway would solve a problem that only exists 5% of the year. Please provide the actual numbers to calculate the percentage of the year when this bad weather condition exists. These low delays are confirmed by the 1994 ATOMS figure of only .61% of flights being delayed above 15 minutes. We further believe that the June 26th, 1995 LDA report by G. Bogen & Associates provides the proof that this delay problem is only 1 - 2% of arrivals after an LDA approach is installed at Sea-Tac after considering both arrival acceptance rates during the actual weather limitations (after LDA installed) and the arrival demands for each hour in 2020. The report also concluded that departures would not cause unacceptable delays.

Besides installing an LDA approach, there are many other alternatives that are more feasible than building a third runway. These include other technology and procedural improvements such as a wake-vortex system, ILS on runway 16L, state-of-the-art radar system, GPS, etc.. It also includes congestion pricing, gate controls and using another airport.

R-4-9

IV) PANEL'S DECISION CRITERIA: HOW TO JUDGE ALTERNATIVES AS "FEASIBLE" AND FORWARD THESE ALTERNATIVES INTO PHASE II OF THE PANEL'S DM/SM INVESTIGATION

This section contains our recommended criteria that any demand/system management options must be expected to obviate or defer the need to construct the third runway in order to be feasible (agrees with Panel's criteria in reference #6, page 4).

a) A demand/system management method should be deemed feasible if it is more cost effective than the 3rd runway

We recommend that any solution that is more cost effective than the third runway costing $5 - 10 million per 1,000 operation should be feasible. Any option should be deemed feasible if it is more cost effective than the third runway and can be implemented in time.

b) Besides cost effectiveness, we believe many other factors weigh heavily towards demand/system management instead of building a 3rd runway

These factors include that the third runway would add additional noise and pollution effects over a larger population than any other airport expansion would.

c) Any demand/system management method should be deemed feasible if the risk factor is low

Even though all of these methods may not have been proven yet, they should be implemented before the irreversible decision to build a third runway is undertaken, since they are very low cost options and most of these demand/system management methods can be reversed if proven not effective, which is not the case with a third runway.

d) Timing: Demand/system management methods need to be implemented by the time that there is a capacity/delay problem. Either a method is a permanent solution or it would defer the need to construct the third runway if a delay of 6 months can be accomplished. The Port does not need to start construction of the third runway until December 1997 - July 1999 in order to meet the Port's completion date of 2001. Additional time to implement demand/system management methods is likely, since the Port's construction schedule is unrealistic

R-4-7

We believe that the word "defer" should be complied with if any option can achieve a 6 month deferral. This is also strongly supported by the fact that there is no delay crisis at Sea-Tac according to FAA figures, contrary to the Port's allegations.

B) REPORT

1) <u>QUESTION: IS THERE OR WILL THERE BE A CAPACITY PROBLEM AT SEA-TAC DUE TO EXCESSIVE DEMAND OR DELAYS?</u>

<u>ANSWER: EXPANSION NOT NEEDED FOR A LONG TIME DUE TO SEVERAL FACTORS, INCLUDING: DELAYS HAVE BEEN EXAGGERATED BY THE PORT/DEMAND FORECASTS ARE UNRELIABLE/DEMAND WILL BE LESS DUE TO HIGH SPEED RAIL, TELECOMMUNICATION, ETC. AND WILL THEREFORE DEFER THE NEED FOR AIR CAPACITY INCREASES</u>

a) Many delay figures, but they all give different results

There is a great proliferation and confusion among the figures for measuring delay (A = actual and E = estimated), besides ATOMS and ASQP figures that are discussed in section #1.b:

1/A	FAA "metering" results for 1990 - 1991 (exh. 1):	
	a) 1990 data	1990/45sec.
	b) 1991 data	1991/34sec.
2/E	1991 STIA Enhancement Plan[4]:	
	a) 1989/335,000 operations/48,000 hours	1989/8.5min.
	b) 390,000 operations	25.8min.
	c) 425,000 operations	34.0min.
3/E	1992 FEIS[5]:	
	a) 355,000 operations/29,000 delay hours	1990/5min.
	b) 411,000 operations/61,600 delay hours	9min.
4/A	TAMS Consultants in 4/21/94 "Forecast Discussion Paper" (exh. 3): "presently experiencing average delays in excess of 15 minutes"	1994/15min.
5/E	ACC 6/10/94 chart "Regional Air Capacity vs Regional Air Demand - 1990 to 2050": much lower future delay POS predicts at 406,000 operations (exh. 4)	2010/3.5min
6/E	P&D Technologies 12/94 chart labeled "Prel. Delay Findings" (reference #4):	
	a) At 345,000 operations which represents the operations at SeaTac from 1990 - 1994 when operations varied between 338,000 to 355,000	1994/5min.
	b) At 425,000 operations forecast 2015	2015/18min.
7/E	DEIS at 345,000 operations, table II.1-2 (reference #21)	1994/4.5min.
8/E	Port answer to the Panel 4/13/95, page C-7 (reference #16) for the "Baseline" case with 345,000 operations (approx. 1990 - 1994 operations)	1994/4.3min.
9/E	Port's chart labeled "Increased Delays" presented 5/3/95 to the Panel which is based on 33,000 hours of delay per chart labeled "Delay Comparison"/353,052[6] x 93% passenger flights[7] = 6 minutes	1994/6 min.
10/A	ATOMS modified by us to estimate total delays, per below analysis	1994/21sec.

243

The disagreements between the above reports about both the current and future delays are significant. During the base periods the delays vary from 34 seconds to 15 minutes. During the 406,000 - 425,000 operation level, the delays vary from 3.5 minutes to 34 minutes. What is significant is that actual measurements ("A" above) are consistently below a one minute average delay for present operations, versus model estimates of present delays ranging from 5 - 15 minutes. What is also significant is that the computer simulation model has apparently been attempting to adopt somewhat to the actual delays that are much lower. The model decreased its average delay from 8.5 minutes in the 1991 report to 5 minutes with higher present operations in the 1992 FEIS and 4.5 minutes in the 4/95 DEIS.

The decrease in number of hours of delay from 48,000 hours 1988 (13 minutes per average aircraft) to 26,000 hours in the 1995 FAA Capacity Enhancement Update[8] at a 345,000 operations also indicate that delays have decreased[9].

b) ATOMS present average delays per operation of 21 seconds in 1994 refutes the Port's delay figures of 4.5 - 6 minutes according to the SIMMOD analysis and 5.6 minutes according to the ASQP analysis

The ATOMS data for SeaTac is reported by the local FAA office to the FAA D.C. office on a daily basis (exh. 10). "TMS" on the sheet stands for Traffic Management System and indicates flights that left SeaTac late due to bad weather or some other hold at the arriving airport. E.g., on this report 8 flights were late leaving SeaTac during the "delay period" of 15:27 and 04:25 since SFO (San Francisco) could not accept these flights. These flights will be allocated to San Francisco by FAA's D.C. office, since they have to coordinate report from two different airports. Finally, the average and maximum delay time gets reported.

The ATOMS delays at SeaTac have been decreasing from 3.05%[10] of total operations 1990 to .81% 1994 (exh. 2). The hours of delay is not reported specifically by ATOMS but can be obtained by multiplying the # of operations delayed more than 15 minutes by the average time of the delay. For 1994, this figure is 2,121 operations (exh. 2) x 40 minutes/operation delayed (exh. 16, page 2) = 1,414 hours. 1,414 hours/348,476 operations would translate to a 15 second average delay per total operation at SeaTac for 1994.

<u>Why is SeaTac included in the airports with more than 20,000 hours in 1993[11], since you can only derive 1,414 hours from the actual ATOMS numbers. Please describe what calculations or computer model was used for these calculations and all assumptions that went into this model. Please enclose the complete calculations with all input and output and list the source for obtaining a copy of these calculations.</u> Even if we add our estimated 471 hours of operations delayed 0 - 15 minutes per below analysis, we would still only get 1,885 total hours. We have found out that the 20,000+ hours is based on an outdated FAA computer model. This outdated computer model gives similar results as the SIMMOD model, that is estimating a 4.5 minute average delay per #1a above, since you would then get 26,136 delay hours for SeaTac in 1994[12]. We believe this is not an accurate number for SeaTac actual delays, since it assumes that the 0 - 14 minute delays would comprise 95% (100% - 1,414/26,136) of the total delays, instead of 25% (471/1885) according to our figures. In addition, the 26,136 hours would indicate a delay that FAA does not recognize as a "reportable delay" and most passengers recognizes as far higher delays than they actually experience at Sea-Tac.

ATOMS data only include operations that have a delay of more than 15 minutes, since FAA does not consider anything less than 15 minutes to be a "reportable delay"[13]. However, we have obtained data from a period when the local FAA office used to keep track of delays that were less than 15 minutes (Exh. 1). Mr. Orr[14] referred to this as a period when the local FAA office was doing "metering

R-3-16

to assess air traffic control efficiency". The computer kicked in when SeaTac was running at 70 - 80% of capacity approximately 3 - 4 hours per day to measure delays of any length. Any delays experienced at other periods are assumed to be negligible. Only 5 - 6% of all operations were delayed according to this data and the average delay per total operation was 34 - 45 seconds during the years of 1990 - 91. The 8.6 minutes estimated by SIMMOD in 1991 (see page 2) is 16 times larger than the actual 34 seconds average delay for 1991 measured by FAA according to these "metering" statistics. Was there any "metering" done for 1992 - 1995? If so, please provide this data.

It is significant that the ATOMS delay percentage continued to drop in 1994, even as the operation level increased (to 346,476[15]) to a similar level as they had been in 1990 after lower operations during 1991 - 1993. Please provide all reasons for the drop in the actual delays 1990 - 94: could it be due to improvements in technology and procedures, the increase in larger planes with better instrumentation or some other reasons? Only 19 airports from the 51 in the FAA analysis managed to cut delay percentage by more than 50% form 1990 - 1993[16].

Other discrepancies between ATOMS and Port delays include a 20% claimed increase in 1994 delays estimated with the SIMMOD model (to 33,000 hours 1994 per 5/3/95 chart "Delay Comparisons") by Mike Feldman with the Port during the 5/3/95 Expert Arbitration Panel hearings. The previous figures showed 26,000 hours[17]. The ASQP statistics increased by 17.6%[18], whereas the ATOMS figures decreased from .66% delayed operations 1993 to .61% delayed operations in 1994. Please explain why SIMMOD analysis and ASQP increase while ATOMS is decreasing?

Our analysis above showed an average delay of 15 seconds per total operation for reported ATOMS delays above 15 minutes during 1994. The ATOMS statistics can be converted to an estimate of all delays as shown below. These calculations also illustrate the difference between the ASQP statistics and ATOMS.

	%	Hours
ASQP[19]:		
Late (15+ min.): 846,856 minutes/23,116 (15.28% of all reported delays) = 36.6 min./ops. 353,052 ops x 93% passenger flights x 15.26% = 50,171 x 36.6 min. =	75%	30,603hrs
On-time (0 - 15 min.): 283,269/83,869 = 3.4 min./ops. 353,052 x 93% x 55.46% = 182,096 x 3.4 min./ops =	25%	10,319hrs
Early: (282,426)/44,251 = (6.4) min./ops. 353,052 x 93% x 29.26% = 96,071 x (6.4) min./ops =	NA	([illegible]hrs)
TOTAL (agrees with Port's figures in ref. #16, p. C-11)		30,667hrs
AVERAGE DELAY PER OPERATION: 30,667 hrs x 60/353,052 x 93% =		5.6 min.
ATOMS[20]:		
Late (15+ min.): 2,121 ops (.61%) x 40 min. =	75%	1,414hrs
On-time (0-15 min.):	25%	471hrs
TOTAL		1,885hrs
AVERAGE DELAY PER OPERATION: 1,885 hrs x 60/353,052 x 93% =		21 sec[21]

The Port claims three deficiencies with the ATOMS statistics[22], which we will respond to as follows:

1) "Delays Less Than 15 Minutes not recorded": We used the 25% ASQP ratio for "On-time" delays to estimate the total, which has a lower risk of error than estimating 54% of the total delays done by the Port to arrive at the total ASQP delays. In addition, we believe that delays above 15 minutes are more relevant anyway, since most passengers would not be that concerned about a "normal" delay of 15 minutes.

2) "Delays Greater Than 15 Minutes May Not Be Recorded Due to Segmentation": This is actually solved by using the ASQP estimating formula for the "On-time" delays (0 - 14 minutes), since the ASQP statistics claim not to have this error. This was never a big problem as evidenced by the 25% share for "On-time" delays.

3) "Only IFR Delays Recorded": The Port's own figures show that "90 percent of the delays at Sea-Tac occur during weather conditions when the airport is operating under a single arrival stream"[23]. Even if we adjusted for the 90% factor would the delays only be 23 seconds per operation, but the Port has not claimed a capacity problem that can be solved by a third runway for the 10% of the delays that occur during dual stream operations.

Why does the ASQP statistic show a 16 times (5.6 minutes per ASQP/21 seconds per ATOMS) larger delay than the ATOMS statistics and a 22 times larger delay when both are measuring actual "late" (above 15 minutes) delays (30,637 hours per ASQP[24]/1,414 hours per ATOMS)? Our preliminary list of reasons for this large difference includes the following deficiencies with using the ASQP statistics for airport planning purposes:

1) ASQP delays are by phase of flight and the "taxi-out" category comprise 49% of the total ASQP delays on a national basis[25]. The "taxi-out" delays should not constitute a large portion of the Sea-Tac delays, since the Port claims that 89% of all delays are caused during arrivals[26].

   The "airborne" category constitutes 29% of the total ASQP delays on a national basis and could imply strong headwinds, etc. since very few planes circle Sea-Tac before descent. Most flights are held at the departing airport now instead of circling the arrival airport due to flow control, so poor weather at the arrival airport should not constitute a large portion of this category.

   The remaining 22% of the ASQP categories consist of the "taxi-in" and the "gate-hold" categories. The "gate-hold" category probably includes the following delay reasons: plane not being able to take off on time due to an earlier late arrival, equipment failure or maintenance of a plane causing plane to take off late, a tractor being late pulling out plane from the gate, re-fueling being late, crew arriving late, baggage being loaded late, plane held for a VIP person arriving late, strike, etc.. These delays are not included in ATOMS since they are caused by the airlines or the airport personnel.

   Therefore, many of the ASQP delays are therefore unrelated to airside capacity problems and will not be reduced by building a third runway. The above problems with the ASQP statistics would severely overestimate the delays caused by airside capacity. The Expert Arbitration Panel was also attempting to find out "what proportion of delays at Sea-Tac are currently attributable to the need to use a single runway during IFR weather conditions?"[27] Thus, it is meaningless to quote the much higher ASQP statistics as a reason to build a third runway. "ASQP is used primarily for consumer on-time performance reporting"[28] to compare which airlines have the best on-time records according to FAA.

2) Delay allocation might not be done to the proper airport in ASQP: e.g., ATOMS

allocates a take-off delay in Seattle caused by bad weather in Chicago to the Chicago airport. Does ASQP have the same allocation system? It is significant that FAA itself is using ATOMS and not ASQP delays when reporting delays by airport[29]. "To the extent that delays are due to other cities and other part of the air transportation system, additional runway capacity would only lead to limited improvements."[30]

3) Only 10 airlines report ASQP as of November 1, 1993 whereas ATOMS measures ALL aircraft delays. Therefore, 54% of delays were estimated by the Port in the ASQP formula. The Panel agreed during the May 5, 1995 hearings that the 54% portion of the total operations probably have less delays than the 46% reporting portion does. The delays are therfore overestimated based on this incorrect extrapolation.

The Port's SIMMOD computer model is not accurate to predict actual delays and time to expand. It estimated 8.5 minutes 1991, which was 16 times higher than the actual total delays of 34 seconds that year as reported by FAA's "metering" program. SIMMOD estimated 4.3 minutes according to the Port in April 1995[31] for the "Baseline" case with 345,000 operations (approximate 1991 - 1994 operations). This was refined to 4.5 minutes in Data Package #11[32], which is the same figure as used in the DEIS[33]. The Port then claims that this figure increased to 6 minutes for 1994 in May, 1995[34]. Thus, the SIMMOD model overestimates the actual delays by a factor of 17 (6 minutes/21 seconds) to 13 (4.5 minutes/21 seconds).

Even the estimated delays by the Port have decreased from 8.5 minutes 1991 to 4.5 minutes 1994 per #Ia above. The conclusion is that even though FAA says that the ATOMS delay figures are not for planning purposes, they seem to be the best ACTUAL figures available FOR PURPOSES OF AIRFIELD EXPANSION. We do not recommend trusting the SIMMOD delay estimates, especially not without a thorough investigation of the inputs into the model. We strongly recommend that FAA resumes the "metering" program that was utilized in 1990 - 91 (and maybe longer) to measure the actual delay of each flight. This would be relatively easy and inexpensive and is key to finding out if there actually is a delay problem at Sea-Tac.

R-3-16

Based on the above analysis, it is not possible that the average delay of 5 minutes stated by the Port's model 12/94 at 345,000 yearly operations, the 4.3 minutes claimed by the Port 4/95, the 6 minutes claimed by the Port 5/95 or the 4.5 minutes reported by DEIS[35] is supported by the actual facts. The Port is again using a computer to prove that something exists that actually does not exist in the REAL world. It also illustrates that the Port and FAA is changing the actual delays four times between 12/94 - 5/95 between 4.3 - 6 minutes. Apparently, they can not get even agree to feed their computer the same assumptions in four separate estimates.

Based on the actual delays measured by ATOMS, SeaTac's ACTUAL delays are not bad enough yet to call for an expansion now.

c) ATOMS data for arrivals during bad weather shows only a 4 second delay/total operation

The main capacity and delay problem that the Port is trying to solve with a 3rd runway in all its statements is the arrival delays during bad weather. If you therefore break out the arrival delays due to weather from the total of 2,141 delayed operations for 1994, you end up with only 1,186 operations (exh. 16). This is only .3% of the 348,476 (exh. 2) operations for that year and only 362 total hours, which represents an average of only 8 seconds of delay per total operation at SeaTac[36].

d) DOT ASQP delay statistics

There are several problems with the ASQP statistics as outlined in section #I.b above. The main problem that the air traffic reasons for delays are not separated from other delays caused by the airlines or others. There might also be a problem to properly allocate at least the gate-hold and the airborne reasons to the proper airport. E.g., a departure gate-hold at SeaTac could be due to bad delay in the arrival airport. This is reported by the departing airport but allocated to the arrival airport in the ATOMS statistics. Further, only 10 airlines reported these statistics as of November 1, 1993[37]. Therefore, you would need to estimate the delays for 54% of the airlines using Sea-Tac which will be very inaccurate.

The nationwide ASQP delay statistics confirm the reduced delays by showing a decrease from 14.9 minutes 1990 to 14.2 minutes 1993[38]. ASQP data for 1994 show that 84.6% of all flights were either early or on-time[39]. ASQP data for May 1995 rank Sea-Tac as #1 in on-time departures (90.0%) and #6 in on-time arrivals (84.6%)[40]. This clearly indicates that there is no reason to build additional capacity at Sea-Tac as compared to other airports in USA.

R-3-18

We believe that the ASQP statistics are much less meaningful than the ATOMS statistics, since they measure the on-time record of airlines from a customer point of view and does not keep track of the AIR CAPACITY reasons for delay like ATOMS does. The fact that an airline was late due to the plane malfunctioning or the crew arriving late has nothing to do with whether a third runway should be built or not[41]. Further, the Port has not bothered to break out the ASQP delays into the 4 reasons that are available with these statistics. Please supply this breakdown for 1994. The taxi-out delay accounts for almost half of this delay nationwide and it is questionable if this reason has anything to do with the capacity increases that are being contemplated at Sea-Tac. Please explain how each of the 4 reasons for the ASQP delay would decrease with the third runway?

e) Airline statistics

Please provide any information you may have regarding "block time" delay statistics that the airlines collect (asked for by Expert Arbitration Panel in question #1 to the airlines 3/3/95).

f) Delay savings of building a 3rd runway have been overstated by Port

Why were savings increased from $241 million in 1991 by building a 3rd runway[42] to $270 million in their 12/94 chart at the 425,000 operation level[43]? The total delay costs for the "do nothing" alternative was decreased simultaneously from $347 million to $314 million[44]. The $347 million represents total delay costs of 241,000 hours x $1,440 and the $314 million figure represents total delay costs of 149,000 hours at the below rate of $2,130/hr. This represents 92,000 less hours in estimated delays in the "do nothing" alternative or a 38% decrease since 1991. This decrease must be due to capacity improvements (or computer model corrections) done since 1991. Why have these improvements not been reflected in an increased capacity for SeaTac? By making these two changes the Port is attempting to claim that an independent 3rd runway will reduce 86% of the cost of delays at the 425,000 level instead of the 69% claimed in 1991 per below analysis on page 5. We believe that the 86% delay reduction claim represents an exaggeration of the reduced delays/increased capacity that a 3rd runway could offer. This is partly due to the reasons in the enclosed report by Gerald Bogan (exh. 9, described more fully per section II below).

R-3-21A

We find it irregular that the Port is predicting this increase in delay savings to $270 million by increasing the hourly operating cost while the hours saved are decreasing:

1) 1991 report[45]: 167,000 hours x $1,440/hr = $241 million

2) 1994 chart[46]: 127,000 hours x $2,130/hr = $270 million

Why has the hours saved from a dependent 3rd runway decreased by 40,000 hours? It can not be explained by some of the 6 improvements to the existing airfield suggested in the 1991 study[47] already having been done. The only one of these 6 improvements that we know has been done is that part of the taxiways suggested in 1991 have been constructed for a total of 6,230 in estimated saved delay hours. The increase in the operating costs does not jibe with the average operating costs of $1,600/hr in 1987 dollars presented by FAA in 1994[48], unless inflation since 1987 has brought this figure to the $2,130/hr figure. It also does not jibe with cost figures presented by the Port in the April 13, 1995 answer to the Panel (reference #16).

g) Passengers are ultimately paying any delay costs. Airport delays are considered minuscule by passengers compared to delays for ground access, etc.. The Port is trying to prevent market forces that dictate airlines moving to reliever airports

The airport delays should be compared to other delays in our society to be viewed in the proper perspective. The ultimate payer of these delay costs are the passengers, since any airline costs associated with a delay would be passed on to the passengers. This is supported by the AIRTRAC report[49]. There is no decrease in airline frequency of service due to these delays, but only some displacement to service to other regional airports[50].

These delays are no different than the substantially longer delays on our freeways that will be included in any price when we buy the food article, bicycle or any other product. The 500 passengers interviewed in a 1991 study were not too concerned about these delays according to the study language: "significantly, delays themselves were not much of an issue; rather passengers apparently feel as though they aren't being told what is happening in a delay situation and it is this lack of knowledge that they don't like"[51].

Further, the delay statistics show no weighing of delay based on length of trip. Obviously, a delay of 5 minutes on a short trip (45 minutes) is more significant than on a longer trip of 2 1/2 hours or 14 hours. Also, the delay on the access road to SeaTac would be considerably longer than the average delay for a particular flight. Suppose a passenger drives from downtown Seattle to Sea-Tac airport, about 12.5 miles. Driving at 55 MPH, the trip would take about 16 minutes. According to Metro and PSRC the average speed during rush hours is down to 26 MPH and predicted by PSRC to go even lower in the future. This would result in a 31 minute trip to the airport. This delay of 15 minutes on the freeway is more than 15 times the estimated actual delay of less than 1 minute at SeaTac presently. Expressed as a percent of a 2 hour flight, the ground access delay is 12.5% and the airport delay is .8% of the total flight time. Therefore, any large investment in a 3rd runway is not nearly as important an issue to the traveling public as building a new freeway would be. Both systems of transportation are heavily subsidized with public funds that are not voted specifically on. Therefore, a feasibility analysis how much contribution this kind of investment makes to the public welfare and the economy is even more important.

This is also supported by studies, where passengers have expressed a bigger concern for the ground access delays than the flight delays[52]. They are also concerned about the frequency of flight and ease of connections as a measurement of the total delay of each trip they make. Even cargo and business interests have expressed more concern for the ground access delays than the air delays[53]. On the other hand, the airlines have little concern for the ground access problem but push for more airport capacity for obvious reasons[54]. It seems to us that in spite of the somewhat contrary interests of the airlines, the airport system should be primarily planned for the customers. THE CRITERIA FOR AIRPORT EXPANSION SHOULD BE WHEN <u>PASSENGERS</u> (AND CARGO CUSTOMERS) WANT AN

R-3-21A

EXPANSION AND NOT WHEN AIRPORTS OR AIRLINES WANT AN EXPANSION.

We also support this contention by Mr. Argue with Alaska Airlines being unable to identify any capacity related delay costs that the airlines absorb during the December 1994 hearings of the Expert Arbitration Panel. We believe that the lack of any response to the Panel's 3/3/95 two delay questions posed to the airlines reinforces our contention. The airlines can not claim that they are making less money at Sea-Tac due to excessive delay costs, since they did not provide the requested proof. The real question is probably what decrease in operations that the airlines would foresee, if they are forced to raise prices due to AIR CAPACITY delays, not delays caused by the airlines or other factors. The other question is probably WHEN will AIR CAPACITY problems make airlines interested in moving to reliever airports such as Paine, Boeing or McChord? There are many other reasons why airlines would want to consider moving to these reliever airports, such as ground access congestion, which will become a much more severe problems in the Puget Sound region in the future due to the North-South direction and the limited expansion possibilities for freeway I-5. This affects especially the population North of Seattle as pointed out in the MSAFS study. Kurth & Company did research for PSRC 4/90 (exh. 27; full report available from the PSRC library) regarding this issue and found that it was very likely that airlines would use another regional airport sometime in the future:

1. The market size here is in line with the size in San Francisco/San Jose, Dallas/Ft. Worth, Washington, DC and Houston that all have multiple airports (p. 1/2 and Table IV-4, p. 4).
2. The 9 airlines, that answered the survey, preferred Paine over McChord, partly because 61% of the regional population could reach Paine in under 60 minutes compared to 45% for McChord (p. 9). As road congestion gets worse, other multiple airport areas have proven that there will be increasing amounts of service at a secondary airports(p. 10).
3. The consultants considered it very important that 2 out of 5 carriers responding to the question # 15 regarding shifting service to a new airport, indicated they would move some services to a new supplemental airport. If the new airport was characterized as a primary airport but without closing Sea-Tac (Table IV-4, p. 13), all 5 carriers said they would shift all or some services (p. 2, 36, 37, Table IV-2, p. 5). "Once one airline begin service, a second carrier follows. In short, while none of the established carriers necessarily want to be first, likewise, none want to be the last to expand" (p. 16).
4. "The market analyses of San Francisco and San Jose illustrate the likely role of a second airport in the Puget Sound Area. Sea-Tac would continue to be the area's primary commercial airport and international gateway" (p. 23).
5. "..the addition of a new runway at Sea-Tac will not eliminate the operational problems and surely will generate environmental/political problems that have led San Francisco and Boston to decide against adding runway capacity..." (p. 31).
6. The carriers "not surprisingly" (p.35) always opt to expand at the existing airport, since they have a lower cost monopoly until a viable second airport is available. Passengers have no choice of airport until one carrier moves.

The thrust of this research is also supported by the 10/92 AIRTRAC study (exh. 11) that illustrated how airlines move to reliever airports (also in San Francisco and Boston) in response to market forces being reinforced by lack of airfield expansion at the main regional airport. Both these reports also illustrates the political tug-of-war that the Port is playing with the public in this area who are the ultimate customers of Sea-Tac. If the passengers were asked where they would rather embark the answer is sure to be a reliever airport for many people living in Snohomish and Pierce and further North and South. It was already proven by the terminated MSAFS study that there are enough people having a shorter access to a new airport in either of these areas to make another airport feasible either North or South of Sea-Tac. In our opinion, the Port is trying to prevent this natural trend due their own

R-44

vested interests of wanting to usurp monopoly control of air capacity in the Puget Sound region.

h) SeaTac's delays are not bad enough yet to call for an expansion now, but rather year 2015 when operations are predicted to reach 425,000. The Port's SIMMOD computer model is not accurate to predict actual delays and time to expand

R-3-23

We believe that the actual average delay should be much higher than the 6 - 10 minutes laid out in the DEIS[55], to indicate a need to expand capacity. This is also supported by ATOMS delay statistics for Boston and San Francisco for 1993 showing 3.9% and 2.4% of all operation are delayed at least 15 minutes[56]. None of these airports are planning any runway additions and their economies are not suffering (exh. 11). Sea-Tac's delays have been lower than these two airports for the last 4 years and were only a fraction of theirs at .68% in 1993. Based on this analysis, SeaTac's delays could quadruple before any expansion is needed.

Due to the inaccuracies with the delay statistics used by the Port to predict delays, we also believe a thorough analysis whether to build a 3rd runway or not should be based on actual delay statistics instead of modeled statistics. The computer model tends to exaggerate the delay problem since the model can not react dynamically to changing operating conditions as an Air Traffic Control Tower would in practice. The local FAA office has the capability to do "metering" of actual delays of any length. Before the Port decides on a large investment in a 3rd runway it would seem prudent to invest in measuring these actual delays instead of relying on inaccurate computer models.

The purpose of the FAA computer delay models should be restricted to a "comparison of the costs of a particular improvement and the delay reductions associated with that improvement.."[57] versus other suggested improvements. We believe that a decision whether and when to build a 3rd runway (or any other improvement) should be based on actual delays as a beginning point and clearly stated assumptions what will be used as input to the computer forecasting model to estimate the future delays.

Our estimated total ACTUAL 1994 delays of 21 seconds (see #I.b above) per total operation is only 7.8% of the latest ESTIMATED delays of 4.5 minutes[58]. Applying this percentage to the Port's latest ESTIMATED delays of 16 minutes at 425,000 operations and 42 minutes at 525,000 operations[59], would yield ACTUAL delays at the same operation levels of only 1.2 minutes and 3.3 minutes. THUS THE ACTUAL CAPACITY OF SEA-TAC HAS INCREASED FROM 380,000 TO AT LEAST 425,000 OPERATIONS (PROBABLY EVEN 525,000), BASED ON THE PORT'S PREVIOUS 4 - 5 MINUTE DELAY CRITERIA (changed to 7 minutes per FAA's 4/14/95 answer to the Panel and 6 - 10 minutes in the April, 1995 DEIS[60]). The 425,000 operation level will not be reached until 2015 according to the Port's own forecast[61]. In addition, the maximum delay criteria could probably be further extended since research indicates that airport delays does not hurt the regional economy and that people are more concerned with ground access delays (see #I.g above).

R-3-8

i) Demand forecasts are so unreliable that the prudent strategy is to wait as long as possible with any expensive and irretrievable capacity expansion

The driving factor behind future delays is demand. Forecasts are inherently unreliable. The Port's 3/92 Flight Plan forecast shows the claimed capacity of 480,000 operations with a third runway being reached approximately 2007 (exh. 32, Fig. 2-5/2-2 of ref. #5). However, the Port's latest forecast shows the same 480,000 not being reached until 2030 (exh. 33, Table 2-1/Fig. 2-1 of ref. #14 and continuing the 2010 - 2020 trend of .8%/year). THUS THE <u>SAME</u> CONSULTANT (P & D AVIATION) HAS EXTENDED THE LIFE OF SEA-TAC WITH A THIRD RUNWAY BY 23 YEARS IN ONLY 2 YEARS TIME!

R-3-7

R-3-8

P & D Aviation is showing a passenger comparison in table 5-9 of their current 3/94 forecast[62]. This table shows a current passenger forecast of 38.2 million passengers for 2020 versus the Flight Plan forecast of 45 million passengers. The operation forecast shows a current operation forecast of 441,600 operations for 2020 versus the Flight Plan forecast of 524,000 operations[63]. However, P & D Aviation has conveniently deleted the 3/92 563,000 operation forecast for 2020 from the current 3/94 forecast, even though the 3/92 forecast was the LATEST forecast shown in the FINAL EIS published 10/92. The 563,000 forecast was labeled as the "update" forecast instead of the "official" 524,000 "Flight Plan" forecast[64]. The "update" was used extensively by the PSRC decision makers to push the 4/96 decision deadline in the 4/93 resolution A93-03, which is the basis for the Panel's present work. The 3/92 forecast feat of P & D Aviation is even more astonishing, since the 524,000 operations predicted for 2020 in the "official" "Flight Plan" forecast INCREASED to 563,000 operations in the "update" forecast while passengers DECREASED from 45 million to 41 million. The method used by P&D Aviation to accomplish this feat is to simply state that "the conversion to larger average aircraft is less optimistic than Flight Plan."[65] The Flight Plan itself labels "operations (as) the basis for evaluating the regional alternatives"[66]. THUS THE <u>SAME</u> CONSULTANT (P & D AVIATION) HAS DECREASED THE 2020 OPERATIONS FORECAST BY 121,400 IN ONLY 2 YEARS, WHICH IS MORE THAN THE CLAIMED CAPACITY OF THE THIRD RUNWAY!

Similarly, the 1985 Master Plan forecast missed the 1990 forecast by 123,000 operations which again is more than the claimed capacity for the third runway[67].

We are bringing up these illustrations to make the point that any forecast, especially by P & D Aviation, should be regarded with a great deal of skepticism. Many of the underlying assumptions can make a tremendous difference on any demand forecast (as illustrated in above examples): how reliable are the underlying primary factors used in the equations: population, employment, personal income, gross regional product and average air fares assumptions; what were the assumptions for the secondary factors and what number of passengers were added or subtracted for each factor from the equation answers: share of the Pacific Rim market, potential diversion of all-cargo flights, carrier service frequency, economic conditions locally, nationally and internationally, competing airports, technological advances in communications, bilateral agreements; how valid are the assumptions used to translate number of passengers to operations: average seats per departure increasing by 1/2 - 2 seats per year for 4 types of operations based on airplane size and fleet mix predictions, load factor increasing from 2.2% for domestic air carrier operations to 10.4% for commuter operations 1993 - 2020; how valid are the air cargo, general aviation and military operation assumptions. All of these factors are included in the latest P & D Aviation forecast but details how they relate are not always given[68]. We submit that this long list of assumptions illustrate how difficult demand forecasts are to make. It would therefore be wise not to be lulled into that forecasts are accurate by any means, especially when you are making irretrievable large dollar decisions. We believe that Washington State should always keep the WPPS fiasco fresh in its mind, where bond holders lost billions on power plants that were never completed due to faulty forecasts.

Secondly, we believe that due to the unreliability of forecasts, it will be prudent to err in the direction of building any additional air capacity later rather than sooner. Our delay research support the conclusion that Sea-Tac capacity is not needed for a long time. AIRTRAC research also supports this conclusion by stating that "hard evidence was not found linking delays in capacity expansion to negative effects upon regional economic development or cost of business."[69]. Thus, there is no need to rush into starting construction of a third runway 1996, thus leaving ample opportunity for implementing and testing many demand and system management options.

The Port's figures show 58.8 average enplanements per departure and a 56.5% load factor for 1993 based on the airlines that responded to a survey[70]. The Port predicts that the 58.8 average enplanements per departure will increase to 68 in 2000 and to 95 in 2020 (exh. 19). The figure for

243

average enplanements per departure is the key figure that determines number of operations, since enplaned passengers divided by average enplanements per departure results in number of departing operations. For example, 19.1 million enplaned passengers in 2020 divided by 95 (94.6 rounded) average enplanement per departure gives 202,000 departures x 2 = 404,000 total passenger operations 2020[71]. Average enplanements per departure is a result of both the average aircraft size and the load factor. These two factors plus number of passengers are the three factors that determine the number of operations[72]. The average enplanements per departure rose very dramatically to 66.4 in 1994 (exh. 19), since the passenger increase of 11.6% was accommodated by only a 4.0% increase in operations (exh. 21)[73]. THUS 83% OF THE INCREASE IN AVERAGE ENPLANEMENTS PER DEPARTURE THAT P & D AVIATION PREDICTED TO HAPPEN IN THE 7 YEARS 1993 - 2000 ALREADY HAPPENED IN ONE YEAR[74]. This large increase happened because of an increase in the load factor or an increase in the average plane size. Both of these factors change if there is a decrease in the percentage of operations consisting of commuters (with a low load factor and small planes).

The commuter's share of total operations decreased by 2.20% instead of the .53% per year that the Port has predicted for 1993 - 2000 (exh. 20). This means that P & D Aviation's forecast is off by 316% (2.2%/.53%) in ONE year. The 2.2% drop also represents 60% of the entire 3.7% drop in commuter share of total operations predicted by the Port for the 7 years 1993 - 2000 (exh. 20).

Variations of this caliber have tremendous impacts on operation predictions. P & D Aviation's own figures pointedly demonstrated that if the load factor increased to 70% for all elements of passenger service in 2020, the 442,000 total operation prediction would decrease by 66,000 to 376,000[75]. We believe that the load factors will increase, and thus increasing enplanements per departure, with the implementation of congestion pricing, etc., besides the trends already underway illustrated above. The conclusion is that SEA-TAC WILL BE ABLE TO HANDLE THE 2020 VOLUME WITHOUT A THIRD RUNWAY IF THE LOAD FACTOR INCREASED TO 70% FROM THE 56.5% IN 1993. This could happen due to any of the above reasons, and is likely based on existing trends.

R-3-7
R-3-8

A 70% load factor would be equivalent to 111 average enplanements per departure in 2020 instead of the 95 predicted by the Port, and would also result in only 376,000 operations in 2020 per P & D Aviation's above example[76]. However, the increase to 111 could be caused by anyone of the two key variables of higher load factors or larger planes as well as by a bigger switch towards more domestic and international flights away from commuters. It is easy to see that average enplanements per departure could easily increase by 44.6 (111 in 2020 - 66.4 in 1994) passengers in 26 years, since it increased by 7.6 (66.4 in 1994 - 58.8 in 1993) passengers in just the last year. The 58.8 figure in 1993 was already 9.9 passengers higher than the bottom of 48.9 passengers (exh. 19)[77] that was hit in 1990. This represents an average of 3.3 passenger increase per year during 1990 - 1993. To accomplish an increase to 111 passengers per departure by 2020 would only take an average increase of 1.7 passengers per year (44.6 passenger increase/26 years) instead of the 1.3 passengers per year [36.2 (= 95 in 2020 - 58.8 in 1993)/27 years) that the Port assumes[78].

It is easy to understand that the average enplanements per departure could reach 111 in 2020 if you vary the mix of operations while keeping the Port's assumptions for aircraft size and load factors the same. The average enplanements per departure in 2020 (using the Port's own load factor assumptions for 2020) varies from 21 for commuters (55% load factor and 21.2% of passenger aircraft operations), 50 for Canada (55% load factor and 11.0% of operations), 123 for domestic (60 % load factor and 65.8% of operations) and 190 (68% load factor and 2.0% of operations) for international operations[79]. Therefore, you can theoretically vary the enplanements per departure from 21 if you operate 100% commuters to 190 if you operate 100% international flights at Sea-Tac. However, by changing the mix of operations to increase air carriers to 75% (65.8% by POS) and international to 7% (2.0% by POS) and decreasing commuters to 10% (21.2% by POS) and Canada to 8% (11.0% by POS) you would achieve 111.6 enplanements per departure 2020[80]. This would thus enable Sea-Tac to

243

handle the Port's 2020 passenger prediction with the stated 380,000 present capacity.

Even though we are only showing our prediction as a sample, it could happen. Commuters used to be only 5.6% of all operations 1970 (exh. 20) and many people predict a boom in international flights for Sea-Tac. Canada might not increase as the Port predicts since Vancouver could actually compete even more effectively with Sea-Tac with the NAFTA agreement in place and a new runway to be built soon. In addition, the substantial amount of cruise ship passengers that presently fly to Sea-Tac and take a bus to their ships in Vancouver could some day maybe fly directly to Vancouver. By the same token as "the number of commuter operations tripled, to over 150,000 landings and takeoffs a year" between 1986 - 1990 (exh. 20), is it also possible according to Dr. de Neufville that "this bubble ... could burst quickly. If commuter traffic at Seattle-Tacoma reverted to the pattern and level prevailing 5 or 6 years ago (1985 - 1986), there might -- for that reason alone -- be no net increase in the number of aircraft operations at Seattle-Tacoma between now and the end of the century."[81] It is important to point out that Dr. de Neufville was correct in the same report, when he predicted that operations would not continue to increase as rapidly as they had prior to 1990. In spite of a decrease from the 150,000 level to 131,000 in 1993, the Port is predicting the 131,000 commuters to increase to 133,000 by 2000, after which it drops gradually to 122,000 by 2020 (exh. 20) [82]. The conclusion is that SEA-TAC WOULD BE ABLE TO HANDLE THE 2020 VOLUME WITHOUT A THIRD RUNWAY IF THE AVERAGE ENPLANEMENT PER DEPARTURE INCREASED TO 111 PASSENGERS FROM THE 58.8 PASSENGERS IN 1993, without changing P&D Aviation's passenger forecast of 38.2 million in 2020. Again, this scenario is entirely likely based on existing trends.

R-3-7

In addition, WE HAVE SERIOUS DOUBTS IF THE LATEST PREDICTIONS BY P & D AVIATION ARE BASED ON GENERALLY EXPECTED TRENDS REGARDING AIRCRAFT SIZE AND LOAD FACTORS. As a matter of fact the average seats is even 3 - 4 seats higher in the fleet mix table presented by P & D Aviation versus the figures actually used for the operation calculations[83]. We urge the Panel to investigate the Port's questionable demand assumptions and to obtain comparisons with present and expected trends for commuters percentage share, load factors and average seats per aircraft at other US airports. The very large inaccuracy of P & D Aviation's latest forecast (that apparently was given to the Panel in a final version dated 8/94), within less than a year after the final version came off the press, casts some very serious doubts on the entire methodology and MOTIVATION behind the Port's forecasted capacity shortage at Sea-Tac. When this incorrect forecasts are added to the false delay reports, the picture is even more serious. Is the Port's understandable bias and parochial interests leading it to use unrealistic assumptions only to reach one conclusion? We believe that the Port has very seriously underestimated the trends towards larger aircraft and/or higher load factors.

R-3-8

At the very least, we believe that this again illustrates the tremendous variation in operation forecasts that can be obtained if you only vary the two key variables (load factors and plane size) slightly that determine number of operations based on a certain passenger demand. Variations in the passenger count, which is the third variable that determines number of operations, seem to change the number of operations much less than the previous two factors.

Dr. Richard de Neufville made several observations about the Flight Plan. According to earlier master plans for Sea-Tac "in the early 1980's, it reportedly seemed "inconceivable that Sea-Tac would ever run out of runway capacity", and thus "all the problems seemed to be with the capacity of the airport terminals". This perspective is almost diametrically opposite to that of the Flight Plan study, which focuses on the pressing needs for more runway capacity."[84].

Increased delays might act as a de-facto demand management technique that provides an economic incentive for both the airlines and the passengers to decrease the number of flights, increase the load factors and use larger planes. <u>Please gives specifics how this phenomenon would reduce delays. Please compare Sea-Tac's load factors with similar load factors at other airports that have more</u>

R-3-7

delays than Sea-Tac. These factors could explain why some airports that have not expanded are still able to increase their operation capacities (e.g. Boston, San Francisco, etc.).

R-4-10

j) What demand decrease did the Port assume for high speed rail in their demand projections?

It is important to remember that e.g. a 1% decrease (188,000 passengers) of the total 18.8 million passengers for Sea-Tac in 1993[85] corresponds to 5% (16,700 operations) decrease in 339,500 total operations 1993[86]. The reason is that all of these 188,000 passengers would use smaller commuter planes with only a 44.6% load factor in 1993[87].

Even the Port's own figures show that rail could draw "less than 5% of air passengers...by 2020"[88], which corresponds to 90,000 less operations which is 20% of all operations predicted for 2020[89]. The Expert Arbitration Panel concurs that they "would expect there to be a very substantial diversion of travelers from air to rail transportation"[90]

The Expert Arbitration Panel asked if a high speed rail system can "be put in operation before 2020"[91] (our emphasis)? We presume that this is a recognition by the Panel that any demand/system management option over which the Port has no control does not have to be fully implemented before the April, 1996 decision deadline in the A93-03 resolution.

Please provide an analysis of the potential for air/rail intermodality similar to what has already been implemented in Europe (Frankfurt, Paris, etc.). We believe that the lack of an answer to the Panel's 3/3/95 question #4 to the airlines, regarding this combined air/rail through transportation services, reinforces the airlines lack of willingness to honestly and openly explore creative solutions to the air capacity problem in the region. We are hoping that FAA and the Port will be more forthcoming. Obviously, rail connections into Sea-Tac could eliminate many commuter flights and ground transportation which would make Sea-Tac more competitive and efficient.

We believe that the Port needs to show SPECIFICALLY how much demand they deducted from the computer generated demand in their 3/94 demand report[92]. It should not be acceptable to simply state that this factor was considered without showing exactly how much demand the model generated and how much adjustments were done to this demand for EACH factor that could not be estimated with the model. This system management alternative should at least defer the need to construct the third runway, even if it might not obviate the need for more air capacity in the long run.

k) What demand decrease did the Port assume for "teleconferencing and electronic communications" in their demand projections

The Apogee Research report quoted by the Port[93] states that it is "possible" that 4.2 % of total travel could be replaced by telecommunications, but that "travel stimulated by productivity gains could be significant enough to offset some (in not most) of the air travel demand lost to substitution." Did the Port use 4.2%, some of it or no substitution at all?

l) What demand decrease did the Port assume for other substitutes to air travel in their demand projections?

The distribution between air travel and road transportation (cars, buses, etc.) could change if relative prices, convenience, congestion or other factors changed. For example, the introduction of rail

R-4-4

between Portland and Vancouver, B.C. will result in less congestion on the freeways between the same points which will in turn increase road transportation. The introduction of safer cars and cars with more convenience features (stereo, fax, computers, etc.) may also tilt the balance towards roads.

What are the chances that a commuter airline starts service to Portland and Vancouver, B.C. out of Boeing or Paine?

R-18-2

What landing and other fees are expected at Sea-Tac with a third runway with or without federal subsidies? If these fees will increase from the present fees, how much will this decrease the demand for each category of travel (commuters, domestic, international, all-cargo, etc.)?

R-4-9

II) QUESTION/SOLUTION #1: IS IT FEASIBLE TO SOLVE THE PROBLEM WITH A THIRD RUNWAY?

ANSWER: CAPACITY WITH THE 3RD RUNWAY WILL NOT INCREASE AS MUCH AS POS PREDICTS. THIS MAKES THE 3RD RUNWAY ALTERNATIVE EVEN LESS FEASIBLE THAN THE ORIGINAL LOW FEASIBILITY. USING OTHER EXISTING AIRPORTS OR BUILDING A NEW SUPPLEMENTAL AIRPORT IS A SUPERIOR SYSTEM/DEMAND MANAGEMENT SOLUTION AND WILL HELP REDUCE DELAYS PREDICTED BY THE PORT

a) There are several versions of the capacity increase with a 3rd runway

1) 8/10/94 ACC chart "Comparison of STIA...Peak Demand and IFR Capacity...": Increase from 30 AAR to 45 AAR year 2000 with demand of 406,000 operations, or 51 AAR at the peak with a dependent 3rd runway, and increasing (exh. 8). These figures are slightly lower than the Bogan figures (see #II.b), using a 36 AAR for the present Sea-Tac.
2) 1991 Airport Capacity Enhancement Plan (reference #2): predicts an increase to 64 IFR operations with a dependent 3rd runway alternative[94] versus an increase to 86 IFR operations with an independent 3rd runway alternative[95]. Thus, the dependent runway only achieves 74% of the capacity of an independent runway. Also, neither alternative can handle the peak hour demand of 102 operations/hour at 425,000[96]. In conclusion, the dependent runway can only handle 62% of the predicted peak demand of 102 operations/hour.

b) Bogan report says 3rd runway will not increase capacity as much as Port predicts

The Bogan report (exh. 9) consists of 4 sections: I) Introduction (p. 1); II) Operational Benefits/Limitations of Third Runway (p. 2); III) Weather Conditions as Justification for a 3rd Runway (p. 12); IV) Alternatives to Increase Capacity Without a 3rd Runway (p. 15). Section II points out that there are taxi and holding constraints that will decrease the capacity of a 3rd runway. The Sea-Tac capacity problem, at least up to a volume of 411,000 could be solved with a better benefit to cost ratio by "electronic and procedural enhancements" to the existing Sea-Tac (p.11). The 411,000 volume was forecasted for year 2000 in the Flight Plan but not until year 2015 in the 4/94 Master Plan Update forecast. Section III states that the weather is the only limiting capacity during 25% of the year and that "electronic equipment and ATC procedural improvements" would improve capacity enough until a permanent solution is found. Section IV details these equipment and procedural improvements and the next generation electronic aids, how the four post plan increases capacity and that 62% of the delay problems could be solved by the proposed technology and procedural improvements.

We believe that the Bogan report makes three main points: 1) capacity with the 3rd runway will not increase as much as the Port predicts; 2) the 44% of time when single arrival stream must be used due to bad weather is overstated by the Port; 3) capacity increases/delay decreases can be done more efficiently with improvements to the existing airfield. We will address the first point in section #II of this report and the remaining two points in section #III.

R-3-24

Capacity increase/delay decrease with 3rd runway will be less than POS predicts according to Bogan:

A) The average arrival rate (AAR) will not double from the present 36 AAR with single stream arrivals in poor weather to 72 AAR due to only 2,500' separation between runways instead of the required minimum of 4,300' for independent runways (p. 2). This will necessitate staggered arrivals on the 2 outer runways and "spacing intervals between arrivals to allow for departures" on the middle runway (p. 2 - 3). Therefore, the present airport capacity of 55 operations per hour during IFR 1 weather conditions with a 4 minute delay[97] will not double either. According to the 1991 study[98], the capacity with a dependent runway will only increase to 64 operations per hour. The IFR 1 capacity with the 3rd runway will therefore only be a fraction of the theoretical max. capacity of 108 operations = 72 landings per hour on two independent outer runways during IFR conditions plus 36 departures per hour on the center runway. The predicted max. peak demand of 95 ops/hour derived from the Flight Plan forecasts (p. 9) (102 at 425,000 operations per reference #2) can not be met "without encountering excessive delays" (p. 11).

B) Some other factors that will hold down the capacity increase of the 3rd runway are runway length and interaction with other runways, taxiway to runway intersecting points, separation between runways at the holding locations and fleet mix (p. 3). The 95.1% of the fleet that will be able to land on the new runway is misleading, since "during rush periods there would soon be no holding area between the runways" to clear the aircraft landing on the 3rd runway. Also, "there is not enough room between runways to hold aircraft awaiting departure" on runway 16R during rush periods. The forecasted reduction in the smaller type aircraft will also reduce the operations due to the inability to allocate smaller aircraft to the 3rd runway that are easier to hold between runways and can cross runways quicker (p. 3 - 5). "During poor weather conditions all holding between runways will probably be prohibited" which will further exacerbate the above problems (p. 5).

All 3 runways being on the same side of the terminal and very close are the reasons for the above problems.

R-3-19

C) "To fully understand the third runway cost vs benefits", you need to estimate during how much of the peak periods you have IFR conditions. If you only have IFR conditions during a portion of the peak periods, "electronic and procedural enhancements of Sea-Tac (with the current two runway configuration) could very well" take care of most of the capacity problems at Sea-Tac (p. 11).

Please define during how much of the year you have both peak periods and bad weather by defining the below variables? E.g., our preliminary numbers during the 1989 base year show the 3 peaks during the day total 6 hours[99] during which you have IFR conditions 25% of the time (POS says this should be 44%), you end up with "IFR peaks" 1.5 hours per day during the peak months. Peak months might be 3 out of 12 months (25% of the year)? Thus during 9% of each daytime flying hours (= 1.5 hours/16 hours) for 25% of the year, or during 2.3% of the yearly flying hours would you have a peak bad weather capacity problem at STIA. Are we planning to spend $1 billion on third runway investments to solve only a 2.3% capacity problem??

D) Since the arrivals and departures are not forecasted to be balanced during peak hours (p. 18), the present 2 runways will accommodate the demand easier than the 50/50 split that is assumed in the 1991 Capacity Enhancement Plan on page 6. This study

also confirms the correctness of the unbalanced departures/arrivals in Figure 9 on page 7. The 50/50 split is therefore incorrectly exaggerating the delays.

c) Airlines are also unsure of claimed effectiveness of the proposed 3rd runway

R-3-37

We are enclosing two letters from ATA that first did not support a 3rd runway with only a 2,500' separation and then reversed its position to support this separation, if the runway is at least 8,500' long (exh. 15). Please indicate source and present the "statistics" that ATA based this reversal on and any other information that was given to the airlines to convince them to change their mind. We believe that it is significant that even ATA had doubts about the feasibility and effectiveness of raising the capacity at SeaTac with a 3rd runway with only a 2,500' separation.

R-18-2

We believe that the airlines lack of an answer to the Expert Arbitration Panel's question #7[100] illustrates the luke-warm support that the airlines have for the third runway project. It would have been easy for the airlines to have answered this question by simply enclosing the "statistics" that ATA based their changed opinion on (exhibit 15). Maybe the airlines would rather move some operations to Paine, Boeing or McChord (or even support a new airport) than to pay the HUGE cost of building the most expensive runway in U.S. history? Please provide a pro-forma analysis of the 3rd runway project showing how much the fees to the airlines would increase with maximum and minimum federal subsidizing of this expensive runway.

d) Only 100,000 operation capacity increase and big ticket for 3rd runway leads to low feasibility in comparison to a new airport and other alternatives, such as technological and procedural improvements

R-4-4

Please present the TOTAL cost of building the 3rd runway, including all airside and landside (new terminals, access roads, maintenance, etc.) developments as well as mitigation costs. The feasibility of the 3rd runway could then be compared to the feasibility of all demand and system management alternatives, including the technological and procedural improvements detailed in the next section. The total cost figure was promised to the public last year, but has yet not been presented. As a matter of fact, the Port is even going a step further and claiming that none of these other improvements have anything to do with the third runway. We believe that the total cost figure is approximately $1.5 - 2.0 billion. When $1.5 - 2.0 billion for 100,000 more operations is compared to the well recognized 400,000 capacity for a two runway airport[101], it is clear that a new airport is more feasible. We believe that the cost of a new airport will be well under the $6 billion maximum (4 times min. $1.5 billion due to 4 times the capacity) to make such an alternative more feasible than a 3rd runway. The unofficial estimate that TAMS Consultants related during their MSAFS study was around $1 billion. Even if we assume $2 billion, a new airport would cost $50 million per thousand operations versus $150 million per thousand operations for a third runway project. In other words, THE THIRD RUNWAY PROJECT WOULD COST 3 TIMES AS MUCH AS A NEW AIRPORT! It would be the most expensive runway in U.S. history.

We further believe that the poor economics is the very reason why the Port is avoiding the reference to a total cost figure including all the accompanying improvements that are needed in connection with a 3rd runway. Alternatively, upgrading an already existing airport (e.g. Paine) with one runway could offer 200,000 operations for upgrading costs of maybe $200 - 400 million for terminals, access roads, etc.. Thus, it is clear that upgrading an existing airport would be even more economically feasible than building a new airport.

The cost for the runway itself has already increased from the $298 million for a 8,500' runway (exh. 28) + $91 million for property acquisition[102] = $389 million to $456 - 526 million in a 9/94 POS chart (Exh. 29).

The feasibility of the third runway project would also be much worse than any demand or system management alternative.

e) The Port's claims that ALL additional forecasted flights would come to SeaTac even without a 3rd runway and would simply add to delays is false. Instead, reliever airports would be used by the airlines

The Port has shifted their main emphasis for needing the 3rd runway from being a "poor weather runway" (that would handle the 44% overstated bad weather problem) to a runway that is needed to avoid future delays because flights have nowhere else to go (exh. 23). We believe this is another blatant attempt in the Port's PR campaign to talk this region into that the Port simply needs the 3rd runway NOW, because the Port claims mistakingly that there are no other choices.

The truth is that there are other choices, but the Port is simply stubbornly pursuing the only alternative that they can see, instead of objectively and fulheartedly backing the region's efforts to find the BEST air capacity alternative for the long term future of the region. We can only guess as to the motives why the Port is only advocating the ill advised 3rd runway: ignorance or a vested interest to usurp more power.

We believe that the AIRTRAC 10/92 study[103], the Kurth & Co 4/90 research (exh. 27), the 1994 ACE Plan[104] and many other studies have conclusively proven that ALL forecasted flights will NOT continue to use SeaTac. Instead, the airlines will explore every opportunity to schedule more flights during off-peak hours (the peaks would even out) and use reliever airports if this is more feasible for each airline. Both the AIRTRAC and the Kurth & Co studies used San Francisco and Boston as examples, since they both judged these situations were relevant to our region's situation. The diversion to reliever airports has ALREADY started happening for some cargo airlines that have started using Boeing as their permanent airport (exh. 24). Again, the Port's PR department is trying to minimize this issue by saying that all-cargo flights represent less than 5 percent of Sea-Tac's 353,000. The 5 % figure is true, but in terms of effect on a deferral of the need for a 3rd runway, the 5 % represents approximately 17,650 operations. If only half of these all-cargo flights (8,825 operations) moved to other airports it would comparable in effect to the Port's predictions for peak pricing and gate controls. It also would "defer the need for the 3rd runway" by more than one year at the 1.6% growth rate that the Port has predicted until year 2000[105]. We therefore believe that all-cargo traffic should be analyzed as a serious system management alternative. <u>Please answer the following questions: what are the landing fees for all-cargo at Sea-Tac versus Boeing; Is it possible for Sea-Tac to encourage this move by their pricing, gate or other policies; Is the delays the true reason that all-cargo is moving to Boeing or what is the true reason; how many more all-cargo operations can be expected to move and by when?</u>

R-4-4
R-4-7

It is only a question of time, when the first airline will start using e.g. Paine as their permanent base (maybe Southwest Airlines that has used Love Field instead Dallas-Forth Worth successfully for years). Without going into detail, the TAMS Consultants also concluded during their MSAFS study (that was terminated by PSRC 10/94) that the 4 million people predicted for our four regional counties by year 2020 living primarily in a North-South direction will provide a very feasible market for a multiple airport system. <u>Without the third runway, when and under what conditions would the first airline(s) move to other airports and what airports would be used first?</u>

f) The expected future use of large aircrafts (seating 600 - 800 passengers) could not be

handled efficiently at Sea-Tac

Airports are already planning for this new aircraft with more space between runways and taxiways, more room for gates, etc.. however, we have no information that Sea-Tac will be able to handle these aircrafts efficiently with or without a third runway. This potential lack of foresight will decrease the competitiveness of Sea-Tac and hurt the regional economy. It will also make it more attractive for the region to invest scarce federal subsidies into new airport facilities instead of acting like you are "fixing up an old outdated car (Sea-Tac) that has already reached its maximum economic usefulness". The Port's own consultants are agreeing with the loss of competitiveness by saying that "if new large aircraft ... became significantly more economic for airlines than existing widebodies on international flights, a tendency for further concentration (to Los Angeles, San Francisco, etc.) could result."[106] <u>Can Sea-Tac handle these planes now? What improvements are needed (details please) and when are those improvements planned for?</u>

R-3-24

<u>III) QUESTION/SOLUTION #2: IS IT FEASIBLE TO SOLVE THE PROBLEM USING THE EXISTING SEA-TAC AIRFIELD OR A NEW AIRPORT?</u>

<u>ANSWER: BOTH TECHNOLOGICAL/PROCEDURAL IMPROVEMENTS, PEAK PRICING AND GATE CONTROLS APPLIED TO THE EXISTING AIRFIELD AND USING A NEW AIRPORT ARE MORE FEASIBLE THAN BUILDING A 3RD RUNWAY.</u>

a) All technological and procedural changes should be considered

We believe that all possible technological and procedural improvements should be considered before any 3rd runway is authorized at Sea-Tac. Some of the reasons, besides cost efficiency, for this belief include:

A) The MOU, paragraph IV.B specifies that the Panel should study "<u>at least</u>" the "pricing mechanisms and the gate controls". Section II.B of the A93-03 Implementation resolution supports this.

B) Apogee Research mentioned both FAA technology and operating procedures[107]

C) The Panel already included GPS, so it would make sense to include any other technology and procedural improvements that can increase capacity or decrease delays. We suggest that all improvements included in ACE Plan 1994 that can accomplish this goal should be included. The improvements presently studied only comprise approximately 4 pages in the 1994 ACE Plan with 362 pages.

We suggest that all improvements be compared not only on a delay saving versus cost basis as in the 1991 Airport Capacity Enhancement Plan for SeaTac but also add the number of added operational capacity. With this, it would be easy to project how much longer SeaTac could avoid building a 3rd runway.

The 1.6% yearly growth rate that the Port predicts between 1993 - 2000 times the 339,500 1993 operations[108] represents a yearly growth of 5,400 operations. We suggest that this threshold be used as an approximate measurement that an improvement to the existing airfield will be able to defer the need to construct the third runway for one (1) year. We are advocating that a 6 month deferral (2,700 operations) of the need to construct the third runway could be an adequate measure of feasibility for each improvement option. In other words, if an improvement to the existing airfield can accomplish a decrease of 2,700 in operations before the ACTUAL delays reaches the unbearable point, this improvement is feasible.

R-3-21B
R-4-9

b) Bad weather/single stream percentage could be cut to 25% instead of the 44% claimed by Port now by using LDA

The 44%[109]/[110] of time when single arrival stream must be used due to bad weather is overstated by POS according to the Bogan report (exh. 9):

A) Bogan states that the figure should be 25% instead of the 44% figure that POS has been using in all its recent reports (p. 14). Bogan is basing the 25% figure on his assertion that installing an LDA system will achieve a dual arrival stream during the 19% time[111] when Sea-Tac has VFR2 weather, which as a ceiling of 2,500' (p. 14/16). Bogan says that an electronic system such as an LDA can guide the aircraft through the clouds to a dual arrival stream on the existing runways. The Port's 1991 capacity study[112], item I-4 makes the same claim on p. 11. However, according to FAA in Renton[113] the LDA probably will not be installed at STIA and will therefore not be included in the 1993 Airport Capacity Enhancement Plan update for SeaTac. LDA has already been installed at St.Louis with 1,300' runway separation and at San Francisco with 750' runway separation[114]. However, it has proven less efficient than believed in the 1991 capacity plan for SeaTac according to one source[115]: It will only reduce the ceiling to 3,500' (instead of 2,500') from the 5,000' for VFR 2 (19% of the time at SeaTac) according to this source and would therefore not be a worthwhile investment according to the source. We have some concerns about why the LDA improvement will be deleted and have been told by some other sources that it still might permit dual approaches during the VFR 2 weather. Part of the answer is apparently that San Francisco has agreements with ALPA and other unions to use this method in San Francisco. We would urge the Panel to investigate this issue in more detail since it could be a key to at least 19% of the 44% of bad weather limitation at SeaTac. We would like to ensure that the Port is not purposely downplaying the importance of LDA, GPS or any other navigational or procedural aids that might solve part of the weather problem, to make the 3rd runway look better.

B) Similarly, Bogan says that dual arrival streams can be conducted when the "cloud base in the arrival area (5 to 20 miles from the airport) should be 3,500 feet (1,400 - 2,500 feet per item I-4 in reference #2, p. 11) above the ground with visibility 4 miles or better" (p. 15). However, P&D Technologies claimed throughout the 1994 - 1995 Master Plan process that STIA always uses a single arrival stream if the cloud ceiling is below 5,000' for the VFR 2 condition. What is the correct lower limit: 3,500', 2,500' as the upper limit for IFR 1 or the 1,400' stated above?

Maybe other methods can be used to accomplish this dual stream approach, such as GPS, etc..

The accuracy of the 44% for single stream arrivals was verified with tower records according to conversations I had with Ron Ahlfeldt. We suggest that the Panel ask for a copy of these tower records to verify the percentage for single arrival streams and different AAR during different conditions. We also question the 44% single stream for SeaTac when Boston has 10 - 15% with 1,000' separation[116], San Francisco has 6 - 7% with 750' separation[117] and Vancouver has 6.5%[118] for single stream conditions. We doubt that the weather is so much worse in Seattle compared to these places.

The enclosed "Special Instrument Approach Procedure" for San Francisco using LDA (exh. 26) is presently being tested since 3/95. They also have a waiver to decrease the ceiling to 1,600', but they will not make this a special approach until they have tested the enclosed 2,100' ceiling first. Three airlines have already signed up to use the system (United/United Express/Continental) and they believe more will sign up as the system proves itself.

R-3-21B
R-4-8

FAA will publish this approach as a public approach within the next few months (per Paul Best with FAA in D.C., Flight Standards). This apparently means that SeaTac could use this approach without having to go thru the lengthy waiver and testing period of 7 - 9 years that San Francisco has done to get this procedure accepted.

Apparently MLS (presently used at SeaTac in a similar manner but only for limited aircrafts), FMS and GPS technology can be used instead of LDA to accomplish the same purpose of getting the plans "down thru the soup" so they can land using dual streams at SeaTac.

Finally, FAA confirmed that LDA was still planned for Sea-Tac in their 1993 Aviation System Capacity Plan (Exh. 30). FAA also reiterated that LDA national standards were being published that would "enable the use of these capacity-enhancing approach procedures."[119]

c) Six improvements in 1991 SeaTac capacity plan would save approximately the same as a 3rd runway and are much cheaper to implement

The 6 improvements to the existing airfield outlined in the 1991 Airport Capacity Enhancement Plan, items I-1 to I-6 were predicted to save $214 million in delays[120]. This represents 62% of the total cost of delays of $347 million at the 425,000 operation level in the "do nothing" configuration. The dependent runway alternative is only predicted to save $241 million (including items III-1 to III-5), even though the effect of the dual arrival stream during IFR is included in the $241 million. This represents only 69% of the total cost of delays of $347 million.

Foremost among these 6 improvements are the in-trail separation that was implemented and the LDA and wake-vortex that have not been implemented yet.

This comparison between these 6 improvements and the 3rd runway becomes even more favorable towards the improvements in light of the decrease of the savings from the 3rd runway from 167,000 hours 1991 to only 127,000 hours during the 12/94 hearing[121], as outlined above. If you multiply the 127,000 hours x $1,440/hr used in 1991 report, the savings from a 3rd runway should actually be $183 million instead of the $214 million outlined above. Thus, the $214 million saved from doing the 6 improvements recommended in 1991 is actually more than the $183 million saved by building the 3rd runway.

Expressed in terms of capacity, it would be possible to increase the SeaTac capacity to 425,000 (instead of the 380,000 stated in the 1992 FEIS) by implementing these 6 improvements and only have a delay cost of $133 million for 92,690 hours of delay left from the original $347 million for 241,040 hours in the 1991 report. This would translate into 13 minutes of average delay per operation (92,690 hours x 60/425,000 = 13 minutes). It would probably be more relevant to reduce the most recent Port number of 149,000 hours[122] of original delays presented per #I.I above on page 3 and deduct the 148,350 hours[123] predicted for these 6 improvements. Thus, this would give you a 425,000 capacity with no delays.

In addition, there are several more capacity increasing technology and procedure options contained in FAA's 1994 ACE Plan, that could increase capacity at Sea-Tac.

d) All feasible technology/procedural capacity increasing methods in the 1991 SeaTac capacity plan with updates should be implemented as soon as they are available

Capacity increase/delay decrease can be done more efficiently with improvements to existing

R-3-21B
R-4-7

airfield according to Bogan (exh. 9):

The "electronic and procedural enhancements" include the following items (p.16), many of which were also recommended by the 1991 Capacity Enhancement Plan (reference #2) when referred to below. We need to find out which improvements have already been done at STIA and which ones will still be done and when:

A) Full all weather lighting and electronic landing aids (= Item I-3 in the 1991 plan): The Category I ILS on runway 16L is the only item that is included in reference #2. How much additional delay savings will the all weather lighting contribute over and above the ILS system? Apparently the ILS system will be implemented in the future, but will not have as much delay saving effect as expected according to statements by FAA in Renton.

B) LDA (= Item I-4 in the 1991 plan): Both studies state that this will provide the capability for simultaneous arrival streams during certain poor weather conditions (see p. 17 also). See III.b for a detailed discussion.

C) State-of-the-art radar system (= Item I-2 in the 1991 plan): Bogan claims that this will also provide for simultaneous arrival streams. High resolution rapid update radar systems are being tested to determine the minimum safe operation spacing between aircraft (p. 20). The effectiveness of this system depends on how many airplanes have corresponding systems installed on board. What is the present status of these systems?

D) Wind shear and wake vortex system (= Item I-6 in the 1991 plan): This will allow minimum separation standards due to safety information provided by this system. ACEP says that "this equipment is under development and is expected to be available by Future 2". In 1995, FAA still identified Sea-Tac as one of the prime candidates that would be able to benefit from this program"[124] and it will apparently be part of the 1995 Sea-Tac airport capacity update report to be published in July, 1995 (reference #20). Up to 80,000 hours per year in delay savings could be achieved from programs such as this one, "if they were able to run independent parallel arrivals." (d:o). When can this system actually be installed?

E) Exit taxiways to include high speed turnoff capability plus additional mid-field turnoff locations (= Item I-1 in the 1991 plan): Two of four taxiways were already built 1994 and 2 more will be built in 1995. They were only built to reduce taxi-in delays, etc as stated in Port documents (exh. 13) and would not increase capacity of Sea-Tac according to my 1994 discussion with Ron Ahlfeldt with P&D Technologies. The reason was that these taxiways will not reduce the runway occupancy time to maximum 50 seconds which is necessary to reduce the in-trail separation per Item I-2[125]. This contradicted the $9 million in delay savings shown in the 1991 capacity enhancement plan. We understand that the fleet mix partially determines the runway occupancy time, since a 747 takes 70 seconds to get off the runway and a FK 28 only needs 28 seconds. The Port's 4/14/95 answer (reference #16) to the Panel has finally revealed what we suspected all along: that the taxiways were actually built to increase capacity and not to "reduce taxi-in delays", etc. as the Port had stated in their taxiway documents above. The report states that the taxiways were the major factor enabling the Port to reduce in-trail separation from 3 NM to 2.5 NM (ref. #16). We believe that this again illustrate the low credibility that we believe any Port statement deserve.

<u>How much has the reduced in-trail separation increased capacity/reduced delay at the present Sea-Tac configuration</u>? According to the 1993 Aviation System Capacity Plan, the increase should be in the order of "3 - 5 arrivals per hour" (exh. 25). The Port is again trying to diminish the importance of this gain in the May 1995 Expert Arbitration Panel hearings by saying that the capacity gain is diminished by a great amount of bigger planes. According to our rough estimates, this method could therefore increase operations in the order of 15,500 operations per year[126]. We believe that this capacity increase will defer the need for the 3rd runway as detailed per Item #III.f below.

R-3-21B
R-4-0

F) **Spreading of noise during departures = Item I-5: This item is only included in the 1991 plan and does not show up in the preliminary update being done 1995.**

These improvements should be the first priority for Sea-Tac, instead of building a 3rd runway since they can be easily implemented and are more cost-effective according to Bogan (p. 19). Five out of six options from the 1991 capacity study have apparently not been fully implemented, including LDA and the wake vortex system that was predicted in 1991 to have big effects on delays. We already elaborated on LDA per Item #III.b above. The Port is underestimating the effect of the already implemented reduction in the in-trail separation, that was previously estimated to increase capacity by 15,500 operations.

Thus, we believe it is clear that all system improvements to the existing airfield are very feasible, especially compared to the 3rd runway alternative on a cost/benefit basis. E.g., the taxiways were estimated to cost $8 million in the 1991 report and would save $71 million annually in delay costs (Item I-1 and I-2 in the report). <u>Please verify status of each one of these 6 suggested improvements from the 1991 report, including that they are still viable and when they will be implemented. What other improvements are planned to the existing airfield, including all options described in both the 1993 and the 1994 ACE Plan by FAA?</u>

We are enclosing the preliminary pages that have been released to us so far from the 1995 update of the 1991 Sea-Tac Airport Capacity Enhancement Plan (exh. 6). <u>Please provide a complete copy of this report as soon as it is available which was supposed to be July, 1995</u>. <u>What items have been deleted in this report compared to the previous plan from 1991 and why?</u> <u>Please provide any other updates already available to the 1991 Sea-Tac Airport Capacity Enhancement Plan, including as detailed in the ATA 3/28/94 letter (exh. 1).</u>

e) GPS

We are enclosing one article regarding GPS (exh. 7) that predicts that "the tidal wave is forecast for the late 1990s, after which commercial aircraft ...are expected to be GPS-equipped (p.36)." We are incorporating the 8/94 summary of the GPS program called the "GPS Implementation Plan" published by FAA by reference, since it is a good summary of the GPS program. We believe it could solve several of the SeaTac capacity problems within similar timeliness as can be expected from a 3rd runway development after all the legal challenges have been met.

DOD agreed in February, 1995 to keep their selective availability (SA) signal at a certain level and not make the degrading any worse (p. 17 in the Plan). At the March 1995 ICAO meeting a transition plan from ILS to GPS instead of to MLS was discussed (p. 16 of Plan). GPS will never require any need for grading and filling to place it in the right place and will have less "bouncing" of the signal. Category I precision approaches (p. 13 in Plan) will help somewhat at SeaTac[127]. This program is also scheduled to become a primary means of navigation and "reduce the distance between parallel runways and the distance between aircraft during arrival sequencing" before the end of 1998.

We have been told by FAA[128] that the category II/III precision approaches (p. 8 of the above Plan) will be deemed "feasible for sure" by FAA by the end of 1995 and that partial implementation is expected to start year 2001 with full scale operation 2005. The feasibility of this program is also confirmed by the enclosed paper presented recently (exh. 17).

According to AIRTRAC preliminary data a GPS system could increase the SeaTac capacity by approximately 20,000 operations/year (exh. 18). In 1993 the MLS system's system budget was cut down to 255 Category II and III MLSs from the planned 1,250 MLSs, because FAA decided that GPS

R-3-21B
R-4-0

243

would be able to do a better job in the long run than the MLS system.

f) Capacity of the present airport is higher than the presently stated maximum 380,000 operations. Capacity can be increased even more by filling millions of empty seats each year, implementing several technology and procedural improvements and optimizing landside capacity

According to the existing 1988 Regional Airport System Plan (exh. 12), the SeaTac capacity was 350,000 operations, which is higher than previous capacities. This was upgraded only 3 years later when the Flight Plan process started to 380,000, partly to reflect the capacity increases due to the four post plan. Why has there been no upgraded capacity figures for the last 4 years? Is there an effort by the Port to downgrade any improvements done at SeaTac since 1991 in order to make the 3rd runway project look better? Or have improvements been delayed for the same reason? There is good reason to suspect that capacity improvements have been made since delay costs (for doing nothing) have decreased per section #II above.

We believe that any capacity enhancement improvements that the Port has already achieved above the 380,000 stated maximum capacity, should be considered in deciding the amount of deferral in building new airspace capacity. This should include the reduced in-trail separation per item #III.d.E above.

Since the capacity of an airport is "stretchable", they do "routinely operate far above their rated capacity. Boston's Logan Airport for instance now serves around 400,000 operations a year with virtually the same facilities that were rated at a capacity of around 250,000 operations a year about 15 years ago."[129].

There are many reasons why an airport can "stretch" the operation capacity with existing airfields including: increase the average enplanement per departure by improving one of the three variables that define this number (increase the load factor, use larger planes or change the mix of operations towards domestic and international air carriers away from commuters that automatically have both bigger planes and higher load factors); emphasize technology and procedural improvements; build landside capacity (terminals, parking, baggage handling, etc.) to maximize the passenger throughput. It is clear that Sea-Tac has already experienced an increase in maximum operations from these three factors, but it is also clear that Sea-Tac has not done all that it can do to maximize all three of these items.

Even though enplanements per departure has increased dramatically since 1990, there are still millions of empty seats flying out of Sea-Tac each year that can be better utilized. Even though Sea-Tac has decrease the in-trail separation from 3 NM to 2.5 NM 1995, there are still several technology and procedural improvements that can increase the capacity of Sea-Tac. Even though Sea-Tac has been building some landside capacity in recent years, there are still efficiencies to be gained in this area.

R-3-24
R-4-7

g) Technological and procedural improvements have a high feasibility, especially compared to building a third runway

The cost of all technology and procedural improvements are extremely low in comparison to the expensive solution of building a third runway (see section #II.d). The delay reduction effect of six of these technology and procedural improvements is approximately the same as building the third runway (see section #III.c). Therefore, there is no question that the feasibility is far superior from pursuing technology and procedural improvements, and building another runway should only be the

243

very last resort after all other improvements have been implemented.

h) Airlines should be backing technological and procedural changes instead of a 3rd runway

Please present some numbers to illustrate why the airlines would not be paying more landing fees due to a costly 3rd runway with very little benefits versus the less expensive means of raising capacity by the above technology and procedural methods. This would be especially true if the 3rd runway did not get full FAA funding, which should be an alternative analysis as required by FAA. If airlines actually are paying for some delay costs, maybe the airlines view these costs as a positive sign that indicate that the airport is being fully utilized and the airlines are not paying higher airport fees for more capacity that would not be fully utilized? Maybe the airlines could explain what average delay time that they see as critical before they would recommend starting construction of a capacity increase. E.g. a 10 minute delay at $2,130/hr would cost $355 per operation.

i) Congestion pricing incl. peak pricing

First, we would like to address Mr Feldman's comments regarding the Panel's "lack of sensitivity to the importance of commuter operations to the rest of the state" when "Walla has eight flights a day to Seattle that they count on"[130]. This comment misses the entire point of doing both system and demand management, i.e. to utilize the federal tax dollars subsidizing the existing Sea-Tac in an efficient manner and to avoid the need for building excessive new airport improvements. This is detrimental to both the federal budget and the nearby communities that have to live with the noise of an airport, a fact that Mr. Feldman seems to put in a lower priority than the convenience of the people from Walla Walla. In addition, we do not understand how any potential decrease in commuter operations during peak hours of only 0 - 7% (per the Port's own figures) would severely hurt the Walla Walla (or any other) economy, especially since Horizon and United Express control 85% of the total commuter market? The Walla Walla people would simply adjust to this potential small decrease in peak hour operations. This claimed negative effect of the economy is probably not provable similarly to delays not severely hurting the regional economy according to the AIRTRAC research 10/92[131]. The Walla Walla people maybe even benefit because if the planes can fly with a higher load factor, maybe the air fares can be decreased?

The legal complication of discrimination seems to have been overcome by FAA/DOT having issued final guidelines about this procedure (see Exh. 33 of RCAA's 4/14/95 response to Expert Arbitration Panel). These guidelines seems to be the answer that Apogee Research was looking for 8/93 by indicating in their report "DOT guidelines forthcoming"[132]. It also seems to be the answer that Dye Management Group was looking for 10/92 when they said that "guidelines regarding peak-hour based landing fees .... were currently under review by OMB"[133]. This would allow Boston to change their PACE pricing program that was previously held discriminatory to a non-discriminatory peak pricing system.

Will congestion pricing be implemented and if so, when? If these above guidelines have not resolved all legal challenges, please explain in detail the potential for a legal challenge, even if the pricing system is properly designed. The FAA is supposed to "review and comment on POS analysis of demand management options for consistency with federal law and policy" according to the 3/94 MOU section VI.C. Please perform this analysis independent of the Port. Maybe Mr. Ron Ahlfeldt with P&D Aviation could be asked about this, since he already stated in a SeaTac University session 8/94 that he did not believe it was legally impossible to enforce a peak pricing system.

The Port is basing the expected effect of a peak pricing system on the formulas used in the

R-4-7

Boston study and are trying to convince the public that the small effect thus arrived at is too small to be feasible according to resolution A93-03. Please produce the Boston report so we can have a chance to study it. Is this report showing the same effect for the Logan airport? Has Logan implemented the peak pricing system yet, after it apparently has been declared legal? If it has been implemented, what is the ACTUAL effect of the system? If Logan is showing similar effects to the Port's conclusions and they have or intend to implement it, why is it feasible in Boston and not in Seattle?

R-4-6

Apogee Research notes that the "peak period pricing has been implemented successfully by the Port Authority of New York and New Jersey for each of the three major commercial airports under its control"[134]. However, the system was designed to "encourage general aviation traffic to use reliever airports" and "not..to encourage larger commercial aircraft." Apogee Research also notes that "Properly designed, such surcharges could also effectively encourage traffic to shift to non-peak periods or to alternative, reliever facilities." Further, "If instituted properly, pricing should be able to shift some air taxi and commuter operations, which constitute 40 percent of Seattle-Tacoma's total aircraft operations, to non-peak periods or to appropriate reliever facilities. This should help level out peaks and create a more uniform traffic flow." (our emphasis). We therefore believe the question is not IF pricing works but HOW to design the pricing. It is also interesting to note that Apogee Research is coming up 5 - 10 % "potential benefits" for each of pricing and gate control[135], which shows that at least Apogee's lower figure is similar to the Port's higher figure. Please supply more information about how peak pricing is used in other areas.

"Broadly increasing (landing) fees (for all operations), which might discourage smaller commercial aircraft or the use of gate pricing as an incentive"[136] could also be considered by the Panel. We suggest, however, that the Panel initially recommends the most feasible alternative from many pricing schemes, instead of implementing several schemes simultaneously. This will provide a test period during which the ACTUAL results of EACH pricing system can be measured against expectations, before any changes or additional pricing systems are implemented.

We believe that one of the main reasons that the Port does not want to implement a new pricing system (besides not meeting the A93-03 conditions) is that it would probably lead to some airlines moving to Paine, Boeing, McChord or other reliever airports, including maybe even a stronger interest from the airlines in a new airport. Apogee Research states that "the key to successful pricing policy in the long run may be the availability of a suitable alternative (reliever) airport in the region."[137] We believe that this reluctance of the Port illustrates their predominating interest in expanding there own economic power with a 3rd runway than the long term economic, social and environmental well-being of this entire region.

R-4-7

"Revenue neutrality may also be desirable, unless a specific nondiscriminatory application of increased revenues (if anticipated) is possible"[138] is Apogee Research's opinion. We agree with that and but we would like to have the Port answer a question whether they see a need to increase revenues also? We would think that there would be no such need, UNLESS A THIRD RUNWAY IS BUILT. We therefore believe that the airlines ought to be very willing participants in a peak pricing or other pricing system if they were faced with the two alternatives that we believe might very well be realistic: either peak (or other) pricing changes to help utilize the existing airport better or higher overall fees at an expanded airport with lots of excess capacity, especially during off-peak good weather periods (especially if only limited federal financing is available).

Even if changed pricing was not revenue neutral, any increase in fees to airlines will not have a material affect on their profitability since these costs only comprise a small portion of the airline's total costs. "While airport-related costs are about 7 to 7.5 percent of airline costs now, they are increasing the fastest."[139]

The feasibility determination depends on when a congestion pricing method could be implemented. We believe it is significant that only 7 airlines are under a lease that would prevent implementation of a new pricing system according to the Port. The Port labels these airlines "major carriers" but the 7 of them only comprise 52,200 or 15.3% of the total of 339,500 operations in 1993[140]. Please provide alternative numbers. If these numbers are not correct and explain in detail why the congestion pricing could not be implemented sequently as described herein. Federal Express, SAS and Time Air are not really "major carriers" at Sea-Tac with only 1,400, 295 and 359 yearly operations respectively. This leaves more than 20 domestic and international air carriers and more than 10 all-cargo carriers that have leases that would allow implementation of congestion pricing. The Port admits that "some carriers at Sea-Tac are on more flexible month-to-month leases"[141]. If the Port still claims the year 2001 as a major obstacle, please provide copy of every lease and a table showing the expiration date of the particular clause that would prevent any price changes to accomplish congestion pricing, even if they were revenue neutral. According to a 11/29/94 memo from Jerry Dinndorf to the Panel, this list should already be available since Mr. Dinndorf stated that "the Port is also compiling information regarding carriers who have both mid-term and short-term leases." The 11/29/94 memo only included page 1 and 8 of Appendix B of the Continental 1/1/74 lease and cover page and page 5 of Basic Airline Lease and Agreement of the Continental 1/1/70 lease, revised 4/75. We do not understand how this sample lease prevents any changes according to paragraph 4 of the lease labeled "Rents and landing fees - Adjustments". These rents are "subject to adjustment 1/1/1998 and 1/1/2001 according to this paragraph and "the parties shall commence negotiations covering such adjustments not later than six (6) months prior to the effective date of such adjustments...". Has the Port already negotiated the rent adjustments scheduled for 1/1/98?

Please explain why there would need to be "unanimity among signatory carriers...to achieve an equitable "whole airport" congestion pricing system."?[142] The only clause in the above lease sample that we find that relates to this issue, is paragraph 4 of Appendix 4 of the sample lease. It states only that 65% of the airlines must agree to amend the lease if "additional Discretionary Improvement Allowance funds are required, and/or capital improvements in addition to those financed by the Revenue Bonds are required". We do not understand why this paragraph would apply to a demand management method that does not need any capital funding? Why would not the Port be similar to any landlord of real estate that can implement price changes whenever each lease expires? Thus, 85% of the congestion pricing could be implemented before 2001 and 15% would not start until 2001. We believe that the lack of an answer to the Panel's 3/3/95 questions #3 and 5 to the airlines prove that there is no insurmountable obstacles to implementing a congestion pricing system. The only objection that we observed during the December hearings from the airlines is that they do not like any kind of demand management, because it is against the free market system. Mr. Argue has previously said that he prefers "supply management" instead of "demand management".

R-4-7

We are also strong supporters of a free market system and we believe that is exactly why an airport should be run as any other business. E.g., movie and other theaters charges more for better seats and during peak hours and the Seattle bus system charges more during peak hours. Actually most well-run business charges more for a more desirable product, so why should not a government subsidized operation do it? The effect of the airlines' present position is really to ask the federal government to subsidize 15.4 million seats leaving and arriving empty at Sea-Tac 2020[143]. Even the airlines themselves charge more for flying during weekends, high seasons, etc.. We believe that the airlines would actually be very wise to support at least a revenue neutral congestion pricing system, since it would lead to better overall load factors and keep airline fees lower than paying for an expensive third runway. In short, it should implement a system that would increase airline profits and that each individual airline would have a difficult time implementing by itself due to the severe competition in the airline industry. The airlines could even pass these price differences between peak and off-peak on to the passengers with the logical motivation that the airport charges them more. Passengers would easily accept this, and the effect of congestion pricing would naturally be higher than

243

if the airlines absorbed the cost. What alternative did the Port assume in its analysis of congestion pricing?

Finally, we would like to know how the Port's 0 - 7% claimed "percent of peak period operations canceled or rescheduled"[144] translates into annual operations? If the 339,500 annual operations in 1993 have e.g. 30% of total operations during these peaks, the annual capacity increase would be max 7,100 (= 30% x 339,500 x 7% above) operations with a $200 increase. This would "defer the need to construct the third runway" 16 months. Please provide a copy of the "Boston-Logan demand management analysis"[145] that the Port is relying upon in arriving at the max 7%.

Apogee Research estimated that this method could have a 5 - 10% "potential benefit"[146]. This translates into 19,000 - 38,000 more operations in addition to the present 380,000 max. capacity.

j) Gate controls

Apogee Research estimated that this method could have a 5 - 10% "potential benefit"[147]. This translates into 19,000 - 38,000 more operations in addition to the present 380,000 max. capacity. With the present demand forecast, implementing both congestion pricing and gate controls would therefore extend the life of SeaTac up to 2015 - 2025. The Flight Plan also claimed that "improved load factors ... might be achieved through gate controls imposed directly by airport operators"[148]. Even Port commissioner Paige Miller believes that if slots are restricted, "you can be sure that those airplanes are going to be full, or virtually full." (exh. 33).

"Gate control" has already been implemented in other transportation systems: we already have HOV (High Occupancy Vehicle) lanes on freeways in our region, other regions still have tollroads and it is being discussed for reintroduction in this region, etc..

We believe that the lack of an answer to the Panel's 3/3/95 question #6 to the airlines prove that there is no insurmountable obstacles to implementing a gate control system.

R-4-7

k) Move some operations to reliever airports and plan for a new airport

The moving of operations has already started with several all-cargo companies and constitutes a system management alternative that we believe the Panel should explore (see details per item II.e above).

Following trends in other regions, it is only a question of time when other operations will follow. E.g., commuters might move to Boeing, Paine or McChord (if available by the military). Some factors that will speed up this move, besides increased volume and delays at Sea-Tac, would be expected delays or halting of plans to build a 3rd runway, implementation of peak pricing and gate controls and increasing access problems to Sea-Tac due to expected log jams on our freeways.

R-4-4

Please provide the figures on "allocation of some air passenger demand to one of more supplemental airports" that was going to be produced "in future documentation for the Airport Master Plan Update" according to the Port's 3/94 demand report[149]. There will be diversion to other regional airports through 2020 if the third runway is not built. The only question should be when the diversion will start and how much diversion? If this diversion from Sea-Tac starts before construction on additional airside capacity is started, it will act to defer and maybe even obviate the need for construction of the third runway.

243

Dr. Richard de Neufville points out that traffic from a region with a high degree of locally originating passengers (Sea-Tac has 72.5% for domestic air carrier operations[150]), is "more appropriately handled by several airports if the traffic originates in the metropolitan area (as for Washington DC)."[151] This is also a reason why a second airport would be within easier access for a sufficient number of people in this area to make it feasible, as was proven by the TAMS Consultants in their MSAFS (Major Supplemental Airport Feasibility Study) that PSRC ended for political reasons October, 1994.

The use of existing alternative airfields (especially Paine Field and McChord) is supported by FAA in a 1994 study[152]. Already existing underutilized runways should be used before spending the largest amount ever in USA to squeeze in one more runway at the undersized SeaTac (exh. 14). Even building a new supplemental airport will be more feasible than building a third runway, due to many problems with building a third runway.

The fact that PSRC's 10/94 resolution A94-01 said it could not find a LOCATION inside the four counties for a MSA has nothing to do with the RELATIVE MERITS of another airport, inside or outside the four counties, as a superior system management tool compared to a 3rd runway. We have already outlined the high feasibility of using a new airport versus the expensive band-aid solution of building a third runway in section #II.d above.

l) Move all-cargo operations to off-peak hours

We reported earlier (see #II.e) that if half of the all-cargo operations moved to another airport, it would defer the need for a third runway by more than one year.

R-4-7

Even though all-cargo only constituted 4.7% of total operations in 1993[153], it is noteworthy that these operations constitute 8% of total operations during the 7 AM peak hour and 11% during the 8 PM peak hour[154]. What can be done to move these operations to off-peak hours where you would expect to find them? Has the Port tried unsuccessfully and is that one reason why some all-cargo companies are moving to Boeing per #III.k above?

IV) PANEL'S DECISION CRITERIA: HOW TO JUDGE ALTERNATIVES AS "FEASIBLE" AND FORWARD THESE ALTERNATIVES INTO PHASE II OF THE PANEL'S DM/SM INVESTIGATION

a) A demand/system management method should be deemed feasible if it is more cost effective than the 3rd runway

Since the 3rd runway achieves approximately 100,000 more operations for an approximate cost of $1.5 - 2.0 billion, the feasibility measure is $15 - 20 million/1,000 operations. Even if the Panel does not agree with the $1.5 - 2.0 billion price tag, the Port's own figure for only the runway itself, without any mitigation costs, terminals or other landside improvements is $524 million for the preferred 8,500' option[155]. This would yield $5.24 million/1,000 operations.

b) Besides cost effectiveness, we believe many other factors weigh heavily towards demand/system management instead of building a 3rd runway

We believe that an even more favorable approach towards any demand and system management option than above should be used due to several factors that are more favorable for many demand and system management options:

1) A 3rd runway would spread airport operations over a wider population.
2) Many demand and system management options (e.g. peak pricing and technology improvements) would utilize present scarce airport resources more effectively. It is extremely inefficient usage of public resources to have 8.0 million seats leave and arrive empty at Sea-Tac 1993 and increasing to 15.4 million even with the Port's assumptions about increasing load factors[156]. A better utilization would potentially have a beneficial impact on the federal budget deficit and our federal tax rates.
3) We believe that effective utilization of present resources would even set a positive trend for future US airport projects, instead of perpetuating the trend of using federal tax dollars to subsidize unnecessary new airfield expansions. We have showed in section I that the Port's present delay figures exaggerate the need for new airside capacity.
4) It is possible that not building the 3rd runway might even lead to higher load factors through a "de facto demand management". This would in turn lead to a better utilization and profitability for both airports and airlines.

c) Any demand/system management method should be deemed feasible if the risk factor is low

If the effect of that demand/system management method is likely but is not yet for certain, it should be feasible. We recommend this interpretation for several reasons:

1) The effects of several of the demand/system management methods look very promising, but are still being analyzed to ascertain their exact effect and timing (e.g. GPS and some other technology and procedural improvements). Therefore, these methods can not be implemented immediately. Washington State (part of the AIRTRAC recommendations) and PSRC has decided to adopt a "dynamic strategic planning" concept. This planning method should be used in this instance. This method entail keeping several options open until the very last moment possible to avoid making costly and irreversible mistakes. It also entails using less costly or reversible alternatives with a possibility of success before reverting to more costly irreversible alternatives[157]. Dr. de Neufville also defines "dynamic strategic planning" in reference to Sea-Tac as "the deferral of decisions about actually building new facilities ... until the necessary preliminary work ... has been done, and the needs for these facilities becomes more clear." (our emphasis)[158].

The Port will probably argue that the Panel should only consider items that can be implemented immediately, since there plans call for preliminary construction to start immediately if the Panel gives a go ahead decision by 4/96.

We believe that this is a faulty argument since the delay figures (see #1) do not indicate that there will be a capacity crisis for a long time. The Port's rush to an immediate construction start is simply a negotiating tactic to convince the Panel and PSRC that there is no time to implement any demand and system management methods and that a go ahead decision is needed ASAP.

Even if Port's delay figures indicate a present or future capacity crisis, the Port could easily delay the actual construction start of the 3rd runway. It should be delayed until they have resolved all the lawsuits and have an option through negotiations or condemnations to buy all the additional properties that they need. The additional costs for these steps would be a small fraction in relationship to the costs that the Port has already spent trying to force this project on the public.

2) Some demand/system management methods can actually be "tested" with a very small

cost and can be reversed if they prove not effective. These methods include peak pricing, gate controls and even some low cost technology improvements. When you compare the cost of these methods to the irreversible and extremely high cost of building a 3rd runway, it should be an easy decision to "test" this methods. This is entirely in accordance with good "dynamic strategic planning" concepts.

d) Timing: Demand/system management methods need to be implemented by the time that there is a capacity/delay problem. Either a method is a permanent solution or it would defer the need to construct the third runway if a delay of 6 months can be accomplished. The Port does not need to start construction of the third runway until December 1997 - July 1999 in order to meet the Port's completion date of 2001. Additional time to implement demand/system management methods is likely, since the Port's construction schedule is unrealistic

We would recommend that any demand/system management method is feasible, even if it could only defer the need to construct the third runway by at least six months for the following reasons:

1) There is no need to "defer" if there is no need in the first place. We believe that our delay figures (see #1) indicate conclusively that there will not be a capacity crisis for a long time at Sea-Tac. At the vrry least, there is no immediate need to start construction of a third runway as the Port's schedules indicate.
2) If our delay analysis is not accepted, there is still no need to rush into construction right away in 1996 as the Port's schedule in their 4/14/95 report indicates. This would therefore leave a considerable "window" before any construction would have to be started in order to have a runway ready by the time delay would be intolerable.

As we explained above, it would be poor business to start actual construction until the Port had finished all the legal challenges and the acquisition of the properties needed. We believe that research will find that this was actually done in previous legal challenges and property acquisitions, e.g. in Dallas-Forth Worth and Denver. Both Dallas-Forth Worth and Denver did not start construction until after a lengthy legal and political battle and Chicago has still not started any construction due to the same reasons. We therefore believe that the Port's 5 1/2 year "Construction Schedule" for building a 3rd runway[159] should be divided into 2 phases: property acquisition/legal challenges and actual construction. Since the property acquisition is not completed until December 1997 according to the Port's "Construction Schedule", we believe that the acquisition/legal challenge phase is approximately 1 1/2 years and the construction phase is 4 years. In addition, the "Construction Schedule" indicates a 1 1/2 year period (from December 1997 - July 1999) when only Miller Creek is relocated and ASR and ASDE facilities are built. We question whether this construction can not be done concurrently with the July 1999 - October 2001 schedule, since those work areas should be outside other work areas?

In conclusion, we believe that the Port's "Construction Schedule" has several flaws that seem to attempt to hide the fact that the actual construction phase might only be 2 1/2 - 4 years. This would thus leave a "window" to try out demand/system management methods until at least October 1997 and still be able to complete the third runway by October 2001. As a matter of fact, the Port's own schedule indicates that actual third runway construction would not need to begin until December 1997 - July 1999, in order to meet the 2001 completion date. A detailed analysis of the Port's construction schedule (exh. 22) reveals that it is highly unlikely that it will happen. The Port assumes that construction will "begin at the start of the 1996 construction season" (p. ES-11) which is implausible. The schedule itself is admitting that "the process of site selection, corridor and alignment study, property acquisition (our emphasis), design and

243

procurement may be more time consuming than the construction." (p. ES-11). E.g., exhibit 22 predicts that "Property Acquisition" will be completed 12/98 according to Figure 2, which does not agree with a three year schedule for the same task in a 1989 report by the Port. The Port is admitting this on page XI-5, when they state that "if a large number of properties were to go to condemnation, the schedule for property acquisition would be substantially (our emphasis) longer than with willing sellers. The schedule is also admitting that "in order to allow the Port the ability to start construction in 1996, the planning and engineering activities must parallel the Master Plan Update and EIS projects." (p. ES-11). Based on our information, we do not believe that this has taken place, which would delay the Port's schedule right from the start. The schedule concedes that 5,000 homes should be insulated by June, 1996 when the clearing is started (p. XI-3), but this is not likely based on the present progress of this program. The 1 year period to finish all the that are left to do in October 2000 is not realistic (p. XI-4).

3) Many of the demand/system management methods do actually cost the Port very little (peak pricing, gate controls, high speed rail, etc.). It would not make any sense not to implement any method that is practicably free of charge, even if this method would contribute very little additional capacity. This would be tantamount to replacing the engine in a car, when all you needed was a tune-up. Just because federal tax dollars are available to subsidize a large portion of a 3rd runway project does not mean that you must spend these tax dollars. Even with the Port's own figures of maybe a 1 - 5 % capacity increase with a peak pricing system, this would add 4,000 - 20,000 more operations. This is 4 - 20% of what a 3rd runway would add and it is basically free of charge.

4) Even if a demand/system management option can not be fully implemented prior to 4/96 (e.g. peak pricing and GPS), implementation should done as soon as any option is available. The feasibility of the method should be measured as to the amount of its effect and if the method can be implemented before a capacity problem occurs and before or shortly after the third runway could be operational.

f) The fact that some system/demand management options (congestion pricing, gate controls, etc.) are "difficult" to implement should not provide an excuse for not pursuing them. The "political" decision to try them has already been made.

It is obvious when reading Port reports about system/demand management that the words "difficult to implement", "legal and administrative concerns", "appear to have marginal effect", "appear to have moderate effectiveness and implementation feasibility", "could be moderately effective", "appear to have poor to moderate effectiveness", etc. appear quite frequently. We believe that this is basically a question of bureaucratic inhibitions and reluctance to try out new methods.

Our opinion is that the political decision has already been made to try these methods be passing resolution A93-03 that says "after demand management and system management programs are pursued and achieved, or determined to be infeasible" (our emphasis). This language should be interpreted to specify that demand and system management shall be implemented, unless it is determined to be infeasible, which puts the burden of proof on the people that attempts to prove that these methods are infeasible. The Panel itself noted 2/24/95 that Part IV.B of MOU specifies that the POS "shall consider relevant environmental, economic, market, legal, safety and technical matters" which is also echoed in the "implementation Steps". It is noteworthy that the word "political" is absent from this list of considerations. Therefore, the fact that other airports might shy away from demand and system management options due to "political" considerations is not relevant to the Sea-Tac situation.

R-4-7

243

The only "excuse" not to pursue these methods must be based on a conclusion that all these methods are "infeasible" due to one of the above considerations. We understand that the legal "excuse" based on federal law is not a severe impediment anymore. The recently revised "Policy on Airport Rates and Charges" published by FAA allows a "properly structured peak pricing system that allocates limited resources using price during periods of congestion"[100]. We concluded per section #III.I, that the leases might only prevent implementation until 2001 for 15% of the Sea-Tac operations, but we are asking for complete leases and listing of all leases with renewal dates, preventive clauses, etc..

R-4-7

243

REFERENCES

We have not supplied the Panel with copies of all quotations from these references in order to save paperwork. However, we will be able to supply copies of any of the quoted materials upon request.

1. According to April 1995 conversations with George Orr at FAA, Renton who is in charge of the ATOMS reporting locally.
2. STIA, Airport Capacity Enhancement Plan, 1991. This reference was made available to the Panel by FAA 4/95.
3. ACE (Aviation Capacity Enhancement) Plan, 1994. This reference was made available to the Panel by FAA 4/95.
4. "Preliminary Delay Findings" chart. Presented by P&D Aviation during the Panel's 12/94 hearings.
5. Flight Plan Project, Final Environmental Impact Statement (FEIS), October 1992. Panel has it.
6. Preliminary Order On Demand/System Management Issues issued by the Panel 2/24/95
7. "Sea-Tac Airport Acceptance Rates" chart. Presented by P&D Aviation during the Panel's 12/94 hearings.
8. Air Traffic Control Handbook, #7110.65H, 9/16/93. We assume this reference will be made available to the Panel.
9. According to April 1995 conversations with David McCullum, FAA, Washington, DC, project manager for LAAS in the Satellite Navigation Program.
10. Apogee Research 8/23/93, Major Supplemental Airport Work Scope and Actions Associated With Demand/System Management And Noise Monitoring". This report was attached to our 10/29/94 submission to the Panel.
11. According to April 1995 conversations with Sarah Dalton at FAA, Renton who is a main person writing the 1995 Airport Capacity Enhancement Plan to be published in July 1995. This is the first update of the 1991 plan (reference #2).
12. Aviation System Capacity Plan, 1993. We assume this reference will be made available to the Panel.
13. The Economic and Social Importance of Air Transportation for Washington, AIRTRAC, 10/92. This reference was already provided to the Panel as exhibit 11 in our 4/14/95 report.
14. Airport Master Plan Update, Technical Report No. 5, Preliminary Forecast Report, 4/12/94. Panel was given a copy of this report by POS 4/95.
15. Airport Master Plan Update, Technical Report No. 6, Airside Options Evaluation, 9/19/94. Panel was given a copy of this report by POS 4/95.
16. Information On Demand/System Management Issues Requested By The Puget Sound Regional Council Expert Panel, prepared for POS by P&D Aviation and Claire Barrett & Associates, 4/13/95
17. AIRTRAC Project IIa: Air Transportation Demand, Aviation Industry Trends, and Air Capacity in Washington Through 2020, 10/92, by TRA Airport Consulting
18. AIRTRAC Project IIb: Review of Flight Plan Demand and Capacity Analysis, 8/17/92, by Dr. Richard de Neufville
19. Preliminary Report On Demand Management To The Puget Sound Regional Council Expert Arbitration Panel, by P & D Aviation and Claire Barrett & Associates, Draft 11/17/94
20. Data Package No. 11, Airport Capacity Enhancement Plan Update, by FAA, Technical Center, Atlantic City, New Jersey, April 1995
21. Sea-Tac Airport Master Plan Update Draft EIS, April 1995 (3 volumes)
22. Expert Arbitration Panel for PSRC, Final Phase I Order On Demand/System Management Issues, July 27, 1995
23. Information Request for Demand/System Management Issues issued by the Expert Arbitration Panel 3/3/95

243

FOOTNOTES

A number in a footnote refers to an item in the "Reference" section

1. #6, page 4. The Panel uses the same criteria.
2. #3
3. #3, table 8-1
4. #2, page v
5. #5
6. #21, page I-8.
7. #18, page C-11.
8. #20
9. #21, page II-3.
10. #3, table 1-3
11. #3, table 1-4
12. 348,476 ops x 4.5 minutes/60 = 26,136 hours
13. Defined in FAA Order 6040.15B with updates
14. #1
15. #3, table A-1 and exh. 2, page 6
16. #3, table 1-3.
17. #21, page II-3.
18. #18, page C-11.
19. #18, page C-10. 57% of all flights are not reporting but have been estimated to have the same delays as the 43% that are reporting.
20. Exhibit 16: On-time flights with 0 - 14 minute delays have been estimated to account for the same 25% of total delays and with the same 3.4 minute average as in the ASQP statistics.
21. The difference versus our other estimate of 30 seconds delay is that we assumed an average delay of 7.5 minutes for the 0 - 14 minute delays and we used a slightly different ratio between total delays and "late" delays.
22. Chart "Delay Comparisons" presented to Panel 5/3/95.
23. #16, page B-5.
24. #16, page C-10 to C-11: 846,856 minutes/60 = 14,114 hours. 353,000 total operations 1994 x 93% scheduled passenger operations/151,238 delayed operations per ASQP = 2.17. 2.17 x 14,114 hours = 30,637 hours.
25. #3, page 1-14.
26. #16, page A-2.
27. #6, question #2.a
28. #3, page 1-11.
29. #4, page 1-14.
30. #18, page 23.
31. #16, page C-7.

32. #20, page 25.
33. #21, page II-4.
34. Chart labeled "Increased Delays" presented 5/3/95 to the Panel which is based on 33,000 hours of delay per chart labeled "Delay Comparison"/353,052 x 93% passenger flights = 6 minutes
35. #4
36. 1,186 operations x 40 minutes = 47,440 minutes/348,476 operations/60 = 8 seconds.
37. #3, page 1-11
38. #3, table 1-2
39. #16, page C-10.
40. #22, page 8.
41. #4, section 1.4 discussion throughout this section.
42. #2, page ix, item III-1
43. #4
44. $270 million/86% = $314 million total savings.
45. #2, page ix and page 15
46. #4
47. #2, page viii - ix, items I-1 through I-6
48. #3, page 1-1
49. #13, page 75
50. #13, page 8, Executive Summary items #4,6 and 8. Also #13, page 98
51. "Identifying Service Gaps in Commercial Air Travel: The First Step Toward Quality Improvement," Gourdin and Kloppenborg, 1991 Transportation Journal, page 28
52. #13, page 78, 83 and 90.
53. #13, page 84, 85, 91 and 93.
54. #13, page 84.
55. #21, page II-5.
56. #3, table 1-3.
57. #2, page 15
58. #21, page II-4.
59. #16, page C-7.
60. #21, page II-5.
61. #14, figure 2-1.
62. #14, table 5-9
63. #14, table 5-16.
64. #5, page 2-15 explains it as by referring to the 3/92 update forecast as the "new work by a consultant for the Port of Seattle (shown in Table 2-4 as the "update") and was not available in time to be fully reviewed by the PSATC."
65. #5, table 2-4, page 2-14, footnote 1
66. #5, page 2-15, 2nd paragraph
67. #14, table 5-16.
68. #14, section 5.

69. #13, page 8
70. #14, table 5-13.
71. #14, table 5-14: all figures can be calculated from this table.
72. #14, page 5-36.
73. Total air carrier/air taxi operations per exhibit 21 were 344,000. From this we need to deduct the air cargo operations (16,000 in 1993) by using the same figures as P & D Aviation used 4/94 (reference #14, table 5-11): 274 M domestic air freight + 51 M international air freight = 325 M (thousand metric tons) total x 54% (percent of total in all-cargo planes) = 176 M/10 M (thousand metric tons per cargo plane) = 17,600 all-cargo operations. Thus 344,000 operations - 17,600 cargo operations = 316,400 passenger operations. The average enplanements per departure is 21.0 million passengers/316,400 = 66.4.
74. 7.6 (increase 1993 - 1994 = 66.4 - 58.8) divided by 9.2 (increase 1993 - 2000 = 68.0 - 58.8).
75. #14, page 5-36.
76. #14, table 5-14: Average seats per departure of 158.5 in 2020 can be calculated from this table by multiplying all average seats by departures (205 x 123 + 38 x 43 + 91 x 22 + 280 x 4) and then dividing by 202,000 departures. 158.5 average seats per departure x 70% load factor = 111 average enplanements per departure.
77. We confirmed the 48.9 average enplanements per departure figure for 1990 in exh. 1 by calculating it from statistics in exhibit 2 using the same procedures as for 1994 above.
78. #14, table 5-14.
79. #14, table 5-14.
80. #14, table 5-14 revised in 2020 as follows: 75% domestic x 202,000 departures x 123 passenger per departure + 10% commuters x 202,000 x 21 + 8% Canada x 202,000 x 50 + 7% international x 202,000 x 190 = 111.6 average enplanements per departure.
81. #18, page 21.
82. #14, table 2-1 and #19, table 2-5.
83. #14, table 5-17 shows 41 and 209 seats respectively for commuters and air carriers but table 5-14 only shows 38 and 205 for the same operations.
84. #18, page 7.
85. #14, table 2-1.
86. #14, table 2-1.
87. #14, table 5-14: 168,000 passengers/25.3 passengers per plane/44.6% load factor = 16,700 operations.
88. #21, page II-10.
89. #14, table 5-14:5% x 38.2 million air passengers forecasted for 2020 = 1.9 million/21 passengers per plane = 90,476 operations. The 38 passengers and 55% load factor per commuter plane was used that is predicted for 2020. The 90,476 is 20% of total operations of 441,600 predicted for 2020.
90. #22, page 6.
91. #6, question #5.
92. #14
93. #14, page 5-3
94. #2, page 12, alternative III-1
95. #2, page 14, item IV-1
96. #2, page 18, figure 12
97. #2, page vii
98. #2, page 12, alternative III-1
99. #2, page viii

100. #23
101. Used extensively by TAMS Consultants in the MSAFS 1994 study for PSRC, e.g. in Working Paper 2, 5/94. Also used in the Flight Plan Alternatives Final Report PSCOG, June 1991.
102. #15, table 5-11, page 5-33.
103. #13, many pages throughout the entire report
104. #3, section 6.4
105. #14, table 2-1
106. #14, page 5-3.
107. #10, page 22
108. #14, table 2-1.
109. #2, page viii
110. #7
111. #2, page viii
112. #2
113. #11
114. #12, p. 3-12.
115. #11
116. #13, page 80.
117. #13, page 88.
118. #13, page 96
119. #3, page 3 - 2.
120. #2, page viii - ix and page 9 - 11
121. #4
122. #4, by dividing the $317 million delay costs with the hourly operating cost of $2,126/hr arrived at per #I.f
123. #2, adding items I-1 through I-6
124. #3, page 3-7.
125. #8, para #5-72-f, that also specifies same "weight class" for both planes to have an in-trail separation of only 2.5 NM.
126. 353,000 operations 1994 x 44% bad weather x 50% landings x approximately 20% increase over present bad weather AAR = 15,500 additional operations. If this reduced separation will increase capacity during good weather also, this figure will be higher.
127. #11
128. #9
129. #18, page 22.
130. See Seattle Times 3/14/95 article that was sent to the Panel according to the file at PSRC
131. Exhibit 11 to our 4/14/95 report.
132. #10, page 21
133. #13, page 83
134. #10, page 22
135. #10, page 23
136. #10, page 22

137. #10, page 22
138. #10, page 22
139. #14, page 5-5.
140. #14; 5 airlines are found in table 5-13 and their operations add up to 50,442. Time Air is found in table 4-5 and the 61,919 passengers total 359 yearly operations using the 172.7 enplaments per departure figure found in table 5-14. Federal Express operations of approximately 1,400 per year was obtained from the Port's "Turbojet Fleet Mix Report" for 1994. Thus, the yearly total for all seven airlines is 52,201 operations or only 15.4% of the 339,500 operations for all of 1993. The number of airlines was also estimated from the same sources.
141. #16, page B-8.
142. #16, page B-6.
143. See our analysis per #IV.c.2.
144. #16, page B-8.
145. #16, page B-8.
146. #10, page 21
147. #10, page 21
148. #5, page 2-13.
149. #14, page 5-1.
150. #14, table 5-6.
151. #16, page 11.
152. #3, table 6-1
153. #14, table 5-15.
154. #14, page 5-36.
155. #15, page 5-33, table 5-11
156. 1993 figures: #14, table 5-13: 43.6% of the 18.4 million = 8.0 million; 2020 figures: #14, table 5-14: 40% x 16.3 million air carrier + 45% x .9 million air taxi + 45% x 1.1 million Canada + 32% x .8 million Other International = 7.7 million x 2 = 15.4 million.
157. #16, page 2: "Dynamic Strategic Planning is analogous to playing chess". The Planner: 1) Plan the next 5 or more moves; 2) Select an initial good move; 3) Adjust the plans continuously, in response to what actually happens.
158. #18, page 3.
159. #16, figure C14-1
160. FAA's policy on Airport Rates and Charges: revisions issued 1995 in 60 Fed. Reg. 6906, 6917 and to be codified at 14 C.F.R. pt. 302.

243

Source: 1/93 RCAH Vol II of White Books, by R. Atambusse "Flight Delays: Their calculation and Importance" Exh. 1

DELAY STATISTICS
SEA-TAC 1990-1991[1]

	1990	1991
1. Annual Operations Delayed		
Total Operations Delayed[1]*	21,404 x 12.5 min/delay 4451 hours	16,987
Total Annual Operations	355,007	338,607
% of Total Operations	6%	5%
2. Annual Delay Time		
Total Hours Of Delay[3]	4451	3179
Total Annual Operations	355,007	338,607
Delay In Seconds Per Operation	45 seconds	34 seconds
Total Annual Passengers	16.2 M	16.3 M
Average Delay Per Passenger	1.0 second	.7 second
3. Delays More than 15 Minutes		
Total Operations Delayed 15 Minutes Or More[4]	5053	3414
Total Annual Operations	355,007	338,607
% of Total Operations	1.4%	1.0%

* DELAY: Delay that has occurred for any length of time.

[1]Source: Personnal Communication with Jim Frala, Regional FAA, Air Traffic Procedures, January 15, 1993.

[2]Id.

[3]Id.

[4]Id.

SENT BY: 4-13-95 : 15:31 : ATOMS NETWORK- 91-2062231010:# 2

243

Exh 2

FEDERAL AVIATION ADMINISTRATION
AIR TRAFFIC SYSTEM MANAGEMENT

FEDERAL AVIATION ADMINISTRATION

AIR TRAFFIC ACTIVITY AND DELAY REPORT

December 1994

NAS ANALYSIS PROGRAM
ATM - 300

243

Delays At
55 Select Airports
Calendar Year to Date
1994 Compared To Same Period 1993
(OPSNET Reported)
December 1994 Report
Table IV

ID	1994 Delays	Same Period 1993 Delays	1994 Per-Cent 1993	1994 Delays Per 1,000 OPNS	Same Period 1993 Delays Per 1,000 OPNS	Delays Per 1,000 OPNS Change From 1993
ABQ	47	57	82.5	0.2	0.3	-0.1
ADW	270	272	[illegible]	2.0	2.0	[illegible]
ANC	[illegible]	160	[illegible]	[illegible]	[illegible]	[illegible]
ATL	14268	15643	[illegible]	20.0	23.3	[illegible]
BDL	[illegible]	150	118.0	[illegible]	[illegible]	[illegible]
BNA	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
BOS	14035	19837	70.8	[illegible]	[illegible]	[illegible]
BWI	1507	1033	[illegible]	[illegible]	[illegible]	[illegible]
CLE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
CLT	[illegible]	1704	[illegible]	[illegible]	[illegible]	[illegible]
CVG	2178	1998	109.0	[illegible]	[illegible]	[illegible]
DAY	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
DCA	3298	2988	110.4	[illegible]	[illegible]	[illegible]
DEN	9670	20901	46.3	[illegible]	[illegible]	[illegible]
DFW	31677	27101	116.9	[illegible]	[illegible]	[illegible]
DTW	3373	4173	80.8	[illegible]	[illegible]	[illegible]
EWR	32723	38778	[illegible]	[illegible]	[illegible]	[illegible]
FAI	20	9	222.2	[illegible]	[illegible]	[illegible]
FLL	684	835	81.9	[illegible]	[illegible]	[illegible]
HNL	30	67	[illegible]	[illegible]	[illegible]	[illegible]
HOU	745	865	[illegible]	[illegible]	[illegible]	[illegible]
IAD	583	390	149.5	[illegible]	[illegible]	[illegible]
IAH	2515	1920	131.0	[illegible]	[illegible]	[illegible]
IND	1978	2842	[illegible]	[illegible]	[illegible]	[illegible]
JFK	12530	12481	100.4	35.8	35.7	0.1
LAS	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LAX	7396	6180	[illegible]	[illegible]	[illegible]	[illegible]
LGA	16014	12972	[illegible]	[illegible]	38.3	[illegible]
MCI	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
MCO	1851	1539	120.3	[illegible]	[illegible]	[illegible]
MDW	[illegible]	600	140.2	[illegible]	[illegible]	[illegible]
MEM	275	349	78.8	[illegible]	[illegible]	[illegible]
MIA	5833	5570	104.7	[illegible]	[illegible]	[illegible]
MSP	1619	3204	50.5	[illegible]	[illegible]	[illegible]
MSY	36	46	78.3	[illegible]	[illegible]	[illegible]
OGG	6	8	75.0	[illegible]	[illegible]	[illegible]
ONT	177	220	80.5	[illegible]	[illegible]	[illegible]
ORD	23666	40756	58.1	26.8	47.3	-20.4
PBI	[illegible]	185	[illegible]	[illegible]	[illegible]	[illegible]
PDX	681	542	125.6	[illegible]	[illegible]	[illegible]
PHL	8428	7443	113.2	20.8	18.3	[illegible]
PHX	1925	1515	127.1	[illegible]	[illegible]	[illegible]
PIT	1858	2856	[illegible]	[illegible]	[illegible]	[illegible]
RDU	345	577	[illegible]	[illegible]	[illegible]	[illegible]
SAN	553	818	[illegible]	[illegible]	[illegible]	[illegible]
SAT	72	22	327.3	[illegible]	[illegible]	[illegible]
SEA	2121	2280	93.0	[illegible]	[illegible]	[illegible]
SFO	12264	10075	122.0	28.5	23.8	[illegible]
SJC	211	116	181.9	[illegible]	[illegible]	[illegible]
SJU	126	53	237.7	[illegible]	[illegible]	[illegible]
SLC	955	1274	75.0	[illegible]	[illegible]	[illegible]
STL	10663	8863	122.6	22.7	19.5	[illegible]
TEB	2031	1972	103.5	10.7	9.9	[illegible]
TPA	855	962	88.9	3.2	3.9	-0.7
	237715	267267	88.9	12.5	14.5	-2.0

243

Operations At
55 Select Airports
Calendar Year to Date
Calendar Year 1994 Compared to the Same Period 1993
(OPSNET Reported)
December 1994 Report
Table VI

Airport	ID	CAL 94 OPNS	CAL 93 OPNS	1994 Percent 1993
ALBUQUERQUE INT'L	ABQ	220202	212765	103.0
ANCHORAGE INT'L	ANC	217706	[illegible]	100.0
ANDREWS AFB	ADW	134910	[illegible]	102.0
ATLANTA HARTSFIELD INT'L	ATL	[illegible]	[illegible]	106.0
BALTIMORE-WASHINGTON INT'L	BWI	[illegible]	[illegible]	111.0
BOSTON LOGAN INT'L	BOS	[illegible]	[illegible]	93.0
BRADLEY INT'L	BDL	[illegible]	[illegible]	97.0
CHARLOTTE DOUGLAS INT'L	CLT	[illegible]	[illegible]	107.0
CHICAGO MIDWAY	MDW	[illegible]	[illegible]	135.0
CHICAGO O'HARE INT'L	ORD	[illegible]	[illegible]	103.0
CINCINNATI TOWER	CVG	[illegible]	[illegible]	109.0
CLEVELAND HOPKINS INT'L	CLE	[illegible]	[illegible]	108.0
DALLAS/FT. WORTH INT'L	DFW	[illegible]	[illegible]	105.0
DAYTON COX INT'L	DAY	[illegible]	[illegible]	118.0
DENVER STAPLETON	DEN	[illegible]	[illegible]	97.0
DETROIT METRO	DTW	[illegible]	[illegible]	105.0
FAIRBANKS INT'L	FAI	[illegible]	[illegible]	103.0
FORT LAUDERDALE INT'L	FLL	[illegible]	[illegible]	106.0
HONOLULU INT'L	HNL	[illegible]	[illegible]	101.0
HOUSTON HOBBY	HOU	[illegible]	[illegible]	102.0
HOUSTON INTERCONTINENTAL	IAH	[illegible]	[illegible]	102.0
INDIANAPOLIS INT'L	IND	[illegible]	[illegible]	103.0
KAHULUI/MAUI	OGG	[illegible]	[illegible]	104.0
KANSAS CITY INT'L	MCI	[illegible]	[illegible]	108.0
LAS VEGAS MCCARRAN	LAS	[illegible]	[illegible]	109.0
LOS ANGELES INT'L	LAX	[illegible]	[illegible]	100.0
MEMPHIS INT'L	MEM	[illegible]	[illegible]	102.0
MIAMI INT'L	MIA	[illegible]	[illegible]	105.0
MINNEAPOLIS-ST. PAUL	MSP	[illegible]	[illegible]	103.0
NASHVILLE INT'L	BNA	[illegible]	[illegible]	92.0
NEW ORLEANS MOISANT INT'L	MSY	[illegible]	[illegible]	122.0
NEW YORK KENNEDY INT'L	JFK	[illegible]	[illegible]	100.0
NEW YORK LA GUARDIA	LGA	[illegible]	[illegible]	[illegible]
NEWARK INT'L	EWR	[illegible]	[illegible]	[illegible]
ONTARIO INT'L	ONT	[illegible]	[illegible]	[illegible]
ORLANDO INT'L	MCO	[illegible]	[illegible]	[illegible]
PALM BEACH INT'L	PBI	[illegible]	[illegible]	[illegible]
PHILADELPHIA INT'L	PHL	[illegible]	[illegible]	[illegible]
PHOENIX SKY HARBOR INT'L	PHX	[illegible]	[illegible]	[illegible]
PITTSBURGH INT'L	PIT	[illegible]	[illegible]	[illegible]
PORTLAND INT'L	PDX	[illegible]	[illegible]	[illegible]
RALEIGH-DURHAM	RDU	[illegible]	[illegible]	[illegible]
SALT LAKE CITY	SLC	[illegible]	[illegible]	[illegible]
SAN ANTONIO INT'L	SAT	[illegible]	[illegible]	[illegible]
SAN DIEGO LINDBERGH INT'L	SAN	[illegible]	[illegible]	[illegible]
SAN FRANCISCO INT'L	SFO	[illegible]	[illegible]	[illegible]
SAN JOSE INT'L	SJC	[illegible]	[illegible]	[illegible]
SAN JUAN INT'L	SJU	[illegible]	[illegible]	[illegible]
SEATTLE-TACOMA INT'L	SEA	[illegible]	[illegible]	[illegible]
ST. LOUIS LAMBERT	STL	[illegible]	[illegible]	[illegible]
TAMPA INT'L	TPA	[illegible]	[illegible]	[illegible]
TETERBORO	TEB	[illegible]	[illegible]	[illegible]
WASHINGTON DULLES INT'L	IAD	[illegible]	[illegible]	[illegible]
WASHINGTON NATIONAL	DCA	[illegible]	[illegible]	99.0
WESTCHESTER CO.	HPN	198890	189314	105.0
		19004353	18434041	103.0

243

4-13-95 : 15:41 : ATOMS NETWORK- 91-2062231910:#12

Total System Delays
For Fiscal Year
Breakdown By Causes Of Delays
(OPSNET Reported)
December 1994 Report
Table X

Page 10

FY 95	Delays	Avg Daily Delays	Delays Caused By Weather	Per-Cent	Delays Caused By Volume	Per-Cent	Delays Caused By Ter-Minal Volume	Per-Cent
OCT	16419	530	11212	68.3	3917	23.9	3917	23.9
NOV	19215	641	14254	74.2	4035	21.0	4028	21.0
DEC	19310	623	14611	75.7	3845	19.9	3833	19.8
JAN	0	0	0	0.0	0	0.0	0	0.0
FEB	0	0	0	0.0	0	0.0	0	0.0
MAR	0	0	0	0.0	0	0.0	0	0.0
APR	0	0	0	0.0	0	0.0	0	0.0
MAY	0	0	0	0.0	0	0.0	0	0.0
JUN	0	0	0	0.0	0	0.0	0	0.0
JUL	0	0	0	0.0	0	0.0	0	0.0
AUG	0	0	0	0.0	0	0.0	0	0.0
SEP	0	0	0	0.0	0	0.0	0	0.0
	54944	597	40077	72.9	11797	21.5	11778	21.4

FY 95	Delays By Center Volume	Per-Cent	Delays Caused By Closed Runways Taxiwys	Per-Cent	Delays Caused By NAS Equip-Ment Inter-Rupts	Per-Cent	Delays Caused By Other Events	Per-Cent
OCT	0	0.0	328	2.0	316	1.9	646	3.9
NOV	7	0.0	264	1.4	326	1.7	336	1.7
DEC	12	0.1	216	1.1	326	1.7	312	1.6
JAN	0	0.0	0	0.0	0	0.0	0	0.0
FEB	0	0.0	0	0.0	0	0.0	0	0.0
MAR	0	0.0	0	0.0	0	0.0	0	0.0
APR	0	0.0	0	0.0	0	0.0	0	0.0
MAY	0	0.0	0	0.0	0	0.0	0	0.0
JUN	0	0.0	0	0.0	0	0.0	0	0.0
JUL	0	0.0	0	0.0	0	0.0	0	0.0
AUG	0	0.0	0	0.0	0	0.0	0	0.0
SEP	0	0.0	0	0.0	0	0.0	0	0.0
	19	0.0	808	1.5	968	1.8	1294	2.4

243

Major Supplementary Airport Feasibility Study
Forecast Discussion Paper
Revised: April 21,1994

Puget Sound Regional Council

Exh. 3

File: Pos, University; "Delay"

Implications of SeaTac Activity Forecasts for the Major Supplemental Airport Feasibility Study

3/29/94

The Executive Summary of the *Forecast Report* (Technical Report No. 5) from the Master Plan Update for Seattle-Tacoma International Airport (SeaTac) was distributed to members of the Working Group. This *Report* forecasts passenger activity for the Puget Sound Region and freight and general aviation activity for SeaTac. The *Report* also contains a wealth of information about historic and existing activity at SeaTac. The Major Supplemental Airport Feasibility Study will use aviation activity forecasts and information from this *Report* and from the three phases of the Flight Plan to establish potential activity at a Supplemental Airport.

Forecast Overview

Figures 1 and 2 (all figures are attached at the end of this report) respectively present the passenger enplanement[1] and aircraft operations[2] forecasts from the *Report* graphically. The new enplanement forecasts for the year 2020 are about 15% lower than the Flight Plan Phase I forecast (published in 1990) but almost identical to the Phase III forecast update published in 1991. Forecast enplanements are given for Domestic Air Carrier, Domestic Air Taxi/Commuter, Canadian, and International markets.

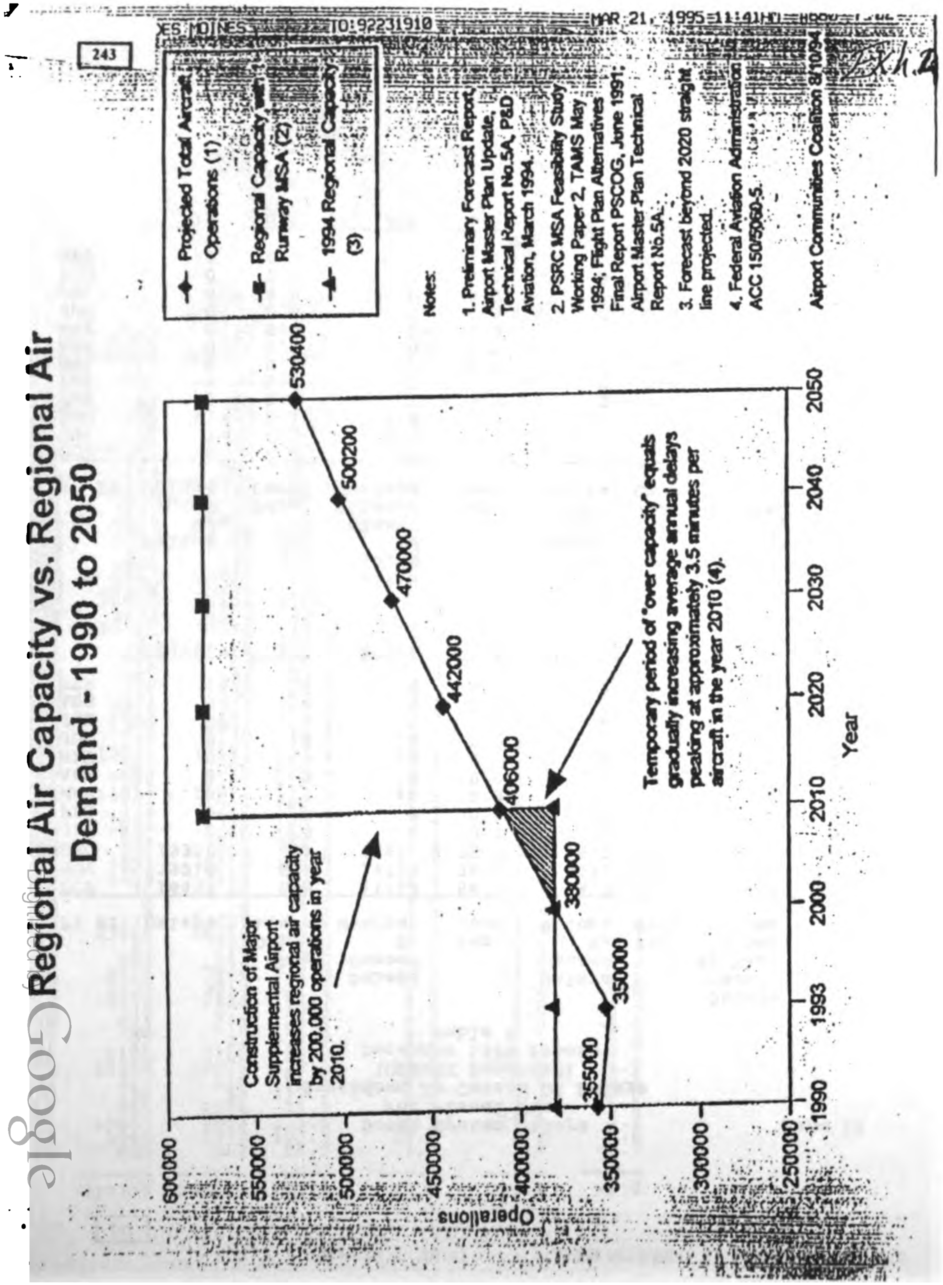
Total aircraft operations for the year 2020 projected in the *Forecast Report* are about 16% lower than those forecast during Phase II of the Flight Plan (1990) and about equal to those in the Phase III updated forecasts. Operations are classified as Passenger (with sub classifications of Air Carrier and Air Taxi/Commuter), All-Cargo, General Aviation, and Military. Operations are further classified by aircraft size (fleet mix). Passenger and aircraft movements are identified for peak hours, peak days, and night hours.

Of major importance, the new forecasts show that the practical annual capacity of SeaTac, as identified in Flight Plan[3], will be reached around the year 2000. As airport capacity is approached, noticeable delays begin to occur. SeaTac is presently experiencing average delays in excess of 15 minutes. Delays increase exponentially with an increase in activity - *i.e.* a 10% increase in operations when activity is already near capacity can produce a doubling of average delay time. The Flight Plan also states that addition of a third, air carrier runway will increase SeaTac's annual capacity from the existing 380,000 operations to about 480,000 operations. The new forecasts anticipate 441,600 operations at SeaTac by the year 2020. A comparison of forecast operations with airport capacity is depicted graphically in Figure 2.

[1] An "enplanement" is a passenger boarding.
[2] An "aircraft operation" is a takeoff or landing.
[3] Flight Plan III, Working Paper 7, 9/3/91.

TAMS TAMS Consultants, Inc.

243



Exh. 2

243

Sea Times 2/25/93 — EXH 5

Knight-Ridder News Service

The Clinton administration is looking at transportation alternatives, like Amtrak's high-speed X2000, which runs between New York and Washington, D.C.

Transportation secretary urging high-speed rail, not airports

by Don Phillips
Washington Post

Transportation policy in the Bush administration had at least two principal themes: encourage the building of new big-city airports and cut funding for passenger trains. Under President Clinton, those themes have been reversed.

Transportation Secretary Federico Peña, who gained his transportation experience by championing a controversial new airport for Denver when he was mayor there, said in a recent interview that while he does not oppose new airports, he thinks (1) the era of new big-city airports is probably over because there is not enough space and local opposition is always strong. It is (2) time to start thinking about high-speed rail and other alternatives to moving people between cities, he said.

Peña essentially raised the possibility that the airport now being built on 50 square miles of high plains east of Denver may be the last for many years.

Peña, 45, is still undergoing heavy on-the-job training. Staffing has been slow. Not one of Peña's choices for top deputies has made it through the White House screening process. The only specific programs to emerge from his department so far were contained in this week's budget document, and amounted to pouring more money into current programs — highways, transit, Amtrak and airport improvement.

Peña

But it is clear his ideas are taking shape. Some are in line with campaign statements by Clinton and Vice President Al Gore and would carry the Clinton administration down a different road than that of its Republican predecessors.

Former Transportation Secretary Samuel Skinner pushed airports. In 1989, he said building 20 new airports at a cost of $100 billion "is not out of the question." Given his Denver background, Peña could have been a Skinner wannabe. But Peña said the country must be realistic.

"It is no accident that we're (Denver) the next airport since Dallas-Fort Worth, which was 19 years ago," he said. "Was that because of some magic I brought as the mayor of Denver? I don't think so. I think it's because we were lucky. We happened to have a large parcel of farmland next to the city that was undeveloped, uncontaminated, that we could use for a new airport."

Even with that, Denver spent

Please see RAIL on C 3

243

RAIL

continued from C 1

1b

a quarter-century talking and fighting over a new airport before construction began, he said, and few cities have even begun that process.

Peña continued, "I think Chicago is beginning to have a conversation about a new airport, and maybe some day they'll have land assembled and ready for a new airport. But it's not going to happen, I don't think, anywhere in America. It's very, very difficult to build an airport."

Peña then asked, "Do you always have to build a new runway to move people between city X and city Y? Can you use high-speed rail?"

He maintained that government can facilitate that process by forming a "partnership" with the private sector to build high-speed rail systems, essentially using federal funds to leverage private money. Four-year budget projections released yesterday contemplate $646 million in federal funds for high-speed rail or magnetic-levitation systems over five years, in addition to $725 million already authorized. The projections also contained an additional $188 million for Amtrak. [illegible]

"Generally speaking ... most studies indicate that rail requires some kind of government involvement," he said. "My answer to that is, if it's a matter of public policy that we want to ensure that people can move efficiently, then there is a role for it. We do it today. We do it with Amtrak. [illegible]"

Peña said one way to ease travel congestion could be expansion of existing airports "where it ~~makes sense and where we could~~ show from a cost-effective point of view that that is the most pragmatic, practical, cost-efficient way that we can move people in situations where there's no other form of transportation available."

3 Peña said another way to add travel capacity would be to beef up the air-traffic-control system quickly, beginning with a hard look at the multibillion dollar Advanced Automation System, which some day is supposed to replace the current system. This program, late and over budget, is one of the most ambitious technological projects in history.

Peña said he wants an FAA administrator from outside government "who'll come in here and give me a very cold, calculated private-sector review of this whole project, top to bottom, and give me their best judgment about whether this thing can be fixed."

"There is something that has gone amiss in the bureaucracy," he said. "I don't know what it is. I really don't. I haven't had time to get in there and begin to claw away at it. But my first-blush impression is that the federal government is not very good in its procurement practices, period, across the board. ... But I think we have a particular problem in this department."

243 10:16 AM

Exh 6

P.02

orig.

Appendix A
Participants

Distributed at 3/10/95 "Technical Advisory Committee Mtg. on POS Master Plan Update, by Regional FAA (Sarah Dalton)

= Airport Capacity Design Team

Federal Aviation Administration

Northwest Mountain Region

Sarah Dalton → regional office
Jim Mast → flight standards
Carolyn Read → district office 227-2661
Dick Sowa

Headquarters

Dot Etheridge
Don Guffey

Technical Center

Douglas Frye
Darryl Stout
John Vander Veer
John Zinna

SEA Airport Traffic Control Tower & SEA Approach Control Facility

William Chord
Roger Sloan

Port of Seattle

Troy Brown
Michael Cheyne
Michael Feldman
Jeff Fitch
Barbara Hinkle
John Rothnie
Jim Serril
Dave Smith
Burr Stewart
Diane Summerhays
Dave Van Vleet
Bob Wells

Puget Sound Regional Council

Pete Beaulieu

Aviation Industry and Citizen Groups

Aircraft Owners and Pilots Association

Jules Bresnick
Ray Costello

airline

United Airlines

Phil Hogg
Jess Marker

Alaska Airlines

Ed Heeseker
George Knockly

Continental Airlines

Jim Simon

Delta Airlines

Jack Volkel

MARKAIR, Inc

Rod Stone

Northwest Airlines

Mark Salmen

Trans World Airlines

Grant Nelson

Boeing Field

Jack Frazelle
Bob Nonas

Air Transport Association

Neil Bennett

Air Line Pilots Association

Wes Dawson

Consultants

Ron Ahlfeldt (P&D Aviation)
Bob Maruska (HTNB)

243 10117 AM

EXHIBIT 16
DEMAND CHARACTERISTICS SEA-TAC

Annual & Daily Demand

Year	Annual Operations	Daily Operations	Equivalent Days
Baseline	345,000	1040	332
Future 1	425,000	1280	332
Future 2	525,000	1581	332

NOTE: (Annual Operations) / (Daily Operations) = Equivalent Days
The 1989-91 SEA Capacity Design Team Study used 331 equivalent days.
Source: Baseline schedule based on 30 August 1993. Agreed to on 27 January 1994.

Fleet Mix

	Class 1	Class 2	Class 3	Class 4
Baseline	8.6%	54.2%	31.3%	5.9%
Future 1	8.6%	54.2%	31.3%	5.9%
Future 2	8.6%	54.2%	31.3%	5.9%

Source: Schedule Supplied by Port of Seattle.
Agreed to on 23 March 1994.

P.03

10117 AM

Figure 243 Airfield Weather

	Ceiling/Visibility	Runway Operating Configuration
FR 1	5,000 feet and above/5 sm and above	Ind Arr & Dep with dual approach streams
VFR 2	2,500 to 4,999 feet/3 to 5 sm	Single arrival stream with additional aircraft under ceiling ? ?
IFR 1	800 feet to 2,499 feet/2 sm and above	Single Approach Stream
IFR 2	Not Applicable/1,800 RVR to 2 sm	One Approach Stream - Protect Glideslope
IFR 3	Not Applicable/600 RVR to 1,799 RVR	Same as IFR 2 - No Arrivals to the North
IFR 4	Not Applicable/600 RVR and below	Low visibility plan - one runway

VFR - Visual Flight Rules
IFR - Instrument Flight Rules
sm - statute miles

Figure 15. Daily Traffic Demand Distribution by Aircraft Class

Aircraft Class	Aircraft Types	Baseline (345,000)	Future 1 (425,000)	Future 2 (525,000)
Class 4	Single-engine props 12,500 lbs. or less	5.9%	5.9%	5.9%
Class 3	Twin-engine props 12,500 lbs. or less	31.3%	31.3%	31.3%
Class 2	Large aircraft 12,500 to 300,000 lbs. & small jets	54.2%	54.2%	54.2%
Class 1	Heavy aircraft over 300,000 lbs.	8.6%	8.6%	8.6%

why are the not different.

Figure 16. Approach Speeds (Knots)

Speed	Class 1	Class 2	Class 3*	[illegible]
Knots	155	140	130	120

* Note: Class 3 airspeed increased to 130 knots from 120 knots as previously used in all capacity enhancement studies.

EXHIBIT 4

AIRCRAFT TYPES OBSERVED AT FIELD DATA COLLECTION

Class 1 - Heavy Jets

B747	Boeing 747	DC10	McDonnell-Douglas DC10
B767	Boeing 767	MD11	McDonnell-Douglas MD-11
L101	Lockheed L1011	DC8	Mcdonnell-Douglas DC-8

Class 2 - Non-Heavy Jets

A320	Airbus 320	DC9	McDonnell-Douglas DC-9
B727	Boeing 727	MD80	McDonnell-Douglas MD-80
B737	Boeing 737	FA28	Fokker Fellowship
B757	Boeing 757	G2	Gulfstream/Amer. Gulfstream II
HS25	Hawker-Siddeley HS/DH/BH125	LR35	Gates Learjet 35
WW24	Westwind 1124	DA50	Dassault Falcon
N265	Rockwell Int'l Sabreliner (265)	C650	Cessna III

Class 3 - Large Twin-engine Propeller Aircraft

DH80	DeHavilland DASH-8	BA31	British Aerospace Jetstream 31
BE30	Beech Super King Air 300		
CV64	General Dynamics Convair 640	CV60	General Dynamics Convair 600
CV69	General Dynamics Convair	SHD6	Short 360
SW4	Swearingen Merlin (IV/Metro III)	BE20	Beech Super King Air 200

Class 4 - Single-engine and Small Twin-engine Propeller Aircraft

DC30	McDonnell-Douglass DC-3	AC68	Rockwell Int'l Super Commander
BE90	Beech King 90	PA31	Piper Navajo
C172	Cessna Skyhawk 172	C210	Cessna 210
C208	Cessna Caravan I	C310	Cessna 310
C340	Cessna 340	C402	Cessna 402
C404	Cessna Titan		

Item # in 1991 ACEP

EXHIBIT 2

POTENTIAL IMPROVEMENTS[1]

#on Fig.3

Airfield Improvements

I-1
1. Basecase 2000.
   - High speed exits on Runway 16R/34L
   - South Aviation Support Area
   - Expanded Concourse A
   - MLS
   - 34L as primary arrival runway in north flow why?
   - 16R/34L shortened by 325' off the north end → why?, to get safety area in?
   - 16L/34R shifted 300' to the south

1500'
2. 1 Class 3 & 4 Runway (16/34X) 1500' from 16L/34R
3. 2 Class 3 & 4 Runway (16/34X) 2500' from 16L/34R

2500'
4. 3 Full use Runway (16/34X) 2500' from 16L/34R with arrivals on 16L & 16X or 34R & 34X.
5. 4 Full use Runway (16/34X) 2500' from 16L/34R with arrivals on 16R & 16X or 34L & 34X.

3300'
6. 5 Full use Runway (16/34X) 3300' from 16L/34R with Precision Runway Monitor. 16R departures cross Runway 16L at threshold.
7. 6 Full use Runway (16/34X) 3300' from 16L/34R with arrivals on 16R & 16X or 34L & 34X (no PRM).
8. 7 Modified Full Use Runway (16/34X) 3300' from 16L/34R, except NO heavy aircraft on 16X/34X.

Facility & Equipment Improvements

~~9. Offset Procedures.~~

I-6
10. 8 Wake Vortex Detection and Avoidance System.

I-3
~~11. CAT I Approaches with 3 RVRs.~~

I-2?
12. 9 CAT II Approaches.
13. 10 CAT III Approaches.

~~14. Staggered Runways for Reduced Wake Vortex Thresholds Separations.~~
~~15. Converging Runway Display Aid (CRDA) for Simultaneous Converging Instrument Approaches between SEA 16L/X and Boeing Field 13R.~~

Operational Improvements

~~16. Reduce In-trail Separations in IFR to 2.0 nm.~~
17. 11 Reduce In-trail Separations in IFR to 2.5 nm.
18. FMS and GPS Approaches. 13 12

User Improvements

~~19. All Commercial Flights Capable of Operating at 300' RVR.~~
20. 14 Demand Management Strategies.

[1] Improvements will be modeled with and without interaction with Boeing Field as appropriate.

I-5, I-4 of 1991 ACEP gone from this 7/95 update

243

1600$ to 1800$ per hr typically at Sea-Tac

Figure 3. Capacity Enhancement Alternatives and Annual Delay Savings

	Estimated Annual Delay Savings[1] (In hours and millions of 19__ dollars) Baseline (345,000)	Future 1 (425,000)	Future 2 (525,000)
Airfield Improvements			
1. Class 3 & 4 Runway (16/34W) 1500' from 16L/34R	?/$?	?/$?	?/$?
2. Class 3 & 4 Runway (16/34W) 2500' from 16L/34R	?/$?	?/$?	?/$?
3. Full use Runway (16/34W) 2500' from 16/34Rwith arrivals on 16L & 16W or 34R & 34W	?/$?	?/$?	?/$?
4. Full use Runway (16/34W) 2500'from 16L34R with arrivals on 16R & 16W or 34L & 34W	9,361/$?	49,718/$?	109,840/$?
5. Full use Runway (16/34W) 3300' from 16L/34R with Precision Runway Monitor (PRM) 16R departures cross Runway 16L at threshold.	11,095/$?	58,087/$?	155,394/$?
6. Full use Runway (16/34W) 3300' from 16L/34Rwith arrivals on 16R & 16W or 34L &34W (noPRM)	?/$?	?/$?	?/$?
7. Modified Full Use Runway (16/34W) 3300' from 16L/34R, except NO heavy aircraft on 16W/34W	10,905/$?	57,318/$?	141,762/$?
Facilities and Equipment Improvements			
8. Wake Vortex Detection and Avoidance System	?/$?	?/$?	?/$?
9. CAT II Approaches	?/$?	?/$?	?/$?
10. CAT III Approaches	?/$?	?/$?	?/$?
Operational Improvements			
11. Reduce In-Trail Separations in IFR to 2.5 nm.	7,306/$?	22,406/$?	24,932/$?
12. GPS Approaches	?/$?	?/$?	?/$?
13. Flight Management System (FMS) transitions to existing approaches	*	*	*
Demand Management Strategies			
14 Even distribution of scheduled hourly ops	?/$?	?/$?	?/$?
15. P&D Daily Operations Profile ? ?	?/$?	?/$?	?/$?

*Not modeled

Savings vs Base Case Yr 2000

Delay Savings = Airline Savings - Crew Time, Fuel, Keeping the airline running

243

Avionics

Can GPS Become Even Better?

Everybody seems to like and want to use GPS. How is this highly accurate system evolving to serve even more users better?

By Hubert Thomas

IN A RECENT *R&W* survey of commercial helicopter operators, we asked "What type of helicopter equipment would you most like to have?" Usually such questions produce mixed replies, but the answer this time was surprisingly uniform. More than 63% said "GPS." No other equipment mentioned received more than a ?% response.

No doubt about it, the U.S. Department of Defense's (DoD's) satellite-based global positioning system (GPS) has caught the imagination of the rotary-wing fraternity, just as it has the rest of aviation, plus marine, rail, and road-transport operators; police, fire, and ambulance officials; surveyors; and even hikers and mountaineers.

Why is this? What makes GPS so attractive to

all these different users? How and when did this tsunami in navigation get started? And since the GPS tidal wave hasn't peaked yet, when will it strike?

The launch

To answer the historical question first, GPS was conceived in the late 1960s when the DoD decided that its future navigation system had to provide highly accurate positioning everywhere on earth, 24 hours a day, 365 days a year, in all weather and at all altitudes.

As well, its guidance signals had to be encrypted to prevent their access by "unauthorized" users, i.e. the bad guys. The system was to be, in Pentagonese, a "force multiplier." Is was a tall order that could not be satisfied by any system then available or being developed.

At the time, the Navy was (and still is) operating its Transit satellite navigation system, which met some of the requirements. But with just six satellites, it could only provide fixes every 30 to 60 minutes.

However, Transit pointed the way toward defining DoD's new system. Various highly classified, space-based concepts were developed under names like Timation and Project 621B. The final result was the 24-satellite GPS NAVSTAR—for NAVigation Satellite Timing And Ranging.

NAVSTAR was designed to provide two levels of accuracy: The highly accurate, encrypted Precision—or P—Code and the less precise Coarse Acquisition—or C/A—Code. The P-Code would support pinpoint military tasks like weapons delivery, while the C/A-Code would be used for general navigation by military ships, tanks, transport aircraft, and helicopters.

Civil use of the system was not considered. Civilians had Omega, Loran C, inertial, VOR/DME, and other aids. They were not expected to have either a need for, or interest in, GPS NAVSTAR.

At least, that's what DoD thought. But word soon got out into the civil community that GPS was a remarkable navaid with real benefits to specialized users like offshore exploration companies. (The benefits *must* have been real, since the earliest GPS survey receivers cost a cool $125,000 each.)

But civil use troubled DoD, especially since the supposedly less accurate C/A-Code available to civilians still yielded positions within about 80 feet (25 m), which was just too close for DoD comfort. Hence, DoD introduced Selective Availability (S/A), which would place a deliberate "dither" on the C/A-Code signals and turn their high precision into a "blur" of position roughly 1,640 feet (500 m) in radius.

(Continued on next page)

Overseas, Loran C—not GPS—gains ground

Gravitation toward the use of GPS in the United States may be displacing Loran C as the most popular navaid, but that's not the case elsewhere. For example, Europe has seen an expansion of the Loran-C radionavigation system operated for civil aviation since 1974.

The new Northwest European Loran-C System (NELS) will begin operating this spring, providing navigation coverage from the Iberian Peninsula north to Norway and including all of Great Britain. Nine new or modified stations, most with new transmitting and timing equipment installed, will form four separate Loran-C chains. The timing of station signals will be controlled by a master control station in Brest, France.

Several other systems are being considered for Europe and beyond. The Commonwealth of Independent States (CIS), which operates its own GPS through the GLONASS system, also has Loran-C expansion plans. It will be coupling its Chayka system with Loran-C chains in the Mediterranean, Baltic, and Barents sea areas. It is planning similar integration in Asia with China, Korea, and Japan.

A U.S. company—Megapulse Inc., of Bedford, MA—is supplying its Accufix 6500 transmitter for NELS under an $18-million contract awarded in 1992.

Eugene M. Brusin, of Megapulse, emphasizes that ground-based Loran C is complimentary to GPS and doesn't have to compete with it.

Combining the two systems through the use of receivers capable of processing both Loran-C and GPS signals is known to improve signal availability and accuracy of position reports. The precise accuracy of GPS is enhanced by Loran-C's precise change-of-position and velocity determinations.

The two navaids also make up for each other's deficiencies. Megapulse provides reports demonstrating that GPS performance is degraded by electromechanical interference and other factors. On the other hand, the low-frequency radio signals used by Loran C travel at different speeds over land and are disturbed by thunderstorms and precipitation static.

Compared to the Decca radionavigation system, heavily used by North Sea helicopter operators, Loran C provides better performance with fewer transmitters and costs less to operate, Megapulse argues.

There is, of course, also a politic justification to investing in Loran despite the promise of GPS. For Eu pean countries, Brusin said, Loran brings with it a sense of an indepe dent, new source for navigation ou side the U.S. budget cycle and Depar ment of Defense control of GPS. H adds, "They're a little bit hesitant abou the zigzags in the U.S. navigation sy tem."

One such maneuver led to the forma tion of NELS. The U.S. government transfer of Loran C stations to the host countries led to the 1992 agree ment by which Denmark, France, Ger many, Ireland, Norway, and th Netherlands were able to form NELS.

NELS is comprised of three new sta tions equipped by Megapulse, four sta tions modified from U.S. Coast Guard operation, and two existing stations (These were installed in 1985 for use by French navy submarines in the Bay of Biscay, according to Brusin.) The sys tem represents the latest in transmitter technology, with older tube type transmitters replaced by solid-state transmitters.

The emergence of the NELS system demonstrates that Loran C continues to be an appreciated and reliable navaid even during the emerging age of sate lite navigation.

—By Bill Carey

Not surprisingly, the early civil users protested, and since DoD was also having a hard time getting U.S. congressional approval to spend an estimated $3 billion on its own private navaid, civil GPS access was recognized. Instead of getting a go-ahead for the S/A blurring of GPS positions, DoD further agreed to reduce the C/A-Code "dither" from 80 feet to about 33 feet (100 m).

DoD's GPS budget was saved, but the writing was on the wall. Civilians were muscling in on the system.

The rest is history. Today, civil use of GPS is accelerating almost by the minute. The tidal wave is forecast for the late 1990s, after which commercial aircraft and most general aviation aircraft are expected to be GPS-equipped.

An estimated 130 U.S. and foreign companies are now directly involved in developing GPS equipment and technology applications. In most cases, their design concepts have far outraced the military's efforts, which can only move as fast as DoD's procurement bureaucracy allows.

For example, the low-cost Garmin 165 GPS receiver is FAA-approved for IFR nonprecision approaches (NPAs). This capability is still unavailable in any fielded military receiver, even those costing many times the Garmin unit's price.

Equally embarrassing to DoD, total GPS system costs have now rocketed beyond $10 billion. On top of that is an annual $500-million upkeep cost for the future life of the system.

Accurate and multiuse

Why is GPS so attractive? Simply because it works so well, everywhere. For the helicopter industry, the benefits are outstanding. Low-altitude operations are no longer hampered by the loss of VOR signals offshore or behind hills. Consistent, better-than-33-foot accuracy is available at virtually all locations, with freedom from the precipitation static which bedevils Loran-C signals on occasions.

Furthermore, FAA is actively encouraging GPS use for NPAs, with this to be followed in the future by full Category I precision approaches. (In this area, Loran C was disappointing: The promise of Loran-C NPAs was never realized, for a variety of reasons—not least of which was the arrival of GPS.)

Helicopter operators have been quick to cash in on the benefits of GPS. Notably, Erlanger Medical Center's Life Force airmedical program (Oct '94, page 20) and Petroleum Helicopters Inc. (PHI) are each certified to fly NPAs at their heliports near Chattanooga, TN, and Morgan City, LA, respectively.

Erlanger's Life Force Bell 412 lands at the hospital's helipad where a GPS nonprecision approach was recently approved by the FAA.

30, 1994. Equipped with a Garmin 165 GPS receiver, the company's Bell 412 routinely shoots coupled approaches down to a minimum descent altitude (MDA) of 532 feet (160 m) above the hospital helipad, located in what Director of Operations Dan Norman describes as "a sucker hole for weather." When FAA helicopter terminal instrument procedures (TERPS) are completed, Norman expects the MDA to go down to 350 feet (107 m) above the pad.

Does it pay off? Norman reports that prior to the NPA, patients were frequently transferred to ambulances at the Chattanooga airport for the final five-mile (8-km), 18-minute ride to the hospital. Analysis by the hospital's trauma team indicates that for 18 of the patients flown directly to the helipad using the GPS approach, the surface ambulance trip could have been, in medical parlance, "critical." With Life Force flying 1,000 missions per year, such statistics make Erlanger's GPS investment a real lifesaver.

The hospital helipad approach is fairly straightforward, flown at 70 knots and a steady 500 feet (152 m) per minute descent—roughly equivalent to a 4° glideslope, with one gentle 30° turn. Straightforward, but not easy.

"You need to have good training to shoot a GPS approach," says Norman. The helipad is also equipped with a DeVore Heli-PLASI glidepath indicator and a Navy-style "meatball" approach guidance system.

PHI's procedure near Morgan City was approved by FAA this past September. As the company's 40-ship IFR fleet becomes GPS-equipped, pilots will switch from the current special VOR approach (to a point in space about two miles [3.2 km] from the heliport) to the new GPS procedure. The GPS procedure brings them down to an MDA of 360 feet (110 m), just a half-mile from the pad.

Currently, PHI has a Garmin 165 installed in a Bell 412, and Chief Pilot/Director of Training Mike Hurst expects that fleet installation (in PHI's Sikorsky S-76s, Bell 214STs, and possibly Eurocopter BK-117s) will begin once Garmin obtains FAA approval for a receiver modification to guide offset approaches to drilling platforms in the Gulf of Mexico. Garmin expects to

forward. It is flown at 70 knots down a steady 3° descent path.

(One nice personal touch on this approach: When the five-letter waypoint designations were being assigned, Hurst inquired whether one could be named after his 5-year-old daughter Maria. Well, no, said the FAA, because Maria was already assigned to a waypoint elsewhere. But Marea was unassigned, so Hurst grabbed it and achieved navigational posterity for his daughter.)

Both Norman and Hurst were unanimous in their praise for the real encouragement and team spirit evident in the FAA personnel from all parts of the agency who were involved in their GPS procedure approvals. Particular kudos went to Program Manager Steve Hickok of FAA's Vertical Flight Program Office (ARD-30) at FAA headquarters in Washington, DC.

"FAA has been great in getting their entire team together on this," said Norman. Hurst was equally impressed, likening the process to having "layers of bureaucracy peeled away" to achieve PHI's approval in record time.

In the months ahead, expect to see GPS NPA approvals for airmedical helicopter programs at University of Wisconsin Hospital and Clinics at Madison, WI, and Mayo Clinic, in Rochester, MN, among others.

Closing in on Cat I

What about Category I precision ... down to 200 feet (61 m) and

slowly. Three stumbling blocks currently exist to obtaining FAA approval for a GPS Cat I precision approach:

- First, FAA presently requires 1,000 feet (305 m) of approach lights back from the threshold for 200-foot decision height (DH) operations. That's expensive. Raising the DH to 300 feet (91.4 m) eliminates this need, but as we've seen, a GPS NPA can already get you down to 360-foot MDA.
- Second, unlike an NPA, which can just use the "raw" signals directly from the GPS satellites, a GPS precision approach needs more-accurate signals. It requires a means to correct the effects of DoD's deliberate "dithering" of the GPS signal.

Without these corrections, the GPS "dithered" signals could shift randomly to as much as 330 feet (100 m) of either side of the approach center line and—worse—as much as 525 feet (160 m) above and below the glideslope.

Achieving this correction today means installing a *differential* ground station at or near the heliport. The ground station "knows" its precise altitude and geographic positions. Meanwhile, it receives the "raw" GPS signals, which because they are "dithered," report the station's position as different from its known position. The station continuously measures the differences and transmits accuracy corrections over a dedicated datalink to the aircraft's GPS receiver.

Several companies are developing GPS Cat I differential ground stations, estimated cost around $200,000. The first ones should be certified by the FAA by mid-1995.

The cost is an important factor. The FAA doesn't intend to install these stations nationwide to replace ILS. They must be purchased by the operator for private use only and would be certified as Special Cat I (or SCAT-I) systems.

relatively minor—is that of avionics. No FAA-approved GPS Cat I receivers are yet on the market, since the specifications for such a unit have not been defined yet. Consequently, price and delivery data are not available, although equipment is reported to be expected by late 1995 or early 1996.

Preparing for WAAS

Why doesn't the FAA want to install public-use GPS Cat I differential systems? Basically, it is because the agency views the technique as an interim solution that will be made obsolete by the upcoming arrival of the GPS Wide Area Augmentation System (WAAS).

FAA conceived WAAS as the method to augment the military-developed GPS to meet civil safety standards. When the DoD designed GPS, it didn't have civil failure-warning—or integrity—standards in mind. As the GPS system stands today, it can take up to two hours before the DoD detects some types of failures.

But the FAA requires pilots to receive rapid warnings—within 30 seconds while en route, 10 seconds during NPAs, and six seconds on a Cat I approach—when a navaid failure or out-of-tolerance condition is detected.

It is true that many GPS receivers have built-in Receiver Autonomous Integrity Monitoring (RAIM) to do this, but RAIM cannot always meet FAA's integrity criteria under all satellite constellation configurations.

Its lack of fulltime integrity prevents GPS from being certified today as a "sole means" navigation system, and limits its use to the "supplementary" category. WAAS should allow GPS to achieve sole means—or, to use the newest FAA-speak, "primary"—status.

To do this, WAAS will employ 20 or more GPS ground stations across the nation to monitor the integrity of GPS [illegible]

drift out of tolerance, the ground station will immediately detect this and transmit the information to geostationary satellites (geosat—the sort which are used for TV and other retransmission tasks and which appear to hang motionless over the equator).

The geosats will rebroadcast the failure warning back to earth on the civilian GPS frequency. The warning would automatically be received by every GPS receiver over a vast area (see illustration).

WAAS also will play a role in Cat I precision-approach operations. Like the differential ground stations described earlier, WAAS ground integrity-monitoring stations will measure differential signal corrections and broadcast these to the geosat. The geosat will then retransmit these to GPS receivers.

FAA tests have shown that Cat I accuracies (±10 feet [3.3 m] horizontal, ±six feet [20 m] vertical) can be achieved with this wide-area differential technique. This would eliminate the need, and the cost, of a large number of local differential stations.

And because the geosats will continuously transmit GPS signals, yet another benefit of WAAS is that its geosats will appear to aircraft GPS receivers as additional GPS satellites above the horizon. This is important since, even with 24 satellites, GPS still suffers from gaps in coverage at certain times and locations.

WAAS sounds like an ideal solution to qualifying GPS for Cat I operations and opening up even further use of the system. However, two outstanding questions pop up.

Will DoD permit the FAA to broadcast such high-accuracy corrections, which could be received by anyone, both friendly and unfriendly, with a GPS set? DoD is expected to announce its position this month.

And even if DoD agrees, will WAAS actually provide Cat I accuracy across the nation? Concerns remain about interference to the actual GPS signals. The signals are very low-powered and thus very vulnerable to inadvertent—or intentional—jamming.

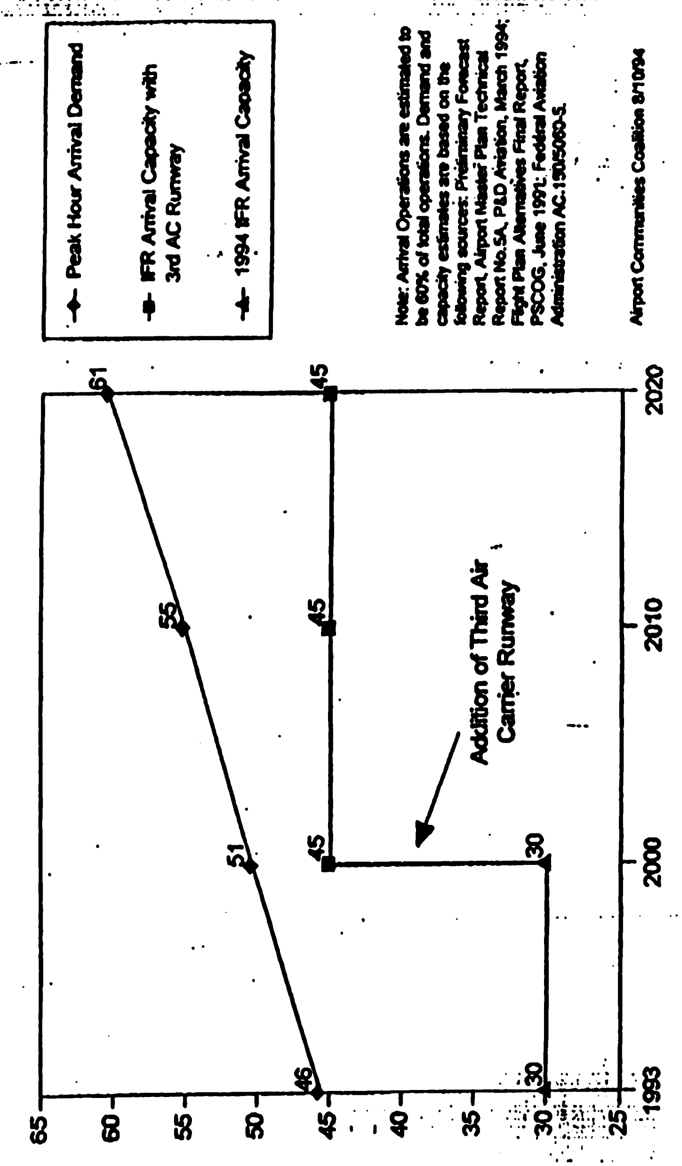
WAAS testing for U.S. Cat I verification is expected in 1997/98, but European tests indicate that no easy solution exists to this question. As a result, some U.S. experts suggest that FAA should not rush into closing down VOR/DME, Loran C, or other systems until this issue is satisfactorily resolved.

Nevertheless, GPS is here and beckoning alluringly. Like most modern high-tech conveniences, we'll all wonder one day how we were once able to get along without it.

Surf's up and that tidal wave is on its way. ■

EX. 8

Comparison of Seattle-Tacoma International Airport Forcasted Peak Hour Arrival Demand and IFR Capacity and IFR Capacity with a Third Runway



Note: Arrival Operations are estimated to be 60% of total operations. Demand and capacity estimates are based on the following sources: Preliminary Forecast Report, Airport Master Plan Technical Report No.5A, P&D Aviation, March 1994; Flight Plan Alternatives Final Report, PSCOG, June 1991; Federal Aviation Administration AC:150/5060-5.

Airport Communities Coalition 8/10/94

243

→ = to N.P. in 4/14/95 submission

SECTION III

DISCUSSION OF AIRSPACE AND
RUNWAY CAPACITY ISSUES AND ALTERNATIVES

Presented by

Gerald Bogan

1/93

243

RCAA
...gional Commission
...n Airport Affairs

801 S.W. 174th St.
Normandy Park, WA 98166
(206) 248-7603

RCAA ENDORSING ORGANIZATIONS
Airport Noise Action Council
Aircraft Noise Coalition
Aircraft Noise Group
Beverly Park Community Club
Brown's Point Improvement Club
Citizen's Ad-Hoc Committee
Citizens to Save Puget Sound
Citizens Alternatives to Sea-Tac Expansion
City of Burien
City of Des Moines
City of Normandy Park
City of Tukwila
Communities Against Noise - Beacon Hill
Friends of Lincoln Park Community Council
Greater Des Moines Chamber of Commerce
Heller Lake Community Club
The Highline Community Council
Highline Hospital District
Highline School District
Highline Community College
Hurstwood Community Club
Lakewood/Seward Park Community Club
Montlake Community Club
Mt. Baker Community Club
North Hill Community Club
Ocean View Community Beach Club
Portage Bay / Roanoke Park Community Council
Ravenna-Bryant Community Association
Redondo Community Club
Salmon Creek Community Council
Seahurst Community Club
Seattle Citizens For Quality Living
Sherwood Community Council
...ood Area Action Council
WAAR
Wesley Terrace Center
White Cen... Chamber of Commerce
Wh... ...ter Ad Hoc Committee
White Center Youth Task Force

Gerry H. Bogan, president of G. Bogan & Associates, Inc., specializes in airport planning and air traffic control. Mr. Bogan is an internationally recognized expert on aviation matters bringing 38 years of experience in the field of air traffic control to bear upon a project.

During his career with the FAA, Bogan's responsibilities included planing and budgeting the national airspace system for the Western Region; managing the enroute air traffic control facility for Southern California; and developing the noise abatement section for the Western Region.

In recent years Bogan has been involved in numerous aviation projects including:

- Feasibility study for a new airport in China
- Air traffic control needs at Jeddah Airport, Saudi Arabia
- Improvement of air traffic control aids, Republic of Indonesia
- Impact of hypersonic aircraft on air traffic control system, NASA
- Study of capacity limits of air carrier airports and airspace review for possible sites for new air carrier airport, California Department of Transportation
- Advice on expansion and noise matters, Suburban O'Hare Commission
- Part 150 Noise Compatibility Study, City of Tempe, Arizona

Mr. Bogan's aviation consulting firm is based in La Quinta, California.

G. BOGAN & ASSOCIATES, INC.
54-368 Inverness / P.O. Box 1397 / La Quinta, California 92253 / Telephone: 619-771-8400 / FAX: 619-771-1901

SEATTLE TACOMA INTERNATIONAL AIRPORT
THIRD RUNWAY PROJECT
AIR CAPACITY

I INTRODUCTION

Seattle Tacoma International airport (Sea-Tac) is the major air carrier airport in the state of Washington. Most communities in the state are reached via connecting flights through Sea-Tac.

1/ Currently air service at Sea-Tac is limited to two parallel dependent runways oriented north and south. The centerline of the runways are separated by 800 feet. Paraphrasing the Federal Aviation Administration (FAA) definition of dependent runways, they are runways separated by less than 4,300 feet and therefore, unable to accommodate instrument arrival and departure operations without considering the arrival and departure activities of the adjacent runway. Aircraft utilizing flight paths associated with dependent runways must be integrated which results in less hourly capacity than similar runways that are farther apart.

2/ Weather conditions also impact the hourly capacity of a runway. When weather conditions are clear and visibility unrestricted, arriving and departing aircraft can utilize a separation, "visual separation", which is less than that required during restricted weather conditions. In general terms, during visual weather, inflight separation is reduced to see and be seen and one runway activity at a time. As weather deteriorates, pilots are unable to operate at the minimum separation criteria for visual operations. Air traffic controllers must provide increased separation between aircraft in poor weather. This results in fewer hourly operations and a reduced airport capacity.

G. BOGAN & ASSOCIATES, INC.
54-368 Inverness / P.O. Box 1397 / La Quinta, California 92253 / Telephone: 619-771-8400 / FAX: 619-771-1901

3/ If such weather exists during peak demand periods the end result is delay to arriving and departing aircraft. When delays become unacceptable, operational and/or airport configuration changes must be made. Weather and its impact on the proposed third runway at Sea-Tac will be discussed in more detail in section III of this report.

II OPERATIONAL BENEFITS/LIMITATIONS OF THIRD RUNWAY

The proposed third runway at Sea-Tac is to be constructed west of the existing parallel runways. It is planned to be 7,000 feet in length and located 2,500 feet west and parallel to runway 16L/34R (the eastern most runway). In order to attain the optimum criteria for such a runway configuration special radar equipment must be installed and special FAA operational procedures implemented.

not in rule 5-125-c

Basic separation between arriving aircraft during instrument flight is three miles or approximately 36 arrivals per hour. This in-trail separation can be reduced to two and one half miles with the use of special radar and corresponding air traffic control procedures. When parallel runways are between 2,500 feet and 4,299 feet from each other, aircraft must also be horizontally separated by a minimum of two miles staggered separation. Again, with the use of special radar equipment and procedures the staggered separation could be reduced to one and one half miles. The diagonal separation requirement places speed and in-trail restrictions on aircraft which reduce the arrival rate and operational flexibility of dependent parallel approaches. This limits the capacity increase normally associated with two arrival streams. Therefore; a third runway at Sea-Tac, if dependent, will not provide a full runway hourly capacity increase as could be expected from an independent runway. At

1810

G. BOGAN & ASSOCIATES, INC.
54-363 Inverness / P.O. Box 1397 / La Quinta, California 92253 / Telephone: 619-771-8400 / FAX: 619-771-1901

successive arrivals for the same runway, insure staggered separation between adjacent runways, and then also provide spacing intervals between arrivals to allow for departures. It quickly becomes obvious that runways constructed less than 4,300 feet apart (dependent), do not provide the hourly capacity of independent runways. To maximize the hourly runway capacity, Sea-Tac will require additional equipment and implementation of procedures designed for dependent runway operations. The Sea-Tac runway configuration planned, i.e., all runways dependent, will not handle the number of operations forecast in future years.

Separation

The use of special equipment and procedures are not the only considerations when determining true runway capacity. An airport's actual runway capacity is dependent on weather, runway length and interaction with other runways, taxiway to runway intersecting points, separation between runways at the holding locations, fleet mix, electronic landing aids, in addition to pilot/controller skills.

At Sea-Tac, pilot and controller skills are not in question. Therefore to understand the potential runway capacity of the proposed third runway the other influencing conditions must be analyzed.

The year 2000 forecast fleet mix in the "Airfield Capacity Review Working Group Study", concludes that 95.1 % of the fleet will be able to use the planned runway for landings and 72.5 % for takeoff. The high percentage of forecast fleet mix that will be able to use the runway is misleading. True, the runway will accommodate the aircraft size that justify the high percentages identified in the study. However, to determine total airport capacity, one must consider the real operational use of the

G. BOGAN & ASSOCIATES, INC.
54-368 Inverness / P.O. Box 1397 / La Quinta, California 92253 / Telephone: 619-771-8400 / FAX: 619-771-1901

new runway during peak hour periods. It is simple to land or depart a single aircraft without consideration of other air operations. However, air traffic control consists of many simultaneous actions. The total airport configuration must be considered when allocating fleet mix to runway usage in an attempt to determine hourly capacity of an airport.

Landing aircraft must clear the 3rd runway before the next aircraft can land or depart. If the current runway 16R/34L is being used for arrivals or departures, aircraft that land on the new runway will have to hold between runways until the other traffic is clear. During rush periods there would soon be no holding area between the runways and either the new runway or the center runway will lose its desired hourly capacity.

A ground taxi problem will exist when runway 16R is used for departures. There is not enough room between the runways to hold aircraft awaiting departure. Therefore aircraft would have to hold either in the gate area or on the ramp/taxiway east of the runway complex. This type of problem will complicate and congest the use of all the runways during rush periods. Maximum runway usage can not be attained under these conditions.

Practical air traffic control logic would conclude that during peak hour periods the new runway would be best used by limiting it to the smaller aircraft. They are easier to hold between runways and can quickly cross adjacent runways between other operations. While this fleet segregation can help to attain maximum runway usage, it does depend on the availability of such type aircraft during the peak periods, and the ability to efficiently assign them to that runway. Forecasts indicate a significant reduction in the smaller commuter type aircraft.

G. BOGAN & ASSOCIATES, INC.
4-368 Inverness / P.O. Box 1397 / La Quinta, California 92253 / Telephone: 619-771-8400 / FAX: 619-771-1901

This will compound the problem of trying to segregate runway usage by aircraft size. Any time "special" actions are required air traffic control becomes more complex resulting in reduced operations, thus, less hourly capacity than expected.

Sea-Tac currently experiences delays caused by the lack of holding area between the two runways. Adding another runway holding area will compound the delay problem. without sufficient holding area will compound the delay problem.

The following is an example of the height and length of the larger aircraft that could use the proposed runway.

Boeing 737-200, 300, 400.	height 36' 6"	length 119' 6"
Boeing 767	height 52' 9"	length 180' 3"
Airbus 300, 310, 320.	height 55' 6"	length 175' 6"

During poor weather conditions all holding between runways will probably be prohibited. FAA has very strict criteria regarding holding areas that can interrupt navigational aids. Electronic navigational aids can easily become unusable if the electronic signal is subjected to reflection interference.

As stated above, it is highly unlikely that aircraft of this size could hold between the runways. Additionally, a metal surface the size of the above aircraft would certainly cause interference with electronic landing aids. An aircraft holding between runways as close as those at Sea-Tac can easily cause such signal interference. This further degrades the use of the proposed runway.

The Flight Plan Study Forecast for the year 2000 is 411,000 operations, with an average day peak month of 1243 operations. The fleet mix for that daily average is:

G. BOGAN & ASSOCIATES, INC.
54-368 Inverness / P.O. Box 1397 / La Quinta, California 92253 / Telephone: 619-771-8400 / FAX: 619-77

Aircraft class	Arr.	percent	dept.	percent	total	percent
Heavy	104	17%	105	17%	209	17%
narrow body	279	45%	279	45%	558	45%
commuter	192	31%	192	31%	384	31%
small prop.	46	3%	46	3%	92	3%
total	621	100%	622	100%	1243	100%

The Airfield Capacity Study runway utilization plan allocates the percentage of arrival and departure traffic by runway and hour as follows:

DAILY PERCENT OF ARRIVALS/DEPARTURES BY RUNWAY

VFR (visual) weather conditions south flow

Runway		Arrivals	Departures
New runway	(16W)	40 %	0 %
Runway	16R	50-55 %	10-15 %
Runway	16L	5-10 %	85-90 %

IFR weather conditions south flow

Runway	Arrivals	Departures
16W	40 %	0 %
16R	0 %	95 %
16L	60 %	5 %

VFR (visual) weather conditions north flow

Runway	Arrivals	Departures
34W	40 %	0 %
34L	50-55 %	10-15 %

G. BOGAN & ASSOCIATES, INC.
-368 Inverness / P.O. Box 1397 / La Quinta, California 92253 / Telephone: 619-771-8400 / FAX: 619-771-1901

IFR weather conditions north flow

Runway	Arrivals	Departures
34W	40 %	0 %
34L	0 %	95 %
34R	60 %	5 %

North flow has the same runway use by percentage, fleet mix, and daily/hourly operations as south flow for both VFR and IFR operations. North flow will have the same airside and landside problems that are encountered in the south flow scenarios. Therefore, for brevity this report will be primarily directed to south flow analysis.

DAILY ARRIVALS/DEPARTURES BY RUNWAY AND AIRCRAFT TYPE

VFR (visual) weather conditions south flow

Runway Used	Aircraft Operations Arrivals	Departures
16W (heavy jet)	41	0
(jet)	111	0
(commuter)	76	0
(prop)	18	0
16R (heavy jet)	52-57	10-15
(jet)	139-153	27-41
(commuter)	96-105	19-28
(prop)	23-25	4-7

G. BOGAN & ASSOCIATES, INC.
54-368 Inverness / P.O. Box 1397 / La Quinta, California 92253 / Telephone: 619-771-8400 / FAX: 619-771-1901

Runway Used	Aircraft Operations Arrivals	Departures
16L (heavy jet)	5-10	89-94
(jet)	14-28	237-251
(commuter)	10-19	163-173
(prop)	2-5	39-42
total operations (rounded)	621	622

IFR weather conditions south flow

Runway Used	Aircraft Operations Arrivals	Departures
16W (heavy jet)	42	0
(jet)	112	0
(commuter)	77	0
(prop)	5	0
16R (heavy jet)	0	98
(jet)	0	265
(commuter)	0	182
(prop)	0	44
16L (heavy jet)	62	5
(jet)	167	14
(commuter)	115	10
(prop)	28	2
total operations (rounded)	621	622

The hourly runway use breakdown that follows is a sample of two hours using the year 2000 forecast. The first sample hour

G. BOGAN & ASSOCIATES, INC.
54-368 Inverness / P.O. Box 1397 / La Quinta, California 92253 / Telephone: 619-771-8400 / FAX: 619-771-1901

is an hour at or near the airport capacity, 58 operations per hour. The second sample hour is the peak hour reported in the subject forecast.

VFR (visual) weather conditions south flow (58 operations/hr)

		air carrier hvy jet	jet	commercial	prop	total
16W	arr.	1	3	4	1	9
	dep.	0	0	0	0	0
16R	arr.	1	4	5	1	11
	dep.	1	1	1	0	3
16L	arr.	0	1	1	0	2
	dep.	5	14	10	2	31

why only 40% arrivals of total? = see p.15

IFR weather conditions south flow (58 operations/hr)

		air carrier hvy jet	jet	commercial	prop	total
16W	arr.	1	3	5	1	10
	dep.	0	0	0	0	0
16R	arr.	0	0	0	0	0
	dep.	5	15	10	2	32
16L	arr.	2	4	6	1	13
	dep.	1	1	1	0	3

— 11 —

VFR (visual) weather conditions south flow (95 operations/hr)

		air carrier hvy jet	jet	commercial	prop	total
16W	arr.	5	10	7	1	23
	dep.	0	0	0	0	0

To: Hagstrouwer, Clses From: 3-16-95 1:28pm p. 1 of 1

G. BOGAN & ASSOCIATES, INC.
54-368 Inverness / P.O. Box 1397 / La Quinta, California 92253 / Telephone: 619-771-8400 / FAX: 619-771-1901

		air carrier hvy jet	jet	commercial	prop	total
16R	arr.	6	12	8	1	27
	dep.	1	2	1	0	4
16L	arr.	1	2	2	0	5
	dep.	9	17	9	1	36

why 57% arrivals of total? = see p.18 = 55

IFR weather conditions south flow (95 operations/hr)

		air carrier hvy jet	jet	commercial	prop	total
16W	arr.	5	10	7	1	23
	dep.	0	0	0	0	0
16R	arr.	0	0	0	0	0
	dep.	9	18	10	1	38
16L	arr.	7	15	10	1	33
	dep.	1	1	1	0	3

— 11 —
— 46

The above tables identify the anticipated fleet mix, daily percent of arrivals and departures by runway, daily arrival and departure fleet mix by runway, and two sample hours of distribution of that data in both VFR and IFR conditions.

The 58 operations per hour breakdown was analyzed using prescribed arrival and departure separation standards. However, the current two runway configuration with improved electronic systems such as LDA, MLS, and state-of-the-art radar, will also satisfy the forecast demand.

243

G. BOGAN & ASSOCIATES, INC.

54-368 Inverness / P.O. Box 1397 / La Quinta, California 92253 / Telephone: 619-771-8400 / FAX: 619-771-1901

The 95 operations per hour breakdown was analyzed in the same manner as the 58 operations per hour. At peak hours and IFR weather conditions, if the 95 operations per hour forecast and proposed runway assignments are correct, a two or even three dependent runway configuration at Sea-Tac would be hard pressed to accommodate the demand without encountering excessive delays.

However, to fully understand the third runway cost v benefits equation, a comparison of peak hour demand to weather must be explored. If a portion of the restrictive weather conditions (IFR), occur during non-peak demand periods then the need for a third dependent runway to temporarily resolve capacity demand may be overstated. Under such circumstances electronic and procedural enhancements of Sea-Tac (with the current two runway configuration) could very well be the prudent answer until a complete solution to the air capacity demand problem is accomplished.

Virtually every current study that has been conducted regarding future demand at Sea-Tac has concluded that a third runway is only a stop gap improvement. The ultimate solution to the forecast passenger demand is the expanded use of existing airports or the development of a totally new regional airport site.

Boeing Field is a prime candidate for use as a commuter airport for those short haul passengers who originate or terminate their travel in the Seattle area. The Port of Seattle 1991 Airport Activity Report states that flights of 150 miles or less accounted for 38 % of all 1991 aircraft operations. A significant reduction in annual operations at Sea-Tac could be realized by increased use of Boeing Field for commuter operations.

243

G. BOGAN & ASSOCIATES, INC.

54-368 Inverness / P.O. Box 1397 / La Quinta, California 92253 / Telephone: 619-771-8400 / FAX: 619-771-1901

Arrival/missed approach conflicts between Sea-Tac and Boeing can be resolved by the use of state-of-the-art navigational equipment, radar, and corresponding air traffic control procedures.

If these assumptions are correct then the installation of such equipment and enhanced air traffic control procedures is a prudent near term solution to capacity problems. A third runway that only temporarily solves the problem is not a reasonable alternative. Instead the time and money spent on a dependent runway could be better used finding a permanent solution to the problem.

The 1991 Sea-Tac airport capacity enhancement plan identifies the savings in hours and dollars that can be realized in several scenarios including an "improvements to existing airfield" scenario. The Plan concluded that improving runway exits and taxiways, reducing in-trail spacing, installing enhanced landing aids and radar, providing a wake vortex advisory system, and refining the noise abatement effects on departures saves over 45,000 hours or $ 213 million dollars at the Future 2 forecast ...iod.

III WEATHER CONDITIONS AS JUSTIFICATION FOR A 3RD RUNWAY

Section .. detai[illegible] the fleet mix and runway use forecasts that [illegible]re being offered as justification for the construction of a third d[illegible]ndent runway [illegible] Sea-Tac. To better understand the value of such a plan, [illegible] analysis of weather conditions is necessary.

follow-up on p. 11 statement

243

...GAN & ASSOCIATES, INC. 1/93

... / P.O. Box 1397 / La Quinta, California 92253 / Telephone: 619-771-8400 / FAX: 619-771-1901

Weather as it affects Sea-Tac air operations falls into two cate... ...es, airport weather, and weather conditions beyond the imme...ate airport area. Airport weather is the weather that effects the immediate airport environs. Surrounding weather affects arrival and departure operations outside the immediate vicinity of the airport. This weather determines departure flow and the arrival rate and spacing required to separate aircraft.

Air traffic controllers must provide separation between arrivals until the pilot is clear of all clouds, sees other arrival traffic and the airport, then a "visual approach" can be conducted. When weather conditions permit, visual approach operations maximize a runways acceptance rate.

Airport weather is determined by observations from a specific ...ai...rt location. The ceiling and visibility determines whether ... or instrument flight rule conditions exist. Instrument weather conditions means that air traffic control is responsible for the separation of all air operations. IFR separation requirements mandated by Federal Air Regulations result in lower hourly capacity than the separation criteria used in visual flight operations.

Sepahn

The proposed third runway will be less than 4,300 feet from the existing runways. Prevailing weather will have a direct ...g on its use and the ultimate hourly capacity increase ...l provide over the current two runway configuration.

...tion II identified taxi and holding constraints that will be encountered during IFR weather conditions. The Sea-Tac taxi-way/ramp congestion and potential electronic interference when holding between runways will result in less capacity potential than claimed in prior studies.

243

To: Hage... Class --- From: ...-16-95 10:16am p. 1 of 1

... BOGAN & ASSOCIATES, INC.

...ness / P.O. Box 1397 / La Quinta, California 92253 / Telephone: 619-771-8400 / FAX: 619-771-1901

...lysis of available weather data indicates that about 25 ...he year IFR or marginal VFR meteorological conditions e...ist, with one third occurring during low traffic demand periods. Approximately 75 % of the year weather is good enough to allow visual approaches to the existing runways. During high demand periods if aircraft are guided through the clouds using an electronic system such as an LDA, dual arrival streams can be conducted which will increase airport capacity without having to build a third runway. During non-visual weather conditions, building an additional dependent runway, will provide little relief to the delays anticipated at Sea-Tac.

During IFR or marginal VFR weather conditions dependent runways are least productive. As previously stated, a third runway at Sea-Tac that is dependent will not provide the needed capacity during peak demand periods. Electronic equipment and ATC procedural improvements to the existing two runways will improve capacity to an acceptable level until a permanent solution is found.

what level?

Multiple consultant studies refer to the weather as VFR 1, VFR 2, IFR 1, IFR 2, and IFR 3. Federal Air Regulations identify weather in only two categories VFR and IFR. VFR weather is defined as three miles visibility or greater and a cloud ceil of one thousand feet or higher above the ground. IFR is when the visibility and or ceiling is less than that of VFR weather conditions. The type of air traffic control separation applic is based on the FAA definition of IFR and VFR weather.

Sepahn

An analysis of the Seattle weather pattern suggests that pea... hour periods can be exposed to ceilings that will require air traffic IFR separation during descent to the airport.

243

G. BOGAN & ASSOCIATES, INC.

...nverness / P.O. Box 1397 / La Quinta, California 92253 / Telephone: 619-771-8400 / FAX: 619-771-1901

When pilots encounter clouds during descent to Sea-Tac, controllers are required to provide standard IFR separation even though the airport weather is reported as VFR. To conduct visual approaches the cloud base in the arrival area (5 to 20 miles from the airport) should be 3,500 feet above the ground with visibility 4 miles or better. If the weather is less than what is required for visual approaches, a single arrival stream is required. When a single stream is necessary, by the time aircraft are clear of clouds arrival delays have already been encountered. A third runway will not prevent that delay.

no matter what the distance and in trail separation is;

I thought you could have staggered arrival streams w/ reduced separation for 3rd R

IV ALTERNATIVES TO INCREASE CAPACITY WITHOUT A 3RD RUNWAY

Section II and III conclude that an additional dependent runway at Sea-Tac will not provide enough capacity to handle the future passenger and air operations demand forecasts of the airport. The consensus of virtually all recent studies of Sea-Tac capacity agree that an additional runway is a interim fix. Expansion of other existing airports and or the development of a new regional airport must be considered if forecast demands are to be satisfied.

A. Airport and electronic aid improvements

Near term delays can be mitigated by the installation of state-of-the-art equipment at Sea-Tac using the existing two runway configuration. Following is a summary of equipment that can be used to improve efficiency and reduce delays.

not working ... MLS ... NCE/1994 and GAO/1994 report

1. Microwave Landing System. An MLS would improve efficiency at Sea-Tac. It would provide multiple arrival and departure tracks which would maximize the use of available airspace. Potential flight path conflicts between Sea-Tac and Boeing Field (BFI) would be reduced.

243

G. BOGAN & ASSOCIATES, INC.

54-368 Inverness / P.O. Box 1397 / La Quinta, California 92253 / Telephone: 619-771-8400 / FAX: 619-771-1901

2. Equip each runway end with full all weather lighting and electronic landing aids. This would allow air traffic controllers more flexibility in runway use. It allows arrivals and departures access to both runways during minimum acceptable weather conditions. All weather runway lighting will assist pilots in entering and exiting runways more quickly, thus reducing runway use time by each aircraft.

3. Install a Localizer Directional Aid (LDA) for runway 16R/34L to be used during visual approach weather conditions. This system provides the capability of two simultaneous arrival streams through the clouds. see attached ...

4. Install state-of-the-art radar systems that will allow reduced in-trail separation for arrivals, and provide the coverage required for simultaneous arrival streams between runways separated by less than 4,300 feet.

5. Install wind sheer and wake vortex systems. This would provide safety information data when minimum separation standards are being used both for arrivals and departures.

6. Minimize runway occupancy time by improving the exit taxiway system to include high speed turnoff capability plus additional mid-field turnoff locations.

No

7. Temporarily use Boeing Field as a commuter airport for short haul passengers originating/terminating in the Seattle area.

243

G. BOGAN & ASSOCIATES, INC.

54-368 Inverness / P.O. Box 1397 / La Quinta, California 92253 / Telephone: 619-771-8400 / FAX: 619-771-1901

B. Overview of FAA "Four Post Plan"

The FAA Four Post Plan was designed to increase efficiency and thus airport hourly capacity rates. The concept of having arrivals approach an airport from four directions is successfully used in many major air carrier airports throughout the United States. At Sea-Tac the Plan is designed to provide enroute arrival tracks to the NW, NE, SE, and SW corners of the terminal radar approach control area. These tracks provide maximum separation from departure tracks. With minimum track crossing; arrivals are able to approach the airport with little or no delay in descent. During visual approach weather two arrival streams can be established which are separated from each other, provide dedicated arrival flows for each runway, and produce the best arrival rate with minimum delay.

This procedure is less efficient when only one arrival stream is used. With electronic aids such as LDA that allow dual arrival paths in marginal weather conditions the Four Post Plan should provide maximum arrival capacity regardless of weather.

The Plan reduces low level holding and maneuvering. Aircraft are less exposed to conflict situations with uncontrolled aircraft in the Seattle Area.

If annual operations can be reduced through the many available alternatives to where demands during optimum weather are less than 56/hour, the 4 Post Plan might not be required, or used only during peak operational periods.

once in place, PS/FAA won't drop it

243

G. BOGAN & ASSOCIATES, INC.

54-368 Inverness / P.O. Box 1397 / La Quinta, California 92253 / Telephone: 619-771-8400 / FAX: 619-771-1901

C. Overview of the 1991 Sea-Tac Enhancement Plan

The Enhancement Plan analyzes delay situations in detail. The two runway airport capacity analysis assumes a 50%/50% of arrivals and departures. The Airfield Capacity Review Study does not support this assumption. In that Study, the year 2000 forecast busy hours are not balanced. Virtually every hour that exceeds 57 operations per hour favors either arrivals or departures. Example; the 58 operations per hour is, 23 arrivals and 35 departures. The 95 operations per hour is, 55 arrivals and 40 departures. The Enhancement Plan delay conclusions may be overstated in comparison to actual delays encountered.

same as ref. #12

The Study concludes that visual approach weather prevails approximately 75 % of the year. The cloud base is 5,000 feet or higher 56 % of the year. The cloud base is between 2,500 and 4,999 feet 19 % of the year. To fully capitalize on the 19 % visual approach weather, electronic landing aids must be added. If the Capacity Review Study forecasts are reasonable and hourly arrival and departure activities are seldom balanced, two runways will accommodate the near-term forecasts. The addition of a third dependent runway would not appreciably increase capacity.

VFR2

easier than if they were balanced 50/50

) Capacity Enhancement Study identifies numerous improvements that would reduce anticipated delays. Each improvement listed has a number of hours saved and the dollar value to that saving. The Study compares delays using 1989 (Baseline) figures. In 1989 more than 15 million passengers flew in and out of Sea-Tac and the airport recorded almost 355,000 operations. The study claims the delay experienced was 48,000 hours which represents a cost of about $ 69 million dollars.

243

G. BOGAN & ASSOCIATES, INC.
54-366 Inver...ess / P.O. Box 1397 / La Quinta, California 92253 / Telephone: 619-771-8400 / FAX: 619-771-1901

The study forecasts that when annual operations reach approximately 425,000, without airfield improvements, delays will be approximately 241,000 hours with an associated cost of $ 347 million dollars. It estimates a delay savings of almost 96,000 hours and more than $ 137 million dollars even without providing for a dual stream of arrivals using s system such as an LDA.

347
<137
211
<74

The Study forecasts additional savings of more than 51,000 hours representing $ 74 million dollars can be anticipated if an ILS and LDA system were installed.

~~More than~~ 62% of delay will be taken care of by these improvements ~~[illegible]~~ $136.

It would seem that by improving the airfield taxiway system, add electronic landing aids, vortex equipment, state-of-the-art radar, and associated improved operating techniques, Sea-Tac can function with minimal delay until a permanent sol[illegible]n can be developed. The cost of a third runway with all [illegible] and limited usefulness does not seem to be an approp[illegible]. The other recommended improvements should be the first [illegible]ity for Sea-Tac capacity enhancement, followed by a concerted effort to find and implement a permanent solution to future capacity problems.

D. Overview of the next generation electronic aids

Research and development of electronic aids that will improve airport capacity, increase safety, and provide more precise navigation capabilities is an on-going project.

FAA and the aviation industry are testing equipment and procedures that will allow landings and departures in zero visibility weather which means airports will be operational ...ost all the time regardless of weather.

243

At the present time independent runways must be laterally separated by a minimum of 4,300 feet. Tests are in progress to determine if independent operations can be conducted with runways separated by 3,500 feet and less.

The global satellite system is expected to provide precise flight track and landing guidance data that will reduce airspace congestion and reduce airborne separation standards.

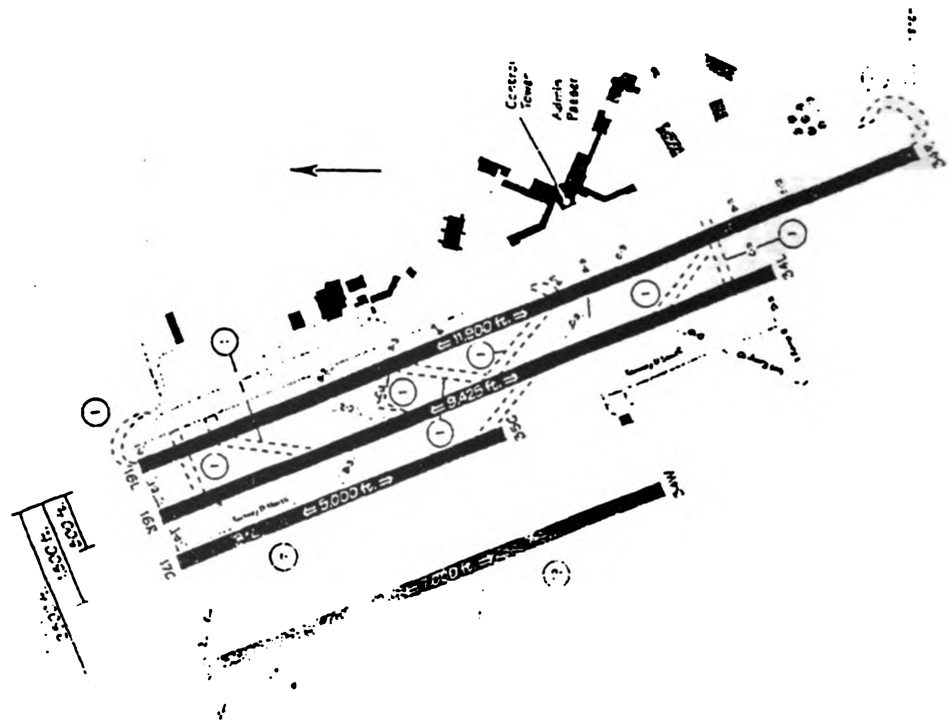
High resolution rapid update radar systems are being tested to determine the minimum safe separation spacing between aircraft.

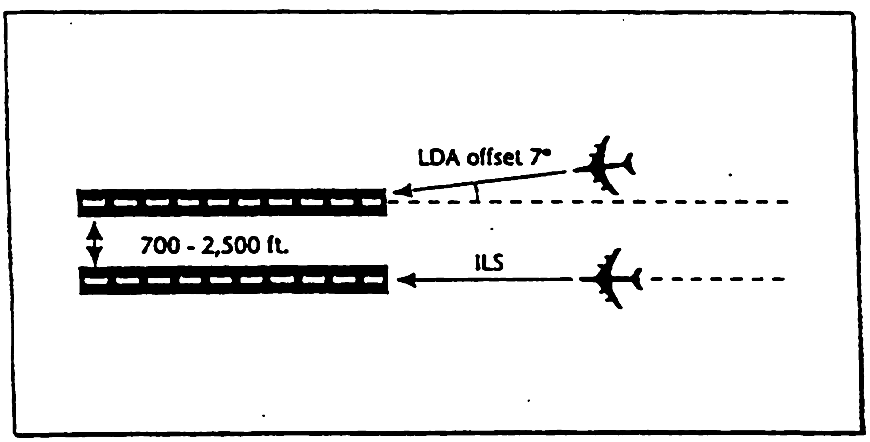
All of the above tests are expected to help reduce airspace congestion, reduce separation between aircraft, improve bad weather operations with the end result of more airport capacity with basically the same airport layout.

Sea-Tac like most other air carrier airports throughout the country have limited expansion capability. The present FAA Airport Capacity Planning Document suggests that a two dependent runway layout can accommodate approximately 275,00 to 365,000 annual operations. If the new equipment and procedures being evaluated are successful, annual operations for two dependent runways could be increased considerably.

w/poor weather

Ref. #27





Simultaneous ILS & LDA Approaches

243

243

G. BOGAN & ASSOCIATES, INC.

54-365 Inverness / P.O. Box 1397 / La Quinta, California 92253 / Telephone: 619-771-8400 / FAX: 619-771-1901

SOURCE DOCUMENTS

1. FAA AC 150/5300-13, Airport Design
2. FAA AC 150/5060-5, Airport Capacity and Delay
3. FAA Handbook 7400.2, Airspace Procedures
4. FAA National Airspace System Plan
5. DOT FAA The Future of Air Traffic Control
6. NOA Surface Weather Observations, Sea-Tac, Jan. 1992
7. Federal Air Regulation Part 91
8. Sea-Tac Tower Orders an Documents re: Arrival Acceptance Rate, Runway Use, Approach Plate Informantion, Airport Traffic Records, Strip Count Worksheets.
9. Trade and Technical Papers re: Future Guidance Systems
10. The Flight Plan Project; Final Environmental Impact Statement
11. 1991 Sea-Tac Enhancement Plan
12. Airfield Capacity Review Working Group, Sea-T Data Package 6 & p. 8
13. Airspace Study Summary Report; P & D Technologies
14. Comprehensive Planning Review Airspace Update Study; P & D Technologies
15. Sea-TAc Noise Mediation Committee, Technical Report
16. Aviation System Capacity Plan 1991-92
17. Terminal Development Plan, March 1992
18. A Critical Review of Capacity Analysis, Antis
19. Project IIb: Review of Flight Plan Demand and Capacity Analysis, R. de Neufville, August 1992
20. PSRC Public Information Documents

I have?

cc

243

Exh. 10

Northwest Mountain Regional Office
ATOMS REGIONAL DELAY REPORT
FOR: 04/12/95

AIRPORT/ARTCC CATEGORY	Z TIME	NO. OF ARRVAL DELAYS	NO. OF DEPART DELAYS	NO. OF ENROUT DELAYS	TOTAL NO. OF DELAYS	AVG DELAY TIME	MAX DELAY TIME
attle		0	31	0	31	20	35
	14:27 TO 15:19					19	26
Air Carrier $VOLUME_CAUSED--> DEPART=11		0	11	0	11		
Air Taxi THS DELAYS: 1/YVR $REASON--> Other ERN DEPART=1 $VOLUME_CAUSED--> DEPART=10		0	11	0	11		
	15:27 TO 04:25					24	35
Air Carrier THS DELAYS: 1/EWR 8/SFO		0	9	0	9		

Continued on Page 3

243

FINAL REPORT

October 19, 1992

Project Ia and Ib: The Economic and Social Importance of Air Transportation for Washington

AIRTRAC

Washington State Air Transportation Commission

DYE MANAGEMENT GROUP, INC.

In conjunction with:

Dick Conway and Associates

and

Horizon Pacific Ventures Limited

243

THE ECONOMIC AND SOCIAL IMPORTANCE OF AIR TRANSPORTATION FOR WASHINGTON

Table of Contents

THE ECONOMIC AND SOCIAL IMPORTANCE OF AIR TRANSPORTATION FOR WASHINGTON

Table of Contents
(continued)

THE ECONOMIC AND SOCIAL IMPORTANCE OF AIR TRANSPORTATION FOR WASHINGTON

Table of Contents
(continued)

46 46 46 48 57 62 67 71 71 71 74 77

APPENDICES

- Opportunities for future growth will be in industries closely dependent on air transportation. Efficient air transportation will be essential in the coming decade. Washington's economy started the 1990s with an abrupt slowdown. Slow growth is forecast over the next 25 years, averaging 1.1 percent.

EFFICIENT AIR TRANSPORTATION INFRASTRUCTURE WILL BE ESSENTIAL TO COMPETE IN A SLOW GROWTH ECONOMY

A slowing national economy will intensify the struggle for economic growth at the state level. Successful states will be those that can maintain their competitiveness in national and world markets. These states will have a high quality of life, a productive labor force, cost-effective government, and adequate infrastructure. In this environment, air transportation will play an increasingly important role in Washington's economic development. Hampered by limited opportunities at home, Washington's businesses will have to extend their reach in order to grow. Companies with northwest markets will have to move into national markets, while those with national markets will have to expand into international markets. Such a process cannot succeed without an efficient air transportation system. The need to market worldwide, to move merchandise quickly, and provide responsive customer service cannot be met without a statewide air transportation system of scheduled air service and general aviation that provides ready access to other states and countries, on-time passenger service, and sufficient cargo capacity.

Costs and Effects of Air Transportation Capacity Constraints

AIRPORTS AND REGIONS ADJUST TO THE EFFECTS OF CAPACITY CONSTRAINTS

Case study analysis centered on Boston Logan, San Francisco International, and Vancouver International airports was undertaken to identify the costs and effects of air capacity constraints and their implications for Washington. The following are the key findings in the case study areas:

1 - There are identifiable direct economic costs arising from capacity constraints. These costs are the additional operational costs incurred by airlines as a result of delay. They

also include the value of passengers' time lost due to delays. Capacity constraints generate environmental costs due to increased air quality and noise impacts.

2 - Hard evidence was not found linking delays in capacity expansion to negative effects upon regional economic development or costs of business. However, in each case study region there is an expectation that at some time in the future capacity constraints will have economic costs.

3 - Air capacity is a consideration for industrial location and expansion. However, it is one among many factors influencing economic development.

4 - Airports and airlines work around capacity constraints to increase passenger throughput. Congestion at San Francisco International has resulted in some displacement of service to other regional airports. Congestion at Boston Logan has coincided with increased service at nearby Providence Airport in Rhode Island.

5 - Airports have made specific operational adjustments in response to congestion. They are also engaged in extensive planning efforts to identify options for increasing capacity.

6 - At Vancouver International and Boston Logan the frequency of service provided by the commercial scheduled airlines is largely unaffected by the capacity constraints. Typically, if there is a market for more service it is added.

7 - The bulk of general aviation operations have been effectively relocated to other airports in the vicinity to address capacity constraints.

8 - Access to a major airport from regional areas by air does not appear to have been adversely impacted by current capacity constraints.

9 - Passengers, cargo and business people are generally more concerned about ground access than airline capacity delays.

VI. THE COSTS AND EFFECTS OF AIR TRANSPORTATION CAPACITY CONSTRAINTS

Introduction

This section examines the potential costs and effects for Washington's economy that might arise from a shortfall in air transportation capacity in central Puget Sound. Rather than attempt to "model" any economic costs arising from an air capacity shortfall, the analysis describes the expected effects of a capacity shortage and draws conclusions about their likely impacts on the wider economy.

The assessment draws on the technical analysis presented in the preceding sections of this report and from additional case study research.

The section is organized as follows:

- The nature of air transportation capacity constraints.
- Expected consequences of air capacity constraints.
- Case study analysis of the effects of capacity constraints.

The Nature of Air Capacity Constraints

Air Transportation Capacity is Not Fixed

In simplest terms air capacity constraints occur when the demand for air travel cannot be accommodated by the available airport facilities and airspace. AIRTRAC's analysis of demand and capacity (Project II) has defined air capacity as "how many aircraft operations can be

handled over a period of time."[1] This analysis also notes that air capacity could be viewed as the ability to move passengers.

For analyzing economic and social effects, what is important is the capacity of the air transportation system, air and landside, to move people and goods in a timely fashion. Typically, demand is more likely to exceed supply at peak hours and at particular times of the year such as holiday weekends. In reality, in the case of airports "capacity" is not a fixed ceiling. Many of the demand management strategies being explored nationwide are specifically designed to increase the utilization of existing airport facilities and hence increase capacity.

Nature of Capacity Constraints

As discussed in other AIRTRAC projects[2], an airport's capacity is difficult to determine because it is dependent upon many factors which are subject to change. These factors include: the mix of aircraft used, scheduling, air traffic control capacity, weather conditions - to list a few. Consequently, air transportation capacity is not a fixed ceiling. In practice, airports operate in excess of capacity.

To accommodate the demands of the business commuter or to offer better connections for passengers, airlines' flights tend to arrive and depart in batches close together. When airports are at, or close to capacity, this causes delays which tend to spread out the arrival and departure of flights by making them late. In this way airports operate at and beyond their capacity. The nature and extent of any capacity constraints in Washington will influence the costs and effects of the constraint.

The analysis of current and future capacity constraints in Washington and their implications for the efficient operation of the air transportation system are addressed in other AIRTRAC work. However, it is important for the reader to have an overview of the nature of capacity constraints when considering the costs and effects of an air capacity shortage.

The following are the types of constraints which affect the capacity of air transportation systems:

243

- **Runway and taxiway capacity.** The annual capacity of existing runways is not fixed and is subject to change. It is dependent upon air traffic control rules, weather, airport operating hours, and the type and mix of aircraft using the runway among other variables.

- **Terminal capacity.** Terminal capacity is determined by the physical constraints upon the arrival and departure of people and goods through an airport. At many airports terminal capacity is constrained by the number of gates. Again, the capacity is variable depending upon type of aircraft and scheduling among other factors.

- **Landside infrastructure capacity.** Constrained access to airports due to surface traffic congestion and other infrastructure shortfalls is an air transportation capacity constraint. Landside infrastructure capacity affects the intermodal connections that enable people, goods, and support services to access the airport. Efficient access to airports is, from the perspective of airport users, extremely important. In the case of citizens in Puget Sound, focus group analysis reported earlier, indicated that landside capacity limitations is their preeminent air transportation capacity concern.

- **Airspace capacity.** Air space capacity constraints arise from the fixed physical requirements due to safety requirements. Again, these change with the adoption of technological innovations.

- **Air traffic control center capacity.** The ability of air traffic control centers to manage air transportation demand, particularly at peak periods, is a capacity constraint. This changes over time depending upon operating rules and use of technology.

243

The Expected Consequences of Air Transportation Capacity Constraints

Why Constraints Are of Direct Economic Concern

The discussion of air transportation capacity constraints is usually in terms of delayed operations or average delay per flight. The economic effects of any future air capacity constraints in Washington will depend not just on delay but upon the extent to which a capacity shortfall impedes the efficient mobility of people and goods. From the perspective of the transportation user and provider, the concept of level of service can provide an important indicator of the efficiency of air transportation mobility.

Level of service is captured not only by delay, but also frequency of flight, ease of connections, as well as landside access and other intermodal connections. It is through adverse impacts upon the level of air transportation services due to air transportation capacity constraints that any economic costs will be experienced in Washington. Nationwide there have been few attempts to assess, much less, quantify these types of economic costs.

The following discussion highlights some of the expected direct economic consequences of air capacity constraints:

- **Delay.** Delay is the measure most commonly used to indicate whether or not demand can be met by existing capacity. Airport specific economic analyses frequently generate estimates of the direct economic costs arising from delays. Typically, economic costs are calculated by estimating the additional operating costs for the airlines (fuel consumption, equipment costs and staff costs), estimating the value of passenger time lost, and calculating other direct costs. These figures can result in quite large numbers. For example, it is estimated that the annual costs of delay at Sea-Tac by 1997 will be approximately $342 million.[3]

- **Frequency of Service.** In the current absence of demand management or slot rationing, as long as there is demand for the service, there is nothing to stop a commuter airline

1826

from adding additional service to Pullman or any other location. Therefore, a capacity constraint need not necessarily affect the frequency of service. However, capacity constraints will, as noted above, increase the costs of operating a particular flight and the length of journey time if the flight is scheduled to leave or arrive during peak periods.

- **Prices.** If the demand for airport capacity exceeds supply one would expect the price to rise. Therefore, an expected cost of capacity constraints would be an increase in the cost of air transportation. The current practices of the scheduled air carriers indicate that this would be manifested by fewer seats allocated to those with discounted coach fares. In this way, flights would be filled in the first instance by full fare paying business passengers. Consequently, passengers would be paying more irrespective of whether prices rise. This will make it harder for business and non-business travellers alike to travel on discounted fares. This increases the cost of doing business, and thus would have a negative economic impact.

As noted earlier, nationwide there is a policy trend towards using the price mechanism to manage the demand for and meet transportation infrastructure costs. In the case of air transportation, this will likely result in a future situation in which capacity constraints could influence the frequency of service. In an environment in which federal policy allows capacity constrained airports to ration access by price, long haul scheduled commercial aircraft are likely to secure access over commuter and general aviation operations. This could have a direct impact on the frequency and convenience of service between commuter destinations and also impact access from rural communities to destinations world wide.

- **Response of the Industry to the Constraint.** One of the largest determinants of the economic costs of air transportation constraints will be the reaction of the air transportation industry itself. As discussed above, the industry response would be to adjust prices. Service levels would be affected if airlines believed that the costs of

operating at a congested airport outweighed the benefits and that the service could more efficiently be provided at another less congested location.

BROADER ECONOMIC CONCERNS

The earlier sections of this report identified the important role which air transportation plays as an infrastructure facilitating economic development. Conversely, the absence of adequate air **transportation capacity will impede economic development in the state. These wider economic costs are highlighted below (as a caveat it is important to emphasize that economic costs arise from inadequate air capacity).**

- **Lost Economic Development Opportunities.** Access to the national and international **air transportation system for the movement of people and goods is an important factor** influencing the location of new and the expansion of existing businesses. However, air transportation access is just one among a number of factors influencing location. At what point air capacity constraints impede economic development is not clear. In many respects, air capacity constraints could be viewed as the consequence of a successful economy that generates increasing demand for air transportation services.

- **Lost Opportunities for Economic Development.** Elsewhere in North America (Raleigh Durham, Dallas Fort Worth, Atlanta, the Province of Alberta, and Vancouver, British Columbia) air transportation facilities and services have been used to promote economic development. As the experience of these regions indicates, there are opportunities for increasing direct air transportation industry employment and attracting industries that place great value on air transportation.

- **Loss of Competitive Position with Other Airports and Regions.** The volume of people and goods using air transportation services in Washington has direct benefits to the state's economy as outlined in previous sections of this report. One of the long-term costs arising from air capacity constraints would be an erosion of the state's competitiveness as an international gateway and as a national entry-point to the Pacific Northwest.

However, capacity alone does not determine whether or not Washington is an international gateway. Instead, it is determined by bilateral agreements, the origin and destination market in Washington, and the national organization of the industry.

Washington is now bordered by several well-positioned, competing airports. Perhaps the greatest concern is potential competition from Portland and Vancouver, British Columbia. With respect to Portland International, the airport has ample capacity but has a much smaller origin and destination market than Washington's. Vancouver International Airport is aggressively expanding, and air transportation is being used explicitly as part of the city's economic development strategy. Portland has been selected by Delta to be its Transpacific Gateway. It is also one of the few airports on the West Coast with land available for development. Denver's new airport, which will be the largest in the world when completed, begins operation at the end of 1993. Vancouver International Airport has environmental approval for a parallel runway. As it stands now, Seattle as a West Coast international gateway is a distant fourth to Los Angeles, San Francisco and Vancouver. At the same time, longer-range aircraft like the Boeing 747-400 will allow carriers to bypass traditional West Coast gateways and fly on to dominant inland hubs: Chicago, Dallas, Minneapolis, and Atlanta to name just a few.

Case Study Analysis of the Effects of Capacity Constraints

Case studies were undertaken to provide empirical insight into the cost and effects of air transportation capacity constraints in central Puget Sound. The objective of the case study research was to draw conclusions for Washington from an assessment of the effects of the capacity constraints experienced at other particularly congested airports and regions.

The case studies focus on:

- Boston, General Edward Lawrence Logan International Airport (Boston Logan),

- San Francisco International Airport, and
- Vancouver International Airport, British Columbia.

The results are drawn from secondary materials collected in the different regions and from a series of telephone interviews with airport managers, industry representatives, and business and citizen interests. Appendix C outlines the case study selection criteria, the approach, and provides a listing of the individuals and organizations contacted.

Exec Summary

BOSTON LOGAN CASE STUDY

Key Findings

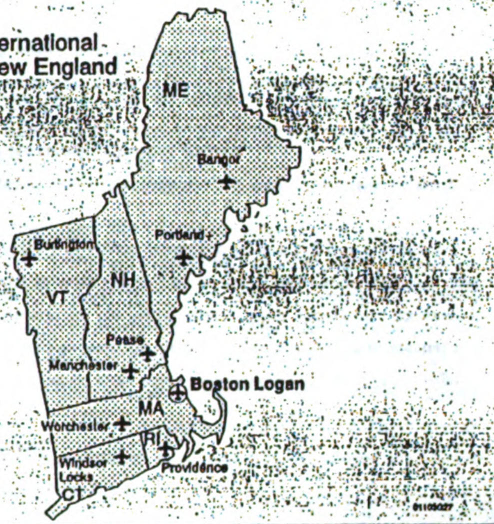
- NA 9 There is strong indication that passengers are more concerned about ground access to Boston Logan airport than delays caused by airside capacity constraints.
- 8 Other regional airports, such as Manchester or Providence, have grown in recent years as Boston Logan has become congested. This is due to growth in the areas surrounding these airports, and difficulties of accessing Boston Logan by surface transportation.
- 6 8 Despite stagnant passenger growth and congestion, there has been a significant increase in commuter flights at Boston Logan.
- 4 Access problems at Boston Logan, delays, and the availability of service from other airports have led potential passengers from outlying areas to use alternate airports. It should be noted that only 20 percent of Boston Logan's passengers come from outlying areas.
- 2 No hard evidence was found to indicate that current delays have had a negative impact on New England's economy. However, there is a concern that they will in the future.

BOSTON LOGAN INTERNATIONAL AIRPORT AND AIR TRANSPORTATION IN NEW ENGLAND

Boston Logan International Airport is the major regional airport in New England. It is primarily an airport serving origin and destination travel. Only 11 percent of passengers are on connecting flights.[3]

Since deregulation, a number of other air carrier airports in the region, Portland, Bangor, Manchester, Worchester, Windsor Locks/Bradley, Providence, and Burlington have grown rapidly. The location of major airports in New England is shown in Exhibit VI-1.

Exhibit VI-1:
Boston Logan International Airport and the New England Region



Despite their recent growth other airports still provide only very limited access to the region. Together, these airports serve about 30 percent of the regional demand for commercial scheduled air services.[4]

In 1991, Boston Logan airport served over 22 million passengers, an increase of about 40 percent since 1982. Passenger numbers stagnated in the late 1980s due to the recession in the regional economy. Over the past decade, Boston Logan has experienced an increase of almost 60 percent in air cargo. In the late 1980s air cargo growth halted due to the downturn in the region's economy.

Like Sea-Tac, a high proportion of operations at Boston Logan airport are commuter flights, some 36 percent in recent years. The high proportion of commuter flights, which has increased significantly in recent years has led to an increase in the number of operations although the number of passengers has remained constant. An indication of the importance of the commuter market is that Business Express, the largest commuter carrier serving Boston Logan, carries out 50 percent more operations than the largest national carrier.

General Aviation. General aviation activity at Boston Logan comprises about five percent of operations. Hanscom Field, Massport's general aviation airport, handles most general aviation demand and serves the needs of private and corporate aircraft.

EFFECTS OF CAPACITY CONSTRAINTS ON THE AIR TRANSPORTATION SYSTEM

Boston Logan has a relatively severe capacity constraint. The airport is one of 23 airports in the nation exceeding 20,000 hours of airline flight delay in 1991. Since 1986, 4.4 percent of all flights at Logan airport were delayed for 15 minutes or more. Like many other airports, Boston Logan airport experiences severe delays under adverse weather conditions requiring Instrument Flight Rules (IFR). IFR conditions reduce the runway capacity for arrivals to one aircraft at a time. Boston Logan airport operates under IFR conditions 10 to 15 percent of the time.

The Nature of the Capacity Constraints

Physical Constraints. The airport is located three miles from downtown Boston at the edge of Boston Harbor on infill. It is surrounded by water on three sides and borders the residential and commercial community of East Boston on the fourth side. Since the 1970s, community sensitivity to noise and the inability to make changes on the coastline without enabling state legislation have prevented any expansion of airside capacity at Boston Logan International.

Airside Constraints. Adverse weather and wind conditions can reduce the airside capacity of the airport to about 50 percent of the current peak-hour demand.

Landside Constraints. Boston Logan faces a serious ground access problem, impacting both passengers and cargo. Ground access problems are exacerbated because the airport is surrounded by water.

Future Constraints. Currently, Boston Logan faces delays during peak hours and under adverse weather or wind conditions. Present demand levels allow the airport to dissolve backups without seriously impacting flights scheduled outside of the peak periods. There is growing concern that Boston Logan may be unable to meet demand for passenger services at some point after the year 2000. A study conducted by the New England Council in 1990 has identified a potential shortfall of between 8 and 19 million passengers by the year 2010, and that at least 15 percent of the expected demand would be unmet.

Response of the Air Transportation System

Airports. After failed efforts to improve airside capacity through runway expansion in the 1970s and a landing fee program in the mid-eighties, Boston Logan airport is concentrating its efforts on improving the landside capacity. To help address landside constraints, current plans for improvement to the ground access at Boston Logan involve construction of a third tunnel. However, this may reduce the amount of land available for cargo operations on site. Land availability is a limiting factor for cargo operations, and there is concern that the future cargo

handling capacity of the airport will not meet future demand. One study argues that up to 60 percent of the air cargo demand at Boston Logan may not be met in 2010.[5]

Currently, Boston Logan is in the process of instituting LAMP, Logan's Airport Modernization Program in response to capacity constraints. This program assumes that passenger growth on the airside will be accommodated through the use of larger aircraft, a reduction in the proportion of operations by smaller commuter aircraft, flattening demand peaks, and progress in air traffic control technology.[6] As part of the program, there are planned improvements to landside capacity and ground access to the airport through: construction of a third tunnel, renovation and expansion of gate capacity, improvements in the processing capacity of international passengers, and a variety of other structural improvements.

Other airports in the region have grown rapidly in recent years and increased both passenger and carrier operations. Several airports, including Bradley, Manchester, Pease (a former air force base), and Worchester are in the process of expanding their landside capacities or are planning to do so. All existing airports are limited in their ability to expand their operations because of constraints in their ability to expand airside capacity.

Attempted Demand Management. In the 1980s demand management was introduced at Boston Logan in an effort to reduce the high proportion of commuter and general aviation aircraft. The demand management initiative was known as the Program for Airport Capacity Efficiency (PACE). The planned demand management program had two phases:

- In the first phase, the airport established a landing fee based on a combination of operations and weight.
- The second phase consisted of a peak-based fee.

Boston Logan was taken to court by general aviation and business interests over PACE and won the case. However, the United States Department of Transportation (USDOT), required Boston

Logan to remove the operation based fee in order not to lose their Airport Improvement Program entitlement. At the same time, USDOT encouraged Boston Logan to look into a peak-hour based fee. The USDOT have since drafted guidelines regarding peak-hour based landing fees. The guidelines are currently under review by the Office of Management and Budget (OMB). Boston Logan representatives are currently awaiting their decision. If peak based landing fees are authorized, they will most likely be used as part of a strategy to address the delays arising from capacity constraints.

Many in the business community believed that PACE would be detrimental to economic development, especially those outside the Boston metropolitan area. In contrast, airport representatives did not expect any adverse impacts. A study commissioned by the airport before the implementation of PACE predicted that no market would lose service and that only marginal flights in markets with high service levels would be eliminated.[7] An airport official confirmed that during the nine months in which the program was actually in place, only marginal flights were lost. A representative of Banger Airport believed that Bangor passengers, using Boston Logan as a hub, lost commute service as a result of PACE.

Passengers. Passengers using Boston Logan have experienced delays for the last 20 years, as have many airports on the east coast. The delays for passengers are inconvenient, according to an airport official, but do not result in missed flights, this is because Logan service is mainly origin and destination travel. Passengers are accustomed to the delays, they absorb the cost, and consider the potential for delay in their choice of flight. Ground access to the airport, however, is a major concern for passengers. Passengers from outlying areas who would have accessed the airport by car are now beginning to use other airports in the region, such as Manchester or Providence. This tendency has been accentuated by an increase in service at other airports and increasing ground access problems at Boston Logan.

Effects on Airlines. Despite increasing delay problems, the number of flights scheduled at Boston Logan has increased in recent years. Airlines continue to focus their activities on Boston Logan and schedule flights despite the delays, and the costs of the delay that they incur.

The airline industry recognizes the capacity problems at Boston Logan airport and would therefore like to see a commuter runway be built. Consequently, the Air Transportation Association is currently in the process of putting together a plan for the operation of this runway that would account for community concerns. The airline representative interviewed saw neither the use of existing airports, all of which have capacity constraints preventing them from taking over a significant portion of Logan's traffic, nor the construction of a second new airport as a solution.

Effects on Cargo. Cargo operations at Boston Logan are not significantly impacted by the airside capacity constraints. According to an airport official, only the belly freight portion of the airport's cargo operations leaving during peak periods is affected by current delay. However, ground access problems are a difficulty for freight forwarders. According to an airport official and an FAA representative, all other air cargo shipments involve heavy freight or packages which are scheduled to leave outside of peak hours. Other airports in the region have significantly increased their cargo operations in recent years. This is in particular true for Manchester, Portland, and Providence.

Wider Economic Effects

Economic Impact. No hard evidence was found to conclude that current delays at Boston Logan impact New England's economy negatively. Members of the business and economic development community feel that current airport congestion does not adversely impact their economic well-being. However, there is acute concern that the projected future gap between capacity and demand will have negative implications for the future economic development.

The study prepared by the New England Council cited above makes an attempt to assess the potential economic impacts of future capacity constraints at Logan airport. A cursory estimate of the capacity gap indicates that it may produce economic losses of between $7.2 and 16.8 billion and between 54,000 and 125,000 person years of employment between 1995 and 2010. This is based on estimates of lost air transportation industry business.

San Francisco International Airport Case Study

#'s in Exec. Summary

Key Findings

4 ▪ San Francisco International airport is the dominant airport in the Bay area; however, growth around Oakland and San Jose airports has enabled these airports to increase both the size of their operations and their share of operations in the region.

4 ▪ San Francisco provides the bulk of domestic and international long distance destinations. Oakland and San Jose serve a substantial portion of the "California Corridor" market and other short distance destinations.

2 ▪ At present, existing delays and congestion at San Francisco International airport do not appear to be adversely impacting the economy in the Bay area.

2 ▪ There is a belief that in the near future capacity constraints will reach a point where they have negative economic impact on the Bay area.

4 ▪ In response to the delays caused by congestion, a small number of airlines have just started to move California Corridor and commuter shuttle service out of San Francisco International.

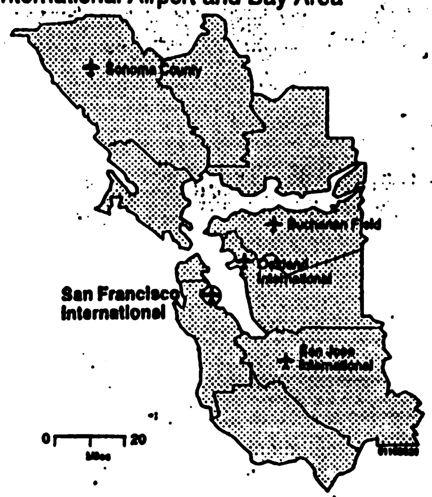
NA 9 ▪ The business community is more concerned about ground access problems than delays arising from air capacity constraints at San Francisco International.

4 ▪ In response to ground access problems at San Francisco International, passengers have started to use the other regional airports for commuter service needs.

Air Transportation in the Bay Area

San Francisco International Airport is the major commercial airport for the San Francisco Bay area and northern California. It is owned and operated by the City and County of San Francisco, and is located 14 miles south of downtown San Francisco in an unincorporated area

Exhibit VI-2:
San Francisco International Airport and Bay Area



of San Mateo County (see Exhibit VI-2). The area has access to two other commercial airports, Oakland International Airport and San Jose International Airport, as well as to two smaller airports serving both commercial and general aviation needs, Sonoma County, and Buchanan Field/Concord.

Historically, San Francisco International has been the dominant airport in the region. Airports in the region have experienced strong growth in passenger traffic over the past decade with Oakland and San Jose growing fastest. In 1970, San Francisco International's market share of the region's domestic origin and destination passengers was slightly over 90 percent, with Oakland and San Jose at six and three percent, respectively. In 1990, it served 71 percent of the region's domestic origin and destination passengers. Oakland's share was 13 percent, San Jose's 16 percent, and Buchanan Field/Concord and Sonoma County each served less than 0.5 percent of passengers.

In recent years, the Bay area has experienced a marked increase in the share of short-haul domestic flights (up to 600 miles), serving the California corridor. Oakland and San Jose serve an increasing proportion of this market. Airport representatives and the business community believe that these two airports serve distinct regional commuter markets. For the most part, the increase in the regional shares for the two airports reflects an increase in population and economic activities in the areas surrounding the two airports as opposed to competitive gains over San Francisco International.

San Francisco International has retained its regional importance for serving long-haul domestic flights, mainly the transcontinental market, and the international market for the entire region. San Francisco serves 50 percent of the region's international passengers and is the region's international gateway. Oakland and San Jose serve mostly the southern California market; 90 percent of scheduled service from Oakland is to southern California. Despite that, San Francisco still serves a large share of the short haul commuter market in the region. Oakland and San Jose provide limited international service but expect to increase service in the future.

San Francisco International is also the major cargo airport for the region. It is the sixth largest cargo airport in the U.S., although only about 10 percent of its cargo operations are cargo-only. During the last decade, air cargo tonnage at the airport increased by about 40 percent to over 580,000 metric tons in 1991. It should be noted that the increase in air cargo activity is almost exclusively due to an increase in international air cargo shipments. San Francisco currently

handles 68 percent of the air cargo in the region, Oakland 26 percent, and San Jose about six percent. While cargo operations in San Francisco concentrate on belly and to some extent on traditional air cargo, Oakland serves overnight small package cargo operations.

San Francisco International has only very limited capacity to accommodate general aviation demand. It ceased meeting general aviation needs almost a decade ago. In addition to smaller airports such as Buchanan Field/Concord and Sonoma County, Oakland and San Jose meet a portion of general aviation needs.

Effects of Capacity Constraints on the System

Nature of Capacity Constraints

Effects of Airside Capacity Constraints. San Francisco International is one of the most heavily congested airports in the nation and exceeded 20,000 annual hours of delay in 1990. In both 1985 and 1988, the average delay per operation exceeded eight minutes. As at many major airports, serious delays occur under Instrument Flight Rules conditions when the airport has to shut down dual arrivals on parallel runways and looses 50 percent of its airside capacity. This situation applies 6 to 7 percent of the time.

Effects of Physical Constraints. The location of San Francisco International not only limits the potential for airport expansion but also creates major ground access problems. San Francisco airport is situated on San Francisco Bay infill, surrounded by water, residential, and commercial development and thus cannot expand the land area it covers without Bay infill. Its location, in a densely populated large metropolitan area with limited freeway access also makes ground access a major problem for passengers.

Response of the Air Transportation System

Effects on Airports. In response to capacity constraints, San Francisco International has made a number of operational adjustments but no attempt to increase its runway capacity. Past and planned capacity improvements focus on increasing the landside capacity of the airport. Operational adjustments have involved reducing certain general aviation activities at the airport in order to make room for scheduled carrier and cargo operations.

In the last decade, landside capacity improvements included: the construction of a new north terminal, the renovation of both existing terminals to provide a total of 80 gates, with 48 of them able to serve wide-body jets. In addition, the airport expanded its parking facilities and constructed an additional passenger tunnel.

The airport's proposed master-plan attempts to address future demand for services at the airport. It calls for the construction of an additional terminal to serve international flights with 20 gates for wide-bodied planes, six gates for conventional sized planes, and a customs facility capable of handling 5,000 passengers per hour. The plan also includes a ground transportation center with parking and staging facilities and an automated people mover system to connect the terminals with the ground transportation center and remote parking facilities.

Strong opposition from the environmental community as well as the communities surrounding the airport has prevented the airport from increasing its airside capacity through an expansion of its runway facilities in the past. The current airport master-plan also reflects this reality and does not contain any physical expansion of existing runway capacity.

San Francisco airport officials also point to existing developments in the industry that, in their opinion, will help the airport to meet future demand:

- The number of airlines using the airport is declining and will continue to decline due to industry trends. (This assumption will only apply if there is no increase in hubbing activities.)

- Airlines will attempt to increase their efficiencies, reduce the number of unprofitable flights, and increase load factors.

- Airlines will move to using larger planes in particular on international flights and thus be able to serve more people with the same runway activity.

9

Effects on Passengers. Passengers are more concerned about ground access to the airport than delays at the airport itself. Despite capacity constraints, passengers prefer to use San Francisco International over regional alternatives because of the frequency of service and fare structure.

A survey of air passengers conducted regularly by San Francisco International Airport shows an overall airport rating of over four, out of five, for San Francisco during the last five years. This evidence suggests that air passengers do not perceive the delays as excessive.[1] A focus group of frequent flyers living in the Bay area conducted as part of the regional airport system plan indicates that congestion at the airport and congested ground access to the airport gives the airport a negative image. The participants were particularly concerned about congested roadways, expensive parking, and poor customer service.[9]

Capacity constraints have adversely affected San Francisco International's image among passengers in comparison to Oakland and San Jose, which are perceived as much friendlier because of their smaller size. Despite this, passengers continue to use San Francisco. The reasons for this decision lie in the higher frequency of flights available at San Francisco and in the lower prices that the larger market there offers. In addition, participants perceived ground access problems at both Oakland and San Jose as an impediment to using these alternatives as well.

Effects on Airlines. Airlines continue to provide good service into San Francisco International despite congestion. A small number of airlines have adjusted their services in response to congestion.

The airline industry considers San Francisco International as the main airport for the San Francisco region and will continue to schedule new service at that airport. There is recognition that the region's aviation system is overcrowded and not meeting current demand at San

Francisco during peak hours. In a focus group meeting, airline representatives stated problems with access, air traffic and congestion at the gates at San Francisco.

Some airlines have recently moved services elsewhere in the region in response to congestion at San Francisco. A representative from American Airlines observed that they have stopped service between San Francisco International and Los Angeles because of the congestion problems at San Francisco. This cancellation of 18 flights to Los Angeles was accommodated by increasing service from San Jose. It appears that at least one other airline is considering a similar move.

Effects on Cargo. To date, cargo has not been significantly impacted by delays at San Francisco. However, runway and ground capacity constraints preclude San Francisco International from marketing air cargo facilities. There appears to be a trend towards decentralization of cargo facilities in response to capacity constraints.

Cargo operations in the Bay area have already experienced a trend towards decentralization. This is a response to the increases in both domestic and international traffic at San Francisco International. The increasing global market for air cargo generated growth in international cargo operations in the region. Growth in cargo has been particularly strong at Oakland. Oakland actively pursues the cargo market segment and tries to attract more operations. San Jose is also attempting to gain a larger market share.

Effects on General Aviation. Most general aviation activity relocated from San Francisco International over a decade ago. Currently, it serves a limited number of general aviation operations, mostly corporate jets.

Oakland and San Jose have significant general aviation activity. San Jose is likely to start considering limiting general aviation activities by not improving or updating existing facilities. The airport has limited runway capacity, and currently 50 percent of that capacity is taken up

by general aviation activity. San Jose expects to continue to serve the general aviation market segment and has just completed construction of a corporate jet terminal.

Focus group research indicates that members of the general aviation community are concerned that future development at Oakland will displace general aviation especially for corporate jets.[9] There is clear concern that reducing general aviation capacity in the region would, over time, have a significant negative effect on the business community.

Social Impact. There is no apparent negative social impact as a result of congestion at San Francisco airport beyond increased journey times. The region is well served by the other two major commercial airports and residents of the communities surrounding these airports use them at least for short-haul flights. Despite the ground access problem and congestion at the airport itself, Bay area residents continue to use San Francisco in particular for long-haul and international flights. Presently, the higher frequency of flights to desired destinations and the lower prices San Francisco offers still offset the negative impacts of congestion at and around the airport.

Wider Economic Effects

No hard evidence was found indicating that the wider economy is adversely effected by delays at San Francisco International. Representatives of the business and economic development community who were contacted do not perceive any adverse impacts at present. There are specific concerns about ground access difficulties at the airport. There appears to be a growing sense that the gap between air transportation demand and capacity may soon reach a point where it starts to have a negative impact on the region's economy. However, no evidence has been assembled to date.

The business community in the Bay area presently believes that it receives good service from San Francisco International and the other airports in the Bay area. None of those interviewed in either air transportation industry or industry in general believed that congestion at San Francisco has had a negative impact on the economy in region. The focus of the business community's concern is on ground access to the airport for both passengers and cargo rather than on congestion at the airport itself. For that reason, there is support for a better market segmentation among the three major airports and for more decentralization of cargo operations. Thus, a movement of both cargo and passenger operations away from San Francisco with its congested ground access system is seen as economically beneficial rather than damaging.

There is concern that the potential future reduction in general aviation activity due to increased use of Oakland and San Jose by scheduled airlines will have adverse economic effects.

VANCOUVER INTERNATIONAL AIRPORT CASE STUDY

Key Findings

#-in Exec. Summary

(1) ■ There are direct costs associated with delays estimated at an average of $800,000 per month. These are borne by the air transportation industry and exclude placing a value on passengers' time.

(2) ■ No hard evidence was found of wider economic costs arising from existing delays at Vancouver International Airport on the regional economy.

(6) ■ Capacity constraints do not appear to impact the level of service. Since the mid-eighties, Vancouver International has seen a steady increase in commercial operations despite increasing levels of delay. Service to Pacific Rim countries has grown rapidly in recent years.

(8) ■ Access to communities across British Columbia has not been adversely impacted. The most rapidly growing segment of demand over the past decade has been regional and commuter service. They have grown at a rate of over 100 percent per year.

(6)(8) ■ For regional passengers, service has actually increased despite increasing delays because of the higher frequency of available flights.

243

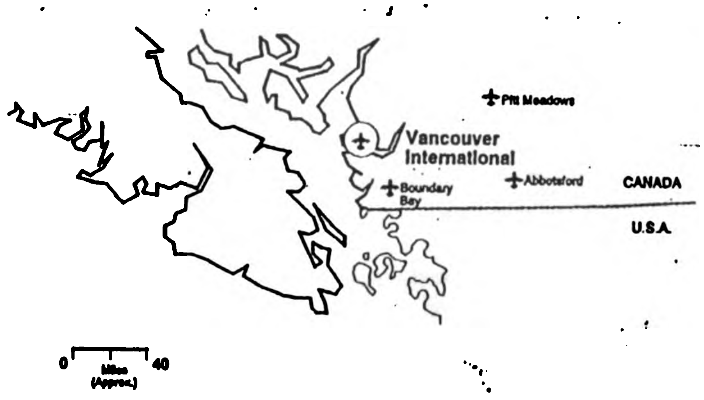
The Economic and Social Importance of
Air Transportation for Washington FINAL REPORT

(8) ■ Passengers, including those coming from outlying areas, prefer the concentration of air service at Vancouver International because it provides them with a higher frequency of service and a larger number of destinations than service split among different airports in the region. It is also more economical for the airlines.

VANCOUVER INTERNATIONAL AND BRITISH COLUMBIA'S AIR TRANSPORTATION SYSTEM

Vancouver International Airport is the major hub for British Columbia. Vancouver International is situated eight miles south of downtown Vancouver, located close to the most densely populated areas of the greater Vancouver metropolitan area. It is situated on Sea Island in the

Exhibit VI-3:
Vancouver International Airport and Region



Fraser River estuary (see Exhibit VI-3). British Columbia is served by four other airports in the Vancouver area, Boundary Bay, Pitt Meadows, Langley, and Abbotsford. General aviation activity is particularly high at Boundary Bay, it is the third busiest general aviation airport in Canada.

Vancouver International Airport is British Columbia's major airport. It is the connecting point for most major carrier operations and commuter services in British Columbia and western Canada. Vancouver International provides air service to the rest of Canada and is Canada's West Coast international gateway for scheduled service to the Pacific Rim.

In recent years, regional services have increased dramatically, rising by about 100 percent per year. In addition, service to Pacific Rim countries has grown significantly. Operations at Vancouver International increased by almost 50 percent, between 1984 and 1989, despite an economic downturn in the early eighties. Between 1977 and 1989, the number of passengers served by the airport increased by 80 percent to over nine million passengers per year.[10]

During the 1980s, both the number and the composition of operations at Vancouver International changed dramatically. In particular, the airport experienced an over 300 percent increase in turbo-prop aircraft in the mid-eighties, reflecting a trend to smaller aircraft and more frequent regional service. Vancouver International has a diversity of scheduled and general aviation operations. Corporate and private aircraft accounted for 12 percent of all movements in 1988.

Vancouver International plays an important role in providing cargo services for the region. Currently, it handles about 140,000 tons per year. Eighty to 90 percent of all cargo leaving Vancouver International is belly freight.[11]

Effects of Capacity Constraints on the Air Transportation System

The Nature of the Capacity Constraints

Growth in Demand. Vancouver International experiences delays because demand exceeds runway capacity. The main factors generating delays are increasing traffic volumes, in particular on regional and Pacific Rim routes and a diverse mix of aircraft rather than adverse

243

The Economic and Social Importance of
Air Transportation for Washington
FINAL REPORT

weather or wind conditions. Demand exceeded the operational runway capacity for the existing mix of operations at Vancouver International in 1988 by 10,000 movements, causing an estimated 40,200 hours of delay. Delays at the airport averaged 8.4 minutes. On average, 40 percent of all departures were delayed, although less than 10 percent experienced delays of more than 15 minutes.[12]

Congestion and delay at Vancouver International to a large extent is a result of increases in demand and the wide range of aircraft sizes using the airport. While weather and wind-related delays occur, they do not explain the sustained level of congestion at the airport. Instrument Flight Rules conditions exist at Vancouver International about 6.5 percent of the time.

The airport currently does not experience major landside constraints, although there is some congestion on the road system accessing the airport and some international passengers may experience delays at customs facilities.

Estimated Direct Cost of Delays. The costs of delay incurred by operators in 1988 were estimated at $800,000 per month. These estimates account for additional operating costs but do not include the estimated value of passengers' time.

Future Constraints. Demand at Vancouver International is projected to increase to 360,000 annual runway movements by the mid 1990s, while capacity, currently at 285,000 movements, is expected to decline to 265,000 movements. The estimated decline is due to an increased proportion of large carriers in the mix of operations.[13] A change in the number of major airlines serving the airport (for example, the proposed merger of Air Canada and Canada International Airlines) could reduce demand for runway capacity, and thus delays, significantly.

large aircraft increased capacity at SFO!! (p.90)

Response of the Air Transportation System

Airports. Vancouver International has moved most general aviation activity to another airport and instituted an Airside Capacity Enhancement Project (ACE) to address delays. Based on analysis conducted as part of ACE, an additional runway, capable of accommodating independent jet operations, is likely to be built. Operational changes at the airside of the airport have already increased capacity by eight percent. A future peak-hour landing fee is being considered.

A 1981 master-plan for Vancouver International, recommended the opening of Boundary Bay Airport to increase the region's capacity for general aviation operations. As a result, the airport was reactivated in 1983. All flight school operations were removed from Vancouver International and are now based at Boundary Bay. Boundary Bay handles over 250,000 operations per year and is the third busiest general aviation airport in Canada.

In 1989 Vancouver International introduced a capacity improvement program which increased airside capacity by eight percent in an attempt to address the capacity problem in the short term. The program included the adoption of new procedures, taxiway improvements, and the conversion of a taxiway into a "stub" runway for departures.

In addition to these measures, the analysis suggested that a minimum landing fee be implemented in order to better distribute air traffic among the airports in the region and to build a parallel runway capable of handling large carrier operations simultaneously with the existing runway system. The airport is in the process of starting construction on the runway and on terminal facilities needed to handle the increased passenger volumes on the landside.

The Effects of Capacity Constraints on Passengers. Passenger surveys conducted at the airport do not indicate any dissatisfaction related to the delays at the airport. The increased frequencies for regional service have actually dramatically increased the level of service for these passengers despite the fact that they have caused delays at the airport. Increased service allows passengers from across British Columbia to access a larger number of domestic and international

flights. For example,the number of flights between Victoria and Vancouver has increased from one to between five and six daily flights in recent years.

The Effects of Capacity Constraints on Airlines. While airlines have pointed out the cost of delays, they have continuously expanded service in recent years despite increasing delays. It is still more cost effective for the airline industry to operate from Vancouver as major regional hub and to shuttle passengers to Vancouver to allow them access to long-distance flights than to spread operations to other airports in the region. This will likely be the case as the industry accommodates future demand as well.

The Effect of Capacity Constraints on Cargo. Cargo operations at Vancouver International are not impacted significantly by the delays occurring at the airport. This is not surprising, given that between 80 and 90 percent of cargo is belly freight. Increased service which contributes to congestion actually increases air freight available from Vancouver.

Effects on Commuter Operations. The dramatic increase in regional and commuter operations (over 300 percent since 1980) has contributed significantly to the increasing delay problems at Vancouver International. This indicates that the delay costs are still smaller than the benefits generated by the increased service volumes. Delay does increase the operational costs of the airlines, but there have been no impacts on the availability of service to communities in British Columbia.

Effects on General Aviation. At Vancouver International, general aviation activities have decreased by over 60 percent to less than 30,000 operations in 1988 since 1980. This is due to increasing delays at Vancouver International and the reopening of Boundary Bay to provide an alternative. It is expected that a future peak-hour landing fee, planned at $25, will divert 20,000 general aviation operations annually from Vancouver International to other airports in the region.

Wider Economic Effects

No hard evidence was found indicating that delays at Vancouver International Airport have had a negative impact on the economy of British Columbia to date.

In order to determine whether major airport investment addressing future capacity problems is economically justified in the Lower Mainland region of British Columbia, a major economic impact and cost/benefit study for different scenarios was undertaken. The analysis did not attempt to identify the direct costs of not expanding airport capacity. The study defined the economic benefits likely to be gained from using alternative strategies to address the airside capacity constraint at Vancouver International. The economic analysis strongly supported construction of a parallel runway capable of serving heavy carrier traffic. The economic benefit from the runway construction, in conjunction with a peak-hour landing fee, was estimated at over $4 billion in present dollars.

It should be noted that observers believe that Vancouver International plays a key role in providing access to the international market. Cultivating the expansion of air transportation is part of Vancouver's economic development strategy. This relies on increasing capacity to meet future demands.

Economic Development Issues. The business community in British Columbia has expressed concerns about long delays at Vancouver International. Business travelers are aggravated by delays sometimes in excess of 1.5 hours, and by delays at other airports such as Prince George due to backups at Vancouver International. Economic development officials are not aware of business relocation decisions related to delays at Vancouver International. Pacific Rim businesses, looking for opportunities in British Columbia, widely recognize the problem. Uncertainties about the future quality of air service have been resolved by the decision to build the parallel runway.

Social Effects. Passengers from outlying areas have benefitted from increased frequencies on regional routes despite increasing delays. The increase in the use of smaller turbo-prop aircraft

instead of larger carriers has increased the frequency of service from outlying areas and created better connections to long distance flights than were available before.

Passengers from outlying areas are taking advantage of the higher service levels. The number of passengers on regional routes has increased from less than 100,000 in 1980 to almost 1.1 million in 1987.

Environmental Impact. Future delays at Vancouver International are projected to have a negative impact on air quality if the delay problem is not addressed. There is no information on the environmental impact of existing delays at Vancouver International airport. The analysis of the feasibility of the parallel runway for Vancouver International, however, included a detailed environmental impact evaluation. The environmental analysis found that the decision not to build the parallel runway would have a negative impact on air quality. The baseline scenario was projected to lead to higher levels of carbon monoxide, hydro carbon, and nitrogen oxide emission than the parallel runway scenario.

NOTES:

1. Page 6-1 Draft Final Report, Air Transportation Demand, Aviation Industry Trends and Air Capacity in Washington Through 2020, report prepared by TRA.

2. AIRTRAC's Project IIb Report, Assessment of the Flight Plan Forecasts prepared by Dr. Richard De Neufville argues that because of its very nature there is no fixed measure of capacity.

3. Federal Aviation Administration, Sea-Tac International Airport Capacity Enhancement Plan, June 1991. With no development the cost of delay at Sea-Tac is forecast to be $342 million by 1997, based on an assumption of 425,000 operations.

4. Boston Regional Airports System Study, Final Report, July 1989.

5. New England Council, Keeping New England's Economy Growing: Observations on the Emerging Crisis in Regional Air Service, Boston, October 1990.

6. New England Council, Keeping New England's Economy Growing: Observations on the Emerging Crisis in Regional Air Service, Boston, October 1990.

7. Telephone interview with Dick March, Director of Aviation Planning Massport.

8. San Francisco International Airport, Information Package, 1992.

9. Apogee Research, Regional Airport System Plan Update; Task Force - Focus Group Results, Draft Report, February 1991.

10. Vancouver International Airport Parallel Runway Project Environmental Impact Statement, Summary Reports, August 1991.

11. Phone interview with Joe Sunoma, Director of Market Research, Vancouver International Airport Authority.

12. Vancouver International Airport Airside Capacity Enhancement Project, Airside Demand/Capacity Analysis, June 1989, and James F. Hickling Management Consultants Ltd.: Vancouver International Airport Economic Analysis of Airfield Capacity Enhancement Strategies for Vancouver International Airport, March 1990.

13. Transport Canada; Vancouver International Airport Parallel Runway Project Environmental Impact, Statement, August 1990.

Exh. 12

TWENTY TWENTY

Regional Transportation Plan

REGIONAL AIRPORT SYSTEM PLAN
1988-2020
Air Transportation Element
of the Regional Transportation Plan

September 1988

PSRC Doc #88-29

Planning Tomorrow's Transportation

9/88

Resource Management

Optimization of regional air carrier capacity through resource management, with no major airport expansions. Elements to include but not be limited to:

- Use of airports outside the region, such as Olympia or Skagit Regional (Bayview), for satellite air carrier operations to the extent permitted under their currently adopted master plans.
- Use of Boeing Field to serve air carrier operations, potentially displacing some of the general aviation now served there.
- Joint management and operation of Boeing Field and Sea-Tac.
- Limited commuter service at several airports (such as the existing San Juan Airlines service to Paine Field) to the extent permitted by currently adopted master plans.
- Use of an airport outside the region, such as Grant County Airport (Moses Lake) or Portland International, as a hub for international flights, with express ground transportation or air shuttle to the central Puget Sound region.

Scope of Satellite Air Carrier Role. The term "satellite air carrier airport" generally refers to an airport that has air carrier service but operates in a subsidiary role to the area's primary air carrier airport (Sea-Tac for the central Puget Sound region). A wide spectrum of service levels can fall within the satellite role. At the lower end of the spectrum is the type of service that now exists at Paine Field in Snohomish County. San Juan Airlines provides five daily departures and arrivals with 15-passenger aircraft. This at the most could total 55,000 annual passengers (arrivals and departures) and less than 4,000 annual aircraft operations (take-offs and landings).

Paine

The satellite airport role assumed in the RASP alternatives is toward the upper end of the spectrum. It was assumed that the region could need one or two satellite air carrier airports with an ultimate capacity of 10 million annual passengers each, and approximately 150,000 - 200,000 annual operations. This represents that level of demand projected for 2020 under the high forecast scenario. It was used as the "worst case" for purposes of estimating capital costs. As a comparison, Sea-Tac's ultimate capacity under the currently adopted master plan is estimated to be 25 million annual passengers and 350,000 annual operations.

Capacity

→ has been raised to 380,000 now!!

The airports identified in the RASP as candidates for a satellite air carrier role -- Bremerton National, Paine Field, and McChord AFB -- have existing master site plans that would have to be updated and revised if the satellite role were adopted. McChord

43

Exh 12

2/16/94

DETERMINATION OF NON-SIGNIFICANCE (DNS) OF PROPOSED NON-PROJECT ACTION

SEATTLE-TACOMA INTERNATIONAL AIRPORT INTERCONNECTING TAXIWAYS RUNWAY 16R-34L FEBRUARY 15, 1994

Capacity: increased from 380,000? [illegible]

The Port of Seattle (Port) has completed a preliminary environmental analysis, including preparation of a Non-project Environmental Checklist and review of pertinent and available environmental information, for the following proposal:

PROJECT DESCRIPTION: The project involves the construction of four additional runway exit taxiways between the existing two runways at Seattle-Tacoma International Airport. The purpose of the new taxiways is to reduce delays encountered by aircraft that have landed and are taxiing to the terminal area. The availability of additional runway exit taxiways would allow shorter taxiing distances and multiple runway crossing points. Pilots would be able to decrease the use of reverse thrust in certain instances, providing a reduction in noise. Reduction of taxiing delays would also reduce the total air emissions per aircraft. More efficient runway exiting also increases the safety margin between aircraft arrivals.

Other project elements include the addition of a service/haul road between the runways to facilitate the movement of equipment and materials during construction and to provide better access to navigational aids and airfield equipment. Portions of the site would be regraded and base material added to support the new pavement and to provide appropriate slopes for runoff control. The existing airfield storm water drainage system would be extended and rerouted to serve the new taxiway layout. Some existing on-airfield navigational aids and support equipment would be relocated. New taxiway lighting, signs, and pavement markings would be provided. Electrical power would be extended to serve the new lighting. Fire hydrant lines would be relocated or extended. Exposed earth would be hydroseeded with grasses.

PROJECT LOCATION: The proposal is for the area between the two existing runways (16L/34R and 16R/34L) at Seattle-Tacoma International Airport, City of SeaTac, King County, WA (see figure 1).

LEAD AGENCY: Port of Seattle (SEPA File No. 94-04).

DETERMINATION: This environmental evaluation is being carried out pursuant to the provisions of Washington State environmental Policy Act (SEPA) under Chapter 43.21C, Revised Code of Washington (RCW), Chapter 197-11, Washington Administrative Code (WAC), and Resolution 3028, Port of Seattle SEPA Policies & Procedures. As lead agency, the Port has determined that the proposal will not have a probable significant adverse impact on the environment. Therefore, an Environmental Impact Statement (EIS) is not required under RCW 43.21C.030(2)(c).

846ie(2) - 02/15/94

243

SEATTLE-TACOMA INTERNATIONAL AIRPORT
INTERCONNECTING TAXIWAYS RUNWAY 16R-34L
'BRUARY 15, 1994

SUPPORTING INFORMATION: Information used to reach this determination, and applicable state laws and Port of Seattle policies, regulations, and procedures, are available for public review at Port of Seattle offices: (1) Engineering Department, Second Floor, Pier 69, 2711 Alaskan Way, Seattle 98121, Attention: Barbara Hinkle; and (2) Aviation Facilities and Maintenance Department, Attention: Michael Cheyne, Third Floor, Main Terminal Building, Seattle-Tacoma International Airport. Any questions relating to this determination or to the proposed action should be referred to Barbara Hinkle, Environmental Management Section, Engineering Division, Port of Seattle, P.O. Box 1209, Seattle, WA 98111, (206) 728-3193.

PUBLIC AND AGENCY COMMENT: Public and agency comments will be received until March 18, 1994. All comments submitted to the Port of Seattle will receive a prompt response. In addition, the Port of Seattle will work with the citizens and organizations who have submitted comments to attempt to resolve environmental issues or questions.

A process is provided to request a reconsideration of this SEPA determination by the Port of Seattle. Such reconsideration will be limited to environmental analysis and evaluation of feasible project alternatives. Questions relating to the reconsideration process should be referred to Barbara Hinkle, Environmental Management Section, Engineering Division, Port of Seattle, P.O. Box 1209, Seattle, WA 98111, (206) 728-3193.

The Port of Seattle encourages interested groups and individuals to comment on this proposal. In addition, a pamphlet is available which describes in detail how Port planning and decision-making take place, including how to participate. To obtain a copy of the pamphlet call 728-3193 or write to the Port's Environmental Management Section at the P.O. Box listed above.

Additional Public Notice: The Port of Seattle is seeking coverage under Washington Department of Ecology's NPDES Baseline General Permit for Storm Water Associated with Industrial Activities for this project. Any person desiring to present their views to the Department of Ecology regarding this application may do so in writing within thirty (30) days of the last date of publication of this notice. Comments shall be submitted to the Department of Ecology at the following address: Washington State Department of Ecology, Industrial Storm Water Unit, P.O. Box 47696, Mail Stop PV-11, Olympia, WA 98506-7696.

Any person interested in the Department's action on this application may notify the Department of their interest within thirty (30) days of the last date of publication of this notice.

WE Brougher

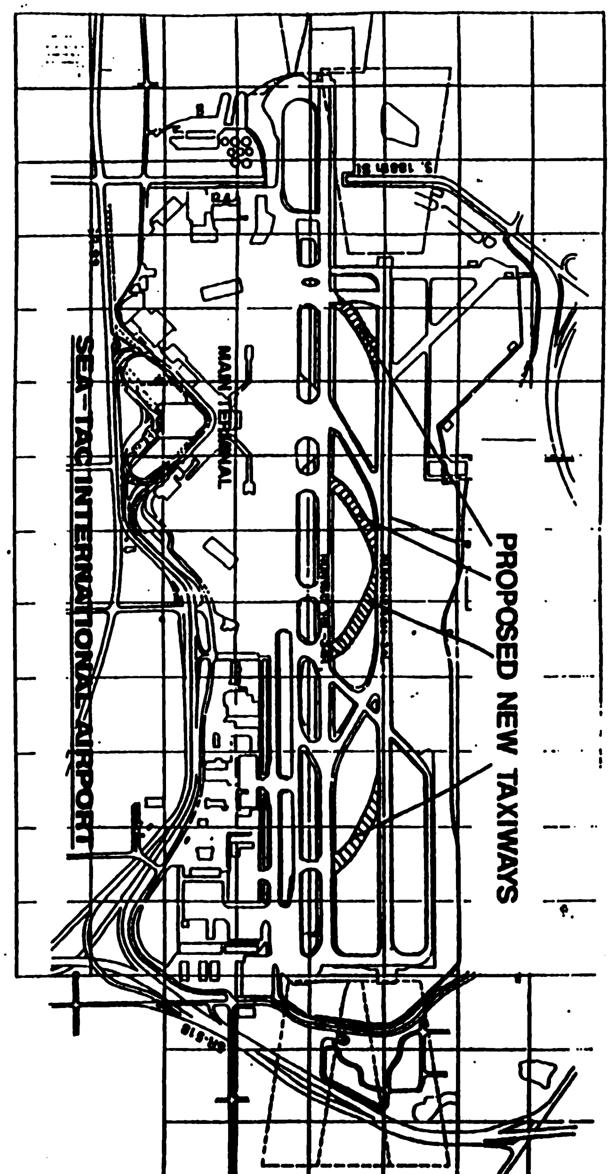
William E. Brougher
Director, Aviation Facilities and Maintenance
SEPA Responsible Official--(206) 433-4640

2/16/94
Date

8461e(3) - 02/15/94

243

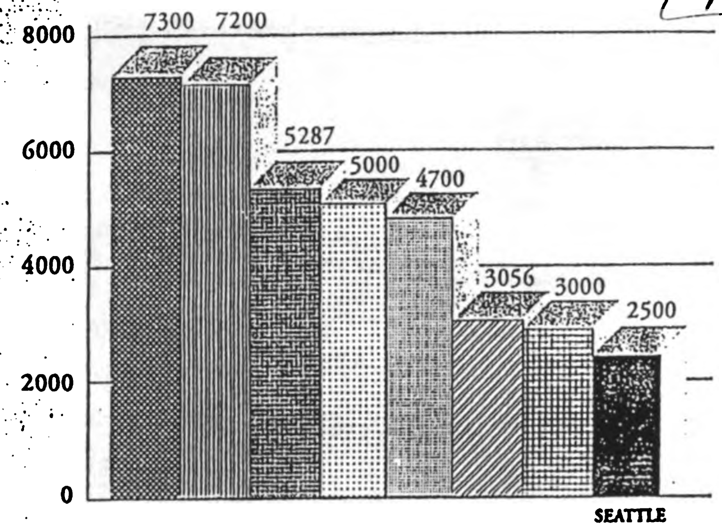
Fig. 1
(page 3)



243

Total Airport Acreage

Capacity



Airports — 1990 Operations

- Salt Lake City — 302,000 Ops
- San Francisco — 437,000 Ops
- Denver Stapleton — 475,000 Ops
- Portland, Ore. — 272,000 Ops
- Houston Int'l. — 310,000 Ops
- Detroit Met. Wayne County — 391,000 Ops
- Memphis — 330,000 Ops
- Seattle-Tacoma Int'l. — 354,000 Ops

SOURCES: U.S. Dep't of Transp., Nat'l Flight Data Center, Public Use Landing Facilities by Acreage; U.S. Dep't of Transp., Fed. Aviation Admin.: DOT/FAA/ASC-91-1, 1991-92 Aviation System Capacity Plan, Table 2-3.

AIRPORT COMMUNITIES COALITION

243

⇒ 11 POS Chrono Exh. I.

Air Transport Association OF AMERICA

Western Regional Office
6539 S. Sepulveda Blvd. · Suite 403
Los Angeles, California 90045 · 3650
Phone 310/670-5183
Fax 310/337-7325

March 29, 1994

Ms. Gina Maria Lindsey
Managing Director, Aviation Division
Port of Seattle
Seattle-Tacoma International Airport
P.O. Box 68727
Seattle, Washington 98168

Dear Ms. Lindsey:

Because of the importance of the subject matter and the ongoing dialogue concerning the third runway at SEA-TAC International, particularly with respect to its length and positioning, the ATA Air Carriers serving the Airport would like to address the various alternatives involved in this project. We understand the sensitivity of this issue and we would like to state at the outset that the information contained in this letter is provided only from a Flight Operations and Air Traffic Control viewpoint and not meant to influence or exacerbate any ongoing controversy regarding this proposed project.

From a purely operational perspective, a third runway at SEA-TAC should be a minimum of 8500 feet in length and provide the airport with the ability to conduct Instrument Approaches independent of the arrivals on the existing Runway 16L/34R. In order to accomplish this goal, we need to examine the criteria for such an operation. The present distance required for basic Simultaneous Instrument Approaches is 4300 feet between runways. Realistically, we do not expect to achieve that separation at SEA-TAC. The FAA, however, has published parameters for these approaches at 3400 feet separation when a Precision Radar Monitor (PRM) system is employed as part of the procedure and, they are studying the possibility of reducing the distance required to 3000 feet, using the same system. These tests are in progress and there are various opinions on what the final figure will be, the ongoing SEA-TAC Airport Capacity Enhancement Study, for example, is using 3300 feet for their calculations.

get copy

To put independent approaches in perspective, Seattle Air Traffic Control, in a recent conversation, quoted the instrument acceptance rate at Seattle as 36 aircraft per hour. The demand at the airport normally exceeds that capacity several hours each day. Obviously, if traffic increases as is expected and capacity remains the same, delays will escalate. Independent approaches, based on data from other airports, would probably increase the acceptance rate at SEA-TAC around 60 to 70 percent. The previously ... d Capacity Enhancement Study will address these issues in much greater detail

243

What %?

Page Two
Ms. Gina Marie Lindsey
March 28, 1994

The critical point here is that any operation conducted with less than the distances listed above will compel us to operate the runways as "dependent" which would require a staggered interval between the two arriving streams during instrument weather. This operation will increase capacity to a far less degree and certainly would not serve us well in our attempts to meet the future traffic management needs of SEA-TAC International Airport.

Since facts and figures in these matters are always open to interpretation, the sources for the information in this letter are:

1/ • SEA-TAC Airport Capacity Enhancement Plan Update

2/ • FAA Handbook 7110.65H

3/ • 1993 Aviation System Capacity Plan

Thank you for your consideration of this matter, this office remains available for any assistance or additional data we may provide.

Sincerely,

Neil F. Bennett
Regional Director

cc: ATA Member Carriers Serving Seattle-Tacoma

243

-- Exh. 15

Air Transport Association ata OF AMERICA

Western Regional Office
8939 S. Sepulveda Blvd. - Suite 408
Los Angeles, California 90045 - 3650
Phone 310/670-5183
Fax 310/337-7329

September 26, 1994

Ms. Gina Marie Lindsey
Managing Director, Aviation Division
Port of Seattle
Seattle-Tacoma International Airport
P.O. Box 68727
Seattle, Washington 98168

Dear Ms. Lindsey:

This office would like to comment, once again, on the proposed third runway at SEA-TAC.

In my first letter dated March 28, 1994, (portions of which were widely quoted out of context) I provided you with a brief analysis of the benefits of the various runway options being considered. At that time, I indicated that the 2500 foot separation option did not provide the capacity increase for the airport that other options would. This statement was based on existing FAA criteria for simultaneous, fully independent instrument approaches. After subsequent analysis and simulation, it appears that the data will not support a separation alternative beyond 2500 feet. Therefore, what appears to be the most appropriate alternative at this time is an 8500 foot runway separated from Runway 16L/34R by 2500 feet. This is a determination based on statistics developed since my last letter. These statistics have not been officially presented to the ATA Member Carriers and any endorsement of this concept is based on the verification and acceptance of that data.

We understand that this configuration will require that we conduct staggered approaches and will not provide us with the immediate ability to conduct simultaneous approaches. If, however, we factor in the costs of the 3300 foot option and the increased taxi time associated with this increased separation, 2500 foot separation becomes more logical. In accepting this concept, we are compelled to look forward to advances in technology which may eventually allow us to conduct independent approaches at SEA-TAC. The primary prospect on the horizon is Global Positioning System (GPS). The FAA is fully committed to this concept and the possibility of applying its technology to precision approaches. We will simply have to rely on the FAA to develop a procedure that can ultimately be applied at SEA-TAC. This leaves us with the issue of runway length.

243

.. PAGE.003

Ms. Gina Marie Lindsey
September 28, 1994
Page 2

This new runway, regardless of whether or not we make staggered or fully independent simultaneous approaches, will be a precision runway. Aircraft will be conducting instrument approaches to this runway, often with low cloud cover, limited visibility and wet surfaces. When the pilot, after conducting this very complex procedure, reaches the runway threshold, he should not be further burdened by limited runway length. It is very important that all concerned understand that any airline support for this configuration is based on a minimum length of 8500 feet.

As stated in my previous letter, the ATA Member Carriers serving the Seattle area are not unaware of the sensitivity of this issue. It is imperative however, that when we finally build this runway that it emerges as an operationally viable improvement to capacity and safety at Seattle-Tacoma International Airport.

Thank you for the opportunity to comment on this important issue.

Sincerely,

Neil F. Bennett
Regional Director

cc: ATA Member Carriers Serving Seattle-Tacoma

243

Exh. 16

ATOMS FOR SEATAC, 1994 SUMMARY

REASON		NON-TMS APR.	NON-TMS DEP.	TMS ARR.	TMS DEP.	TOTAL #	TOTAL %
WX	= WEATHER	543	532	643	0	1718	80%
VOL	= VOLUME	0	259	1	0	260	12%
RWY	= RUNWAY CLOSED	0	5	0	0	5	0%
EQ	= EQUIPMENT FAILURE	0	97	3	0	100	5%
OT	= OTHER	6	36	16	0	58	3%
TOTAL		549	929	663	0	2141	100%

MONTH	NON-TMS APR.	NON-TMS DEP.	TMS ARR.	TMS DEP.	TOT. #	AVE. DELAY
JAN	229	108	76	0	413	52
FEB	23	9	13	0	45	49
MAR	0	15	15	0	30	52
APR	14	86	0	0	100	41
MAY	0	76	21	0	97	41
JUN	2	94	19	0	115	22
JUL	13	189	100	0	302	33
AUG	0	12	32	0	44	43
SEP	26	191	46	0	263	29
OCT	103	81	102	0	286	37
NOV	55	13	136	0	204	38
DEC	89	55	103	0	242	36
TOTAL	549	929	663	0	2141	40

TOTAL DELAYS: 2141 OPS X 40 MIN. = 85,640 MIN./60 = 1,414 HOURS

DELAY/TOTAL OP: 85,640 MIN./348,476 TOTAL OPS = 15 SECONDS/TOTAL OPERATION

4/95; NEAIRIIPS.LTR; AIR, HP Chrono

243

SENT BY: 4-14-95 : 13:26 : ATOMS NETWORK- 91-206223191019 1/14

Exl. 16

Synetics

ATOMS
Air Traffic Operations Management
SUPPORT

FAX Cover Sheet

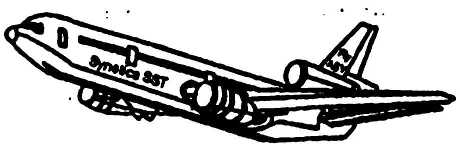
fax: (202)267-5001

To: Mr. Claes Hagestromer

From: Geoff Sellart

Pages: 14 (including cover)

Comments:



ASY-FAX2

243

SENT BY:

04/14/95

Air Traffic Operations Management System
Average Delay Time by Month
for Seattle Tacoma International

Page 1

Month	Average Delay Minutes
January	52
February	49
March	52
April	41
May	41
June	22
July	33
August	43
September	29
October	37
November	38
December	36
Average for 1994	40

SENT BY: 4-14-95 : 13:27 : ATONS NETWORK- 91-2062231910:# 4/14

243

OPSNET DELAYS
CAUSE AND CATEGORY BREAKDOWN

SEA
02/95

		AC ARR	AC DEP	AC ENR	AC_TOT	AT ARR	AT DEP	AT ENR	AT_TOT	GA ARR	GA DEP	GA ENR	GA_TOT	RI ARR	RI DEP	RI ENR	RI_TOT
NON-TMS	WX	13	8	0	21	10	0	0	10	0	1	0	1	0	0	0	0
	VOL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RWY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EQ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	OT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		13	8	0	21	10	0	0	10	0	1	0	1	0	0	0	0
TMS	WX	0	1	0	1	0	11	0	11	0	1	0	1	0	0	0	0
	VOL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RWY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EQ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	OT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		0	1	0	1	0	11	0	11	0	1	0	1	0	0	0	0
COMBINED	WX	13	9	0	22	10	11	0	21	0	2	0	2	0	0	0	0
	VOL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RWY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EQ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	OT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		13	9	0	22	10	11	0	21	0	2	0	2	0	0	0	0

ALL CATEGORIES:

	NON TMS ARR	NON TMS DEP	NON TMS ENR	NON TMS TOTAL	TMS ARR	TMS DEP	TMS ENR	TMS TOTAL	COMBINED ARR	COMBINED DEP	COMBINED ENR	COMBINED TOTAL
WX	23	9	0	32	0	13	0	13	23	22	0	45
VOL	0	0	0	0	0	0	0	0	0	0	0	0
RWY	0	0	0	0	0	0	0	0	0	0	0	0
EQ	0	0	0	0	0	0	0	0	0	0	0	0
OT	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS	23	9	0	32	0	13	0	13	23	22	0	45

1847

SENT BY: 4-14-95 : 13:26 : ATONS NETWORK- 91-2062231910:# 3/14

243

OPSNET DELAYS
CAUSE AND CATEGORY BREAKDOWN

SEA
01/95

		AC ARR	AC DEP	AC ENR	AC_TOT	AT ARR	AT DEP	AT ENR	AT_TOT	GA ARR	GA DEP	GA ENR	GA_TOT	RI ARR	RI DEP	RI ENR	RI_TOT
NON-TMS	WX	181	84	0	265	48	7	0	55	0	0	0	0	0	1	0	1
	VOL	0	12	0	12	0	4	0	4	0	0	0	0	0	0	0	0
	RWY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EQ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	OT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		181	96	0	277	48	11	0	59	0	0	0	0	0	1	0	1
TMS	WX	0	27	0	27	0	49	0	49	0	0	0	0	0	0	0	0
	VOL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RWY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EQ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	OT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		0	27	0	27	0	49	0	49	0	0	0	0	0	0	0	0
COMBINED	WX	181	111	0	292	48	56	0	104	0	0	0	0	0	1	0	1
	VOL	0	12	0	12	0	4	0	4	0	0	0	0	0	0	0	0
	RWY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EQ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	OT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		181	123	0	304	48	60	0	108	0	0	0	0	0	1	0	1

ALL CATEGORIES:

	NON TMS ARR	NON TMS DEP	NON TMS ENR	NON TMS TOTAL	TMS ARR	TMS DEP	TMS ENR	TMS TOTAL	COMBINED ARR	COMBINED DEP	COMBINED ENR	COMBINED TOTAL	
WX	229	92	0	321	0	76	0	76	229	~~[illegible]~~ 168	0	~~[illegible]~~	397
VOL	0	16	0	16	0	0	0	0	0	16	0	16	
RWY	0	0	0	0	0	0	0	0	0	0	0	0	
EQ	0	0	0	0	0	0	0	0	0	0	0	0	
OT	0	0	0	0	0	0	0	0	0	0	0	0	
TOTALS	229	108	0	337	0	76	0	76	229	~~[illegible]~~ 184	0	~~[illegible]~~	413

OPSNET DELAYS
CAUSE AND CATEGORY BREAKDOWN

SEA
04/94

		AC				AT				GA				MI			
		ARR	DEP	ENR	AC_TOT	ARR	DEP	ENR	AT_TOT	ARR	DEP	ENR	GA_TOT	ARR	DEP	ENR	MI_TOT
NON-TMS	WX	6	32	0	38	8	12	0	20	0	0	0	0	0	0	0	0
	VOL	0	17	0	17	0	9	0	9	0	0	0	0	0	0	0	0
	RWY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EQ	0	14	0	14	0	2	0	2	0	0	0	0	0	0	0	0
	OT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		6	63	0	69	8	23	0	31	0	0	0	0	0	0	0	0
TMS	WX	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	VOL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RWY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EQ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	OT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMBINED	WX	6	32	0	38	8	12	0	20	0	0	0	0	0	0	0	0
	VOL	0	17	0	17	0	9	0	9	0	0	0	0	0	0	0	0
	RWY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EQ	0	14	0	14	0	2	0	2	0	0	0	0	0	0	0	0
	OT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		6	63	0	69	8	23	0	31	0	0	0	0	0	0	0	0

ALL CATEGORIES:

	NON TMS				TMS				COMBINED			
	ARR	DEP	ENR	TOTAL	ARR	DEP	ENR	TOTAL	ARR	DEP	ENR	TOTAL
WX	14	44	0	58	0	0	0	0	14	44	0	58
VOL	0	26	0	26	0	0	0	0	0	26	0	26
RWY	0	0	0	0	0	0	0	0	0	0	0	0
EQ	0	16	0	16	0	0	0	0	0	16	0	16
OT	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS	14	86	0	100	0	0	0	0	14	86	0	100

243

1848

OPSNET DELAYS
CAUSE AND CATEGORY BREAKDOWN

SEA
03/94

		AC				AT				GA				MI			
		ARR	DEP	ENR	AC_TOT	ARR	DEP	ENR	AT_TOT	ARR	DEP	ENR	GA_TOT	ARR	DEP	ENR	MI_TOT
NON-TMS	WX	0	6	0	6	0	0	0	0	0	0	0	0	0	0	0	0
	VOL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RWY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EQ	0	5	0	5	0	4	0	4	0	0	0	0	0	0	0	0
	OT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		0	11	0	11	0	4	0	4	0	0	0	0	0	0	0	0
TMS	WX	0	7	0	7	0	8	0	8	0	0	0	0	0	0	0	0
	VOL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RWY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EQ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	OT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		0	7	0	7	0	8	0	8	0	0	0	0	0	0	0	0
COMBINED	WX	0	13	0	13	0	8	0	8	0	0	0	0	0	0	0	0
	VOL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RWY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EQ	0	5	0	5	0	4	0	4	0	0	0	0	0	0	0	0
	OT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		0	18	0	18	0	12	0	12	0	0	0	0	0	0	0	0

ALL CATEGORIES:

	NON TMS				TMS				COMBINED			
	ARR	DEP	ENR	TOTAL	ARR	DEP	ENR	TOTAL	ARR	DEP	ENR	TOTAL
WX	0	6	0	6	0	15	0	15	0	21	0	21
VOL	0	0	0	0	0	0	0	0	0	0	0	0
RWY	0	0	0	0	0	0	0	0	0	0	0	0
EQ	0	9	0	9	0	0	0	0	0	9	0	9
OT	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS	0	15	0	15	0	15	0	15	0	30	0	30

243

OPSNET DELAYS
CAUSE AND CATEGORY BREAKDOWN

SEA
06/94

		AC				AT				GA				RI			
		ARR	DEP	ENR	AC_TOT	ARR	DEP	ENR	AT_TOT	ARR	DEP	ENR	GA_TOT	ARR	DEP	ENR	RI_TOT
NON-TMS	WX	1	10	0	11	1	0	0	1	0	0	0	0	0	0	0	0
	VOL	0	57	0	57	0	8	0	8	0	1	0	1	0	0	0	0
	RWY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EQ	0	18	0	18	0	0	0	0	0	0	0	0	0	0	0	0
	OT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		1	85	0	86	1	8	0	9	0	1	0	1	0	0	0	0
TMS	WX	0	2	0	2	0	17	0	17	0	0	0	0	0	0	0	0
	VOL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RWY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EQ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	OT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		0	2	0	2	0	17	0	17	0	0	0	0	0	0	0	0
COMBINED	WX	1	12	0	13	1	17	0	18	0	0	0	0	0	0	0	0
	VOL	0	57	0	57	0	8	0	8	0	1	0	1	0	0	0	0
	RWY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EQ	0	18	0	18	0	0	0	0	0	0	0	0	0	0	0	0
	OT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		1	87	0	88	1	25	0	26	0	1	0	1	0	0	0	0

ALL CATEGORIES:

	NON TMS				TMS				COMBINED			
	ARR	DEP	ENR	TOTAL	ARR	DEP	ENR	TOTAL	ARR	DEP	ENR	TOTAL
WX	2	10	0	12	0	19	0	19	2	29	0	31
VOL	0	66	0	66	0	0	0	0	0	66	0	66
RWY	0	0	0	0	0	0	0	0	0	0	0	0
EQ	0	18	0	18	0	0	0	0	0	18	0	18
OT	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS	2	94	0	96	0	19	0	19	2	113	0	115

OPSNET DELAYS
CAUSE AND CATEGORY BREAKDOWN

SEA
05/94

		AC				AT				GA				RI			
		ARR	DEP	ENR	AC_TOT	ARR	DEP	ENR	AT_TOT	ARR	DEP	ENR	GA_TOT	ARR	DEP	ENR	RI_TOT
NON-TMS	WX	0	19	0	19	0	5	0	5	0	0	0	0	0	0	0	0
	VOL	0	17	0	17	0	3	0	3	0	0	0	0	0	0	0	0
	RWY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EQ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	OT	0	24	0	24	0	7	0	7	0	1	0	1	0	0	0	0
TOTALS		0	60	0	60	0	15	0	15	0	1	0	1	0	0	0	0
TMS	WX	0	1	0	1	0	4	0	4	0	0	0	0	0	0	0	0
	VOL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RWY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EQ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	OT	0	15	0	15	0	0	0	0	0	1	0	1	0	0	0	0
TOTALS		0	16	0	16	0	4	0	4	0	1	0	1	0	0	0	0
COMBINED	WX	0	20	0	20	0	9	0	9	0	0	0	0	0	0	0	0
	VOL	0	17	0	17	0	3	0	3	0	0	0	0	0	0	0	0
	RWY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EQ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	OT	0	39	0	39	0	7	0	7	0	2	0	2	0	0	0	0
TOTALS		0	76	0	76	0	19	0	19	0	2	0	2	0	0	0	0

ALL CATEGORIES:

	NON TMS				TMS				COMBINED			
	ARR	DEP	ENR	TOTAL	ARR	DEP	ENR	TOTAL	ARR	DEP	ENR	TOTAL
WX	0	24	0	24	0	5	0	5	0	29	0	29
VOL	0	20	0	20	0	0	0	0	0	20	0	20
RWY	0	0	0	0	0	0	0	0	0	0	0	0
EQ	0	0	0	0	0	0	0	0	0	0	0	0
OT	0	32	0	32	0	16	0	16	0	48	0	~~4~~ 48
TOTALS	0	76	0	76	0	21	0	21	0	97	0	97

OPSNET DELAYS
CAUSE AND CATEGORY BREAKDOWN

SEA
08/94

		AC ARR	AC DEP	AC ENR	AC_TOT	AT ARR	AT DEP	AT ENR	AT_TOT	GA ARR	GA DEP	GA ENR	GA_TOT	MI ARR	MI DEP	MI ENR	MI_TOT
NON-TRS	WX	0	11	0	11	0	0	0	0	0	0	0	0	0	0	0	0
	VOL	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	RWY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EQ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	OT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		0	12	0	12	0	0	0	0	0	0	0	0	0	0	0	0
TRS	WX	0	6	0	6	0	24	0	24	0	2	0	2	0	0	0	0
	VOL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RWY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EQ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	OT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		0	6	0	6	0	24	0	24	0	2	0	2	0	0	0	0
COMBINED	WX	0	17	0	17	0	24	0	24	0	2	0	2	0	0	0	0
	VOL	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	RWY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EQ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	OT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		0	18	0	18	0	24	0	24	0	2	0	2	0	0	0	0

ALL CATEGORIES:

	NON TRS ARR	NON TRS DEP	NON TRS ENR	NON TRS TOTAL	TRS ARR	TRS DEP	TRS ENR	TRS TOTAL	COMBINED ARR	COMBINED DEP	COMBINED ENR	COMBINED TOTAL
WX	0	11	0	11	0	32	0	32	0	43	0	43
VOL	0	1	0	1	0	0	0	0	0	1	0	1
RWY	0	0	0	0	0	0	0	0	0	0	0	0
EQ	0	0	0	0	0	0	0	0	0	0	0	0
OT	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS	0	12	0	12	0	32	0	32	0	44	0	44

243

1850

OPSNET DELAYS
CAUSE AND CATEGORY BREAKDOWN

SEA
07/94

		AC ARR	AC DEP	AC ENR	AC_TOT	AT ARR	AT DEP	AT ENR	AT_TOT	GA ARR	GA DEP	GA ENR	GA_TOT	MI ARR	MI DEP	MI ENR	MI_TOT
NON-TRS	WX	7	61	0	68	0	20	0	20	0	0	0	0	0	0	0	0
	VOL	0	45	0	45	0	8	0	8	0	1	0	1	0	0	0	0
	RWY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EQ	0	48	0	48	0	6	0	6	0	0	0	0	0	0	0	0
	OT	0	0	0	0	4	0	0	4	2	0	0	2	0	0	0	0
TOTALS		7	154	0	161	4	34	0	38	2	1	0	3	0	0	0	0
TRS	WX	0	44	0	44	0	56	0	56	0	0	0	0	0	0	0	0
	VOL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RWY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EQ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	OT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		0	44	0	44	0	56	0	56	0	0	0	0	0	0	0	0
COMBINED	WX	7	105	0	112	0	76	0	76	0	0	0	0	0	0	0	0
	VOL	0	45	0	45	0	8	0	8	0	1	0	1	0	0	0	0
	RWY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EQ	0	48	0	48	0	6	0	6	0	0	0	0	0	0	0	0
	OT	0	0	0	0	4	0	0	4	2	0	0	2	0	0	0	0
TOTALS		7	198	0	205	4	90	0	94	2	1	0	3	0	0	0	0

ALL CATEGORIES:

	NON TRS ARR	NON TRS DEP	NON TRS ENR	NON TRS TOTAL	TRS ARR	TRS DEP	TRS ENR	TRS TOTAL	COMBINED ARR	COMBINED DEP	COMBINED ENR	COMBINED TOTAL
WX	7	81	0	88	0	100	0	100	7	181	0	188
VOL	0	54	0	54	0	0	0	0	0	54	0	54
RWY	0	0	0	0	0	0	0	0	0	0	0	0
EQ	0	54	0	54	0	0	0	0	0	54	0	54
OT	6	0	0	6	0	0	0	0	6	0	0	~~0~~ 6
TOTALS	13	189	0	202	0	100	0	100	13	289	0	302

243

SENT BY:

OPSNET DELAYS
CAUSE AND CATEGORY BREAKDOWN

SEA
10/94

		AC ARR	AC DEP	AC ENR	AC_TOT	AT ARR	AT DEP	AT ENR	AT_TOT	GA ARR	GA DEP	GA ENR	GA_TOT	MI ARR	MI DEP	MI ENR	MI_TOT
NON-TMS	WX	72	54	0	126	31	9	0	40	0	1	0	1	0	0	0	0
	VOL	0	13	0	13	0	4	0	4	0	0	0	0	0	0	0	0
	RWY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EQ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	OT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		72	67	0	139	31	13	0	44	0	1	0	1	0	0	0	0
TMS	WX	0	25	0	25	0	76	0	76	0	1	0	1	0	0	0	0
	VOL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RWY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EQ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	OT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		0	25	0	25	0	76	0	76	0	1	0	1	0	0	0	0
COMBINED	WX	72	79	0	151	31	85	0	116	0	2	0	2	0	0	0	0
	VOL	0	13	0	13	0	4	0	4	0	0	0	0	0	0	0	0
	RWY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EQ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	OT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		72	92	0	164	31	89	0	120	0	2	0	2	0	0	0	0

ALL CATEGORIES:

	NON TMS ARR	NON TMS DEP	NON TMS ENR	NON TMS TOTAL	TMS ARR	TMS DEP	TMS ENR	TMS TOTAL	COMBINED ARR	COMBINED DEP	COMBINED ENR	COMBINED TOTAL
WX	105	64	0	167	0	102	0	102	105	166	0	269
VOL	0	17	0	17	0	0	0	0	0	17	0	17
RWY	0	0	0	0	0	0	0	0	0	0	0	0
EQ	0	0	0	0	0	0	0	0	0	0	0	0
OT	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS	105	81	0	184	0	102	0	102	105	183	0	286

243

OPSNET DELAYS
CAUSE AND CATEGORY BREAKDOWN

SEA
09/94

		AC ARR	AC DEP	AC ENR	AC_TOT	AT ARR	AT DEP	AT ENR	AT_TOT	GA ARR	GA DEP	GA ENR	GA_TOT	MI ARR	MI DEP	MI ENR	MI_TOT
NON-TMS	WX	15	142	0	157	11	32	0	43	0	2	0	2	0	0	0	0
	VOL	0	5	0	5	0	5	0	5	0	0	0	0	0	0	0	0
	RWY	0	3	0	3	0	2	0	2	0	0	0	0	0	0	0	0
	EQ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	OT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		15	150	0	165	11	39	0	50	0	2	0	2	0	0	0	0
TMS	WX	0	13	0	13	0	30	0	30	0	3	0	3	0	0	0	0
	VOL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RWY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EQ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	OT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		0	13	0	13	0	30	0	30	0	3	0	3	0	0	0	0
COMBINED	WX	15	155	0	170	11	62	0	73	0	5	0	5	0	0	0	0
	VOL	0	5	0	5	0	5	0	5	0	0	0	0	0	0	0	0
	RWY	0	3	0	3	0	2	0	2	0	0	0	0	0	0	0	0
	EQ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	OT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		15	163	0	178	11	69	0	80	0	5	0	5	0	0	0	0

ALL CATEGORIES:

	NON TMS ARR	NON TMS DEP	NON TMS ENR	NON TMS TOTAL	TMS ARR	TMS DEP	TMS ENR	TMS TOTAL	COMBINED ARR	COMBINED DEP	COMBINED ENR	COMBINED TOTAL
WX	26	176	0	202	0	46	0	46	26	222	0	248
VOL	0	10	0	10	0	0	0	0	0	10	0	10
RWY	0	5	0	5	0	0	0	0	0	5	0	5
EQ	0	0	0	0	0	0	0	0	0	0	0	0
OT	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS	26	191	0	217	0	46	0	46	26	237	0	263

243

4-14-95 ; 13:20 ; ATONS NETWORK- 91-2062231910;# 6/14

OPSNET DELAYS
CAUSE AND CATEGORY BREAKDOWN

SEA
04/94

		AC ARR	AC DEP	AC ENR	AC_TOT	AT ARR	AT DEP	AT ENR	AT_TOT	GA ARR	GA DEP	GA ENR	GA_TOT	MI ARR	MI DEP	MI ENR	MI_TOT
NON-TRS	WX	6	32	0	38	8	12	0	20	0	0	0	0	0	0	0	0
	VOL	0	17	0	17	0	9	0	9	0	0	0	0	0	0	0	0
	RWY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EQ	0	14	0	14	0	2	0	2	0	0	0	0	0	0	0	0
	OT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		6	63	0	69	8	23	0	31	0	0	0	0	0	0	0	0
TRS	WX	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	VOL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RWY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EQ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	OT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMBINED	WX	6	32	0	38	8	12	0	20	0	0	0	0	0	0	0	0
	VOL	0	17	0	17	0	9	0	9	0	0	0	0	0	0	0	0
	RWY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EQ	0	14	0	14	0	2	0	2	0	0	0	0	0	0	0	0
	OT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		6	63	0	69	8	23	0	31	0	0	0	0	0	0	0	0

ALL CATEGORIES:

	NON TRS ARR	NON TRS DEP	NON TRS ENR	NON TRS TOTAL	TRS ARR	TRS DEP	TRS ENR	TRS TOTAL	COMBINED ARR	COMBINED DEP	COMBINED ENR	COMBINED TOTAL
WX	14	44	0	58	0	0	0	0	14	44	0	58
VOL	0	26	0	26	0	0	0	0	0	26	0	26
RWY	0	0	0	0	0	0	0	0	0	0	0	0
EQ	0	16	0	16	0	0	0	0	0	16	0	16
OT	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS	14	86	0	100	0	0	0	0	14	86	0	100

SENT BY:

243

4-14-95 ; 13:20 ; ATONS NETWORK- 91-2062231910;# 6/14

OPSNET DELAYS
CAUSE AND CATEGORY BREAKDOWN

SEA
05/94

		AC ARR	AC DEP	AC ENR	AC_TOT	AT ARR	AT DEP	AT ENR	AT_TOT	GA ARR	GA DEP	GA ENR	GA_TOT	MI ARR	MI DEP	MI ENR	MI_TOT
NON-TRS	WX	0	6	0	6	0	0	0	0	0	0	0	0	0	0	0	0
	VOL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RWY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EQ	0	5	0	5	0	4	0	4	0	0	0	0	0	0	0	0
	OT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		0	11	0	11	0	4	0	4	0	0	0	0	0	0	0	0
TRS	WX	0	7	0	7	0	8	0	8	0	0	0	0	0	0	0	0
	VOL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RWY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EQ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	OT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		0	7	0	7	0	8	0	8	0	0	0	0	0	0	0	0
COMBINED	WX	0	13	0	13	0	8	0	8	0	0	0	0	0	0	0	0
	VOL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RWY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EQ	0	5	0	5	0	4	0	4	0	0	0	0	0	0	0	0
	OT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		0	18	0	18	0	12	0	12	0	0	0	0	0	0	0	0

ALL CATEGORIES:

	NON TRS ARR	NON TRS DEP	NON TRS ENR	NON TRS TOTAL	TRS ARR	TRS DEP	TRS ENR	TRS TOTAL	COMBINED ARR	COMBINED DEP	COMBINED ENR	COMBINED TOTAL
WX	0	6	0	6	0	15	0	15	0	21	0	21
VOL	0	0	0	0	0	0	0	0	0	0	0	0
RWY	0	0	0	0	0	0	0	0	0	0	0	0
EQ	0	9	0	9	0	0	0	0	0	9	0	9
OT	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS	0	15	0	15	0	15	0	15	0	30	0	30

SENT BY:

243

1848

SENT BY: 4-14-95 ; 13:31 ; ATONS NETWORK- 91-2062231910:# 6/14

243

OPSNET DELAYS
CAUSE AND CATEGORY BREAKDOWN

SEA
06/94

		AC				AT				GA				MI			
		ARR	DEP	ENR	AC_TOT	ARR	DEP	ENR	AT_TOT	ARR	DEP	ENR	GA_TOT	ARR	DEP	ENR	MI_TOT
NON-TMS	WX	1	10	0	11	1	0	0	1	0	0	0	0	0	0	0	0
	VOL	0	57	0	57	0	8	0	8	0	1	0	1	0	0	0	0
	RWY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EQ	0	18	0	18	0	0	0	0	0	0	0	0	0	0	0	0
	OT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		1	85	0	86	1	8	0	9	0	1	0	1	0	0	0	0
TMS	WX	0	2	0	2	0	17	0	17	0	0	0	0	0	0	0	0
	VOL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RWY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EQ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	OT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		0	2	0	2	0	17	0	17	0	0	0	0	0	0	0	0
COMBINED	WX	1	12	0	13	1	17	0	18	0	0	0	0	0	0	0	0
	VOL	0	57	0	57	0	8	0	8	0	1	0	1	0	0	0	0
	RWY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EQ	0	18	0	18	0	0	0	0	0	0	0	0	0	0	0	0
	OT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		1	87	0	88	1	25	0	26	0	1	0	1	0	0	0	0

ALL CATEGORIES:

	NON TMS				TMS				COMBINED			
	ARR	DEP	ENR	TOTAL	ARR	DEP	ENR	TOTAL	ARR	DEP	ENR	TOTAL
WX	2	10	0	12	0	19	0	19	2	29	0	31
VOL	0	66	0	66	0	0	0	0	0	66	0	66
RWY	0	0	0	0	0	0	0	0	0	0	0	0
EQ	0	18	0	18	0	0	0	0	0	18	0	18
OT	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS	2	94	0	96	0	19	0	19	2	113	0	115

1849

SENT BY: 4-14-95 ; 13:30 ; ATONS NETWORK- 91-2062231910:# 7/14

243

OPSNET DELAYS
CAUSE AND CATEGORY BREAKDOWN

SEA
05/94

		AC				AT				GA				MI			
		ARR	DEP	ENR	AC_TOT	ARR	DEP	ENR	AT_TOT	ARR	DEP	ENR	GA_TOT	ARR	DEP	ENR	MI_TOT
NON-TMS	WX	0	19	0	19	0	5	0	5	0	0	0	0	0	0	0	0
	VOL	0	17	0	17	0	3	0	3	0	0	0	0	0	0	0	0
	RWY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EQ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	OT	0	24	0	24	0	7	0	7	0	1	0	1	0	0	0	0
TOTALS		0	60	0	60	0	15	0	15	0	1	0	1	0	0	0	0
TMS	WX	0	1	0	1	0	4	0	4	0	0	0	0	0	0	0	0
	VOL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RWY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EQ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	OT	0	15	0	15	0	0	0	0	0	1	0	1	0	0	0	0
TOTALS		0	16	0	16	0	4	0	4	0	1	0	1	0	0	0	0
COMBINED	WX	0	20	0	20	0	9	0	9	0	0	0	0	0	0	0	0
	VOL	0	17	0	17	0	3	0	3	0	0	0	0	0	0	0	0
	RWY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EQ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	OT	0	39	0	39	0	7	0	7	0	2	0	2	0	0	0	0
TOTALS		0	76	0	76	0	19	0	19	0	2	0	2	0	0	0	0

ALL CATEGORIES:

	NON TMS				TMS				COMBINED			
	ARR	DEP	ENR	TOTAL	ARR	DEP	ENR	TOTAL	ARR	DEP	ENR	TOTAL
WX	0	24	0	24	0	5	0	5	0	29	0	29
VOL	0	20	0	20	0	0	0	0	0	20	0	20
RWY	0	0	0	0	0	0	0	0	0	0	0	0
EQ	0	0	0	0	0	0	0	0	0	0	0	0
OT	0	32	0	32	0	16	0	16	0	48	0	~~0~~ 48
TOTALS	0	76	0	76	0	21	0	21	0	97	0	97

OPSNET DELAYS
CAUSE AND CATEGORY BREAKDOWN

SEA
08/94

		AC				AT				GA				RI			
		ARR	DEP	ENR	AC_TOT	ARR	DEP	ENR	AT_TOT	ARR	DEP	ENR	GA_TOT	ARR	DEP	ENR	RI_TOT
NON-TRS	WX	0	11	0	11	0	0	0	0	0	0	0	0	0	0	0	0
	VOL	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	RWY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EQ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	OT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		0	12	0	12	0	0	0	0	0	0	0	0	0	0	0	0
TRS	WX	0	6	0	6	0	24	0	24	0	2	0	2	0	0	0	0
	VOL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RWY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EQ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	OT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		0	6	0	6	0	24	0	24	0	2	0	2	0	0	0	0
COMBINED	WX	0	17	0	17	0	24	0	24	0	2	0	2	0	0	0	0
	VOL	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	RWY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EQ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	OT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		0	18	0	18	0	24	0	24	0	2	0	2	0	0	0	0

ALL CATEGORIES:

	NON TRS				TRS				COMBINED			
	ARR	DEP	ENR	TOTAL	ARR	DEP	ENR	TOTAL	ARR	DEP	ENR	TOTAL
WX	0	11	0	11	0	32	0	32	0	43	0	43
VOL	0	1	0	1	0	0	0	0	0	1	0	1
RWY	0	0	0	0	0	0	0	0	0	0	0	0
EQ	0	0	0	0	0	0	0	0	0	0	0	0
OT	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS	0	12	0	12	0	32	0	32	0	44	0	44

243

1850

OPSNET DELAYS
CAUSE AND CATEGORY BREAKDOWN

SEA
07/94

		AC				AT				GA				RI			
		ARR	DEP	ENR	AC_TOT	ARR	DEP	ENR	AT_TOT	ARR	DEP	ENR	GA_TOT	ARR	DEP	ENR	RI_TOT
NON-TRS	WX	7	61	0	68	0	20	0	20	0	0	0	0	0	0	0	0
	VOL	0	45	0	45	0	8	0	0	0	1	0	1	0	0	0	0
	RWY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EQ	0	48	0	48	0	6	0	6	0	0	0	0	0	0	0	0
	OT	0	0	0	0	4	0	0	4	2	0	0	2	0	0	0	0
TOTALS		7	154	0	161	4	34	0	38	2	1	0	3	0	0	0	0
TRS	WX	0	44	0	44	0	56	0	56	0	0	0	0	0	0	0	0
	VOL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RWY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EQ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	OT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		0	44	0	44	0	56	0	56	0	0	0	0	0	0	0	0
COMBINED	WX	7	105	0	112	0	76	0	76	0	0	0	0	0	0	0	0
	VOL	0	45	0	45	0	8	0	8	0	1	0	1	0	0	0	0
	RWY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EQ	0	48	0	48	0	6	0	6	0	0	0	0	0	0	0	0
	OT	0	0	0	0	4	0	0	4	2	0	0	2	0	0	0	0
TOTALS		7	198	0	205	4	90	0	94	2	1	0	3	0	0	0	0

ALL CATEGORIES:

	NON TRS				TRS				COMBINED			
	ARR	DEP	ENR	TOTAL	ARR	DEP	ENR	TOTAL	ARR	DEP	ENR	TOTAL
WX	7	81	0	88	0	100	0	100	7	181	0	188
VOL	0	54	0	54	0	0	0	0	0	54	0	54
RWY	0	0	0	0	0	0	0	0	0	0	0	0
EQ	0	54	0	54	0	0	0	0	0	54	0	54
OT	6	0	0	6	0	0	0	0	6	0	0	~~6~~
TOTALS	13	189	0	202	0	100	0	100	13	289	0	302

243

SENT BY:

OPSNET DELAYS
CAUSE AND CATEGORY BREAKDOWN

SEA
10/94

		AC				AT				GA				MI			
		ARR	DEP	ENR	AC_TOT	ARR	DEP	ENR	AT_TOT	ARR	DEP	ENR	GA_TOT	ARR	DEP	ENR	MI_TOT
NON-TMS	WX	72	54	0	126	31	9	0	40	0	1	0	1	0	0	0	0
	VOL	0	13	0	13	0	4	0	4	0	0	0	0	0	0	0	0
	RWY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EQ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	OT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		72	67	0	139	31	13	0	44	0	1	0	1	0	0	0	0
TMS	WX	0	25	0	25	0	76	0	76	0	1	0	1	0	0	0	0
	VOL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RWY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EQ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	OT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		0	25	0	25	0	76	0	76	0	1	0	1	0	0	0	0
COMBINED	WX	72	79	0	151	31	85	0	116	0	2	0	2	0	0	0	0
	VOL	0	13	0	13	0	4	0	4	0	0	0	0	0	0	0	0
	RWY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EQ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	OT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		72	92	0	164	31	89	0	120	0	2	0	2	0	0	0	0

ALL CATEGORIES:

	NON TMS				TMS				COMBINED			
	ARR	DEP	ENR	TOTAL	ARR	DEP	ENR	TOTAL	ARR	DEP	ENR	TOTAL
WX	103	64	0	167	0	102	0	102	103	166	0	269
VOL	0	17	0	17	0	0	0	0	0	17	0	17
RWY	0	0	0	0	0	0	0	0	0	0	0	0
EQ	0	0	0	0	0	0	0	0	0	0	0	0
OT	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS	103	81	0	184	0	102	0	102	103	183	0	286

243

1851

OPSNET DELAYS
CAUSE AND CATEGORY BREAKDOWN

SEA
09/94

		AC				AT				GA				MI			
		ARR	DEP	ENR	AC_TOT	ARR	DEP	ENR	AT_TOT	ARR	DEP	ENR	GA_TOT	ARR	DEP	ENR	MI_TOT
NON-TMS	WX	15	142	0	157	11	32	0	43	0	2	0	2	0	0	0	0
	VOL	0	5	0	5	0	5	0	5	0	0	0	0	0	0	0	0
	RWY	0	3	0	3	0	2	0	2	0	0	0	0	0	0	0	0
	EQ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	OT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		15	150	0	165	11	39	0	50	0	2	0	2	0	0	0	0
TMS	WX	0	13	0	13	0	30	0	30	0	3	0	3	0	0	0	0
	VOL	0	0	0	C	0	0	0	0	0	0	0	0	0	0	0	0
	RWY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EQ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	OT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		0	13	0	13	0	30	0	30	0	3	0	3	0	0	0	0
COMBINED	WX	15	155	0	170	11	62	0	73	0	5	0	5	0	0	0	0
	VOL	0	5	0	5	0	5	0	5	0	0	0	0	0	0	0	0
	RWY	0	3	0	3	0	2	0	2	0	0	0	0	0	0	0	0
	EQ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	OT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		15	163	0	178	11	69	0	80	0	5	0	5	0	0	0	0

ALL CATEGORIES:

	NON TMS				TMS				COMBINED			
	ARR	DEP	ENR	TOTAL	ARR	DEP	ENR	TOTAL	ARR	DEP	ENR	TOTAL
WX	26	176	0	202	0	46	0	46	26	222	0	248
VOL	0	10	0	10	0	0	0	0	0	10	0	10
RWY	0	5	0	5	0	0	0	0	0	5	0	5
EQ	0	0	0	0	0	0	0	0	0	0	0	0
OT	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS	26	191	0	217	0	46	0	46	26	257	0	263

243

SENT BY: 4-14-95 ; 13:36 ; ...ATIONS NETWORK-

OPSNET DELAYS
CAUSE AND CATEGORY BREAKDOWN

SEA
12/94

		AC ARR	AC DEP	AC ENR	AC_TOT	AT ARR	AT DEP	AT ENR	AT_TOT	GA ARR	GA DEP	GA ENR	GA_TOT	MI ARR	MI DEP	MI ENR	MI_TOT
NON-TMS	WX	61	0	0	61	21	2	0	23	2	0	0	2	0	0	0	0
	VOL	0	34	0	34	0	15	0	15	0	0	0	0	0	0	0	0
	RWY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EQ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	OT	0	3	0	3	0	1	0	1	0	0	0	0	0	0	0	0
TOTALS		61	37	0	98	21	18	0	39	2	0	0	2	0	0	0	0
TMS	WX	0	15	0	15	0	85	0	85	0	0	0	0	0	0	0	0
	VOL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RWY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EQ	0	1	0	1	0	2	0	2	0	0	0	0	0	0	0	0
	OT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		0	16	0	16	0	87	0	87	0	0	0	0	0	0	0	0
COMBINED	WX	61	15	0	76	21	87	0	108	2	0	0	2	0	0	0	0
	VOL	0	34	0	34	0	15	0	15	0	0	0	0	0	0	0	0
	RWY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EQ	0	1	0	1	0	2	0	2	0	0	0	0	0	0	0	0
	OT	0	3	0	3	0	1	0	1	0	0	0	0	0	0	0	0
TOTALS		61	53	0	114	21	105	0	126	2	0	0	2	0	0	0	0

ALL CATEGORIES:

	NON TMS ARR	NON TMS DEP	NON TMS ENR	NON TMS TOTAL	TMS ARR	TMS DEP	TMS ENR	TMS TOTAL	COMBINED ARR	COMBINED DEP	COMBINED ENR	COMBINED TOTAL
WX	84	2	0	86	0	100	0	100	84	102	0	186
VOL	0	49	0	49	0	0	0	0	0	49	0	49
RWY	0	0	0	0	0	0	0	0	0	0	0	0
EQ	0	0	0	0	0	3	0	3	0	3	0	3
OT	0	4	0	4	0	0	0	0	0	4	0	~~3~~ 4
TOTALS	84	55	0	139	0	103	0	103	84	158	0	242

243

OPSNET DELAYS
CAUSE AND CATEGORY BREAKDOWN

SEA
11/94

		AC ARR	AC DEP	AC ENR	AC_TOT	AT ARR	AT DEP	AT ENR	AT_TOT	GA ARR	GA DEP	GA ENR	GA_TOT	MI ARR	MI DEP	MI ENR	MI_TOT
NON-TMS	WX	49	9	0	58	5	3	0	8	1	1	0	2	0	0	0	0
	VOL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RWY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EQ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	OT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		49	9	0	58	5	3	0	8	1	1	0	2	0	0	0	0
TMS	WX	0	51	0	51	0	83	0	83	0	1	0	1	0	0	0	0
	VOL	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	RWY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EQ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	OT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		0	52	0	52	0	83	0	83	0	1	0	1	0	0	0	0
COMBINED	WX	49	60	0	109	5	86	0	91	1	2	0	3	0	0	0	0
	VOL	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	RWY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EQ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	OT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		49	61	0	110	5	86	0	91	1	2	0	3	0	0	0	0

ALL CATEGORIES:

	NON TMS ARR	NON TMS DEP	NON TMS ENR	NON TMS TOTAL	TMS ARR	TMS DEP	TMS ENR	TMS TOTAL	COMBINED ARR	COMBINED DEP	COMBINED ENR	COMBINED TOTAL
WX	55	13	0	68	0	135	0	135	55	148	0	203
VOL	0	0	0	0	0	1	0	1	0	1	0	1
RWY	0	0	0	0	0	0	0	0	0	0	0	0
EQ	0	0	0	0	0	0	0	0	0	0	0	0
OT	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS	55	13	0	68	0	136	0	136	55	149	0	204

243

Exh. 17

Preliminary Results of Category III Precision Landing With 110 Automatic Landings of a United Boeing 737 Using GNSS Integrity Beacons

Clark E. Cohen, David G. Lawrence, H. Stewart Cobb, Boris S. Pervan, J. David Powell, Bradford W. Parkinson
Stanford University

Gerald J. Aubrey, William Loewe
United Airlines

Douglas Ormiston
Boeing Commercial Airplane Group

B. David McNally, David N. Kaufmann
NASA Ames Research Center

Victor Wullschleger
Federal Aviation Administration Technical Center

Ray Swider
Federal Aviation Administration

ABSTRACT
Differential GNSS and miniature, low-cost *Integrity Beacon* pseudolites were used to carry out 110 successful automatic landings of a United Boeing 737-300 aircraft. The goal was to demonstrate Required Navigation Performance (RNP)—including accuracy and integrity—for Category III Precision Landing using GNSS. These autopilot-in-the-loop flight tests using GNSS Integrity Beacons (low-power, ground-based marker beacon pseudolites placed under the approach path) furnish evidence that

GNSS can provide the full performance necessary to meet the stringent specifications of Category III.

It has been demonstrated that Integrity Beacons can provide consistent accuracies on the order of a few centimeters. But perhaps even more important, this centimeter-level accuracy coupled with the built-in geometrical redundancy provided by Integrity Beacon ranging provides an exceptional level of system integrity. This integrity is calculated to be easily better than the required one part in a billion probability of missed detection. This high level of integrity is achieved independently from ground-based monitors through Receiver Autonomous Integrity Monitoring (RAIM).

The GPS receiver and single-channel navigation computer calculated precise positions and calculated glide path deviations. An analog interface provided ILS localizer and glideslope signals to the autopilot. The 737 was equipped with a dual-channel flight control system which was previously certified for Category IIIA landings. The autolands were performed through touchdown without rollout guidance. The series of 110 automatic landings were carried out at NASA's Crows Landing facility in California over a four-day period during the week of October 10, 1994. A laser tracker was used as an independent means for characterizing flight performance. The feasibility demonstration was sponsored by the FAA.

Figure 1: United Boeing 737 GPS Autoland

Presented at the ION National Technical Meeting, Anaheim, California, January 18-20, 1995.

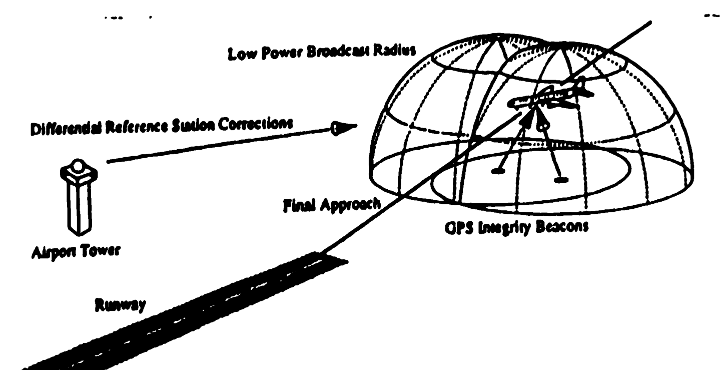


Figure 2: The Integrity Beacon Landing System (IBLS) for Category III Precision Landing

INTRODUCTION
Landing aircraft in poor visibility imposes the very highest standards of performance for a navigation system. Required to work under extreme weather conditions to the highest standards of performance, a Category III (lowest visibility) landing system must meet a vertical position accuracy requirement of 2 ft (95%) with extremely demanding integrity. For each approach, the probability of missed detection of failure cannot exceed 5×10^{-9}.

This paper presents the results from an October, 1994 demonstration of such a landing system based on GPS using a commercial passenger airliner, a United Airlines Boeing 737. The landing system was founded on augmenting GPS with *Integrity Beacons*—a special type of pseudolite—to achieve the Required Navigation Performance (RNP) for Category III precision landing of aircraft.

The series of 110 autolands were carried out in the 737 (shown in Figure 1) at Crows Landing to test the Integrity Beacon concept. These tests were intended to demonstrate both the accuracy and integrity built into the Integrity Beacon Landing System (IBLS).

FAA Category III Feasibility Program
The Federal Aviation Administration began to test GPS as a precision approach landing system through an FAA/industry cooperative program in 1991. Since then, advancements in technology have shown that using GPS for Category III precision approach and landing applications is feasible. The FAA Category III program has participants from both industry and research institutions.

On the industry side, a Request For Proposals (RFP) was issued by the FAA Satellite Program Office in September 1993. The RFP solicited proposals to demonstrate, based on stringent measures of success, Category IIIB feasibility based on GPS. Two contractors have been selected, and demonstration flight tests are planned for Spring 1995.

Meanwhile, research institutions under FAA sponsorship—including Stanford University, Ohio University, and NASA Ames—are carrying out independent flight test programs to demonstrate the feasibility of Category III precision landing using GPS.

Overview of Integrity Beacon Landing System
Stanford University has been developing the Integrity Beacon as a means of augmenting GPS to provide the performance required to achieve Category III specifications [1-4]. Through flight tests and analysis, Stanford University and the Federal Aviation Administration (FAA) have sought to demonstrate that the Integrity Beacon Landing System provides more than adequate accuracy (by any standard, U.S. or International) and that it has fail-proof integrity built upon the centimeter-level precision of carrier phase and the natural redundant cross checks provided by its architecture.

IBLS (for which two patent applications have been filed) is illustrated in Figure 2. It is founded on using GPS augmented with Integrity Beacons—compact, low-power, ground-based marker beacon "pseudolites" (transmitters used as pseudo-GPS satellites). Integrity Beacons are nominally situated in pairs on either side of the approach path to a runway. The power is set low so that the broadcast signal is measurable only inside of the "bubble" shown in the figure. The bubble radius (determined by the

In response to a comment from Leventhal, Lehr replied that Pullman traffic could, of course, fly to New York from Boise if the market were large enough to support a Boise-New York route, "which it isn't. That is how hubs and connecting places grow up. They grow up relating to the market size."

Louise Bjornson believed that, if city center to city center Amtrak service were available, it would be more convenient and cheaper than flying. "I think it is important that we start looking at cost more often."

Lehr explained that there is a substantial federal subsidy for Amtrak.

System Mgmt

Governance FAA

In response to a comment from McLaughlin regarding the impact of technological advances, such as microwave landing systems and global positioning systems, Mahoney replied that the report addresses the microwave landing system. "Basically, there was an estimate made . . . as to how you can increase the capacity and operations . . . using improved landing systems and some of these new technologies." He recalled that it amounted to about eight flights per hour. "I think what the consultants tried to stick with were things that are going to happen. The microwave landing system is going to happen."

X44% IFR x make 16 hours x 350 days = 20,000 ops/year => how much as a percent?

McLaughlin next quoted from page 6-17, which stated that, "with current use at Paine Field, the roads provide adequate access, but the addition of new aviation activity may well be constricted by poor surface access." She believed that road access is "inadequate even now." She added that, if it were adequate, "we wouldn't be spending millions to upgrade it just to take care of what is there now."

Leventhal believed there was merit to McLaughlin's comment, given that the road "is not a single-use highway. . . . It may be adequate now for aviation access, but there are other things occurring on those roads. . . . He thought her concern should be investigated.

Mahoney noted: "There are impacts in the vicinity of Paine Field which are current [and which] are going to happen. You are having to do some mitigation." One participant in this mitigation is "the Boeing Company, which I think is helping pay for some of that. I think what the consultant was trying to say, though, was that, given the terminal and given the access to the Field as it exists today, that is what they called adequate."

Brief commentary followed.

Demand commuter

In response to a question from Creighton about the percentage of commuter traffic destined for Seattle, Lehr replied that the figure is "as much as half."

Creighton believed that amount might therefore be shifted to, for example, Boeing Field.

Lehr replied that a Horizon Air presentation to the Commission indicated that, to do so, "would split one airplane into two airplanes. As opposed to one economic load, you now have two uneconomic loads."

Leventhal added that the speaker had also added in that presentation that "you must have the traffic to fill the plane going back."

In response to another question from Creighton, Lehr replied that all of the Metroliners will be replaced by the newer, larger Dornier aircraft.

Demand

Miller added: "That is why, as you look at the projections for Sea-Tac, the percentage of aircraft that is commuter aircraft will decrease. Two things will happen. An airplane will become a jet rather than

OPSNET DELAYS
CAUSE AND CATEGORY BREAKDOWNS

SEA
12/94

		AC ARR	AC DEP	AC ENR	AC_TOT	AT ARR	AT DEP	AT ENR	AT_TOT	GA ARR	GA DEP	GA ENR	GA_TOT	NX ARR	NX DEP	NX ENR	NX_TOT
NON-TRS	WX	61	0	0	61	21	2	0	23	2	0	0	2	0	0	0	0
	VOL	0	34	0	34	0	15	0	15	0	0	0	0	0	0	0	0
	RWY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EQ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	OT	0	3	0	3	0	1	0	1	0	0	0	0	0	0	0	0
TOTALS		61	37	0	98	21	18	0	39	2	0	0	2	0	0	0	0
TRS	WX	0	15	0	15	0	85	0	85	0	0	0	0	0	0	0	0
	VOL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RWY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EQ	0	1	0	1	0	2	0	2	0	0	0	0	0	0	0	0
	OT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		0	16	0	16	0	87	0	87	0	0	0	0	0	0	0	0
COMBINED	WX	61	15	0	76	21	87	0	108	2	0	0	2	0	0	0	0
	VOL	0	34	0	34	0	15	0	15	0	0	0	0	0	0	0	0
	RWY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EQ	0	1	0	1	0	2	0	2	0	0	0	0	0	0	0	0
	OT	0	3	0	3	0	1	0	1	0	0	0	0	0	0	0	0
TOTALS		61	53	0	114	21	105	0	126	2	0	0	2	0	0	0	0

ALL CATEGORIES:

	NON TRS ARR	NON TRS DEP	NON TRS ENR	NON TRS TOTAL	TRS ARR	TRS DEP	TRS ENR	TRS TOTAL	COMBINED ARR	COMBINED DEP	COMBINED ENR	COMBINED TOTAL
WX	84	2	0	86	0	100	0	100	84	102	0	186
VOL	0	49	0	49	0	0	0	0	0	49	0	49
RWY	0	0	0	0	0	0	0	0	0	0	0	0
EQ	0	0	0	0	0	3	0	3	0	3	0	3
OT	0	4	0	4	0	0	0	0	0	4	0	~~3~~ 4
TOTALS	84	55	0	139	0	103	0	103	84	158	0	242

4-14-95 ; 13:06 ; SENT BY:

Exh-17

Preliminary Results of Category III Precision Landing With 110 Automatic Landings of a United Boeing 737 Using GNSS Integrity Beacons

Clark E. Cohen, David G. Lawrence, H. Stewart Cobb, Boris S. Pervan, J. David Powell, Bradford W. Parkinson
Stanford University

Gerald J. Aubrey, William Loewe
United Airlines

Douglas Ormiston
Boeing Commercial Airplane Group

B. David McNally, David N. Kaufmann
NASA Ames Research Center

Victor Wullschleger
Federal Aviation Administration Technical Center

Ray Swider
Federal Aviation Administration

ABSTRACT

Differential GNSS and miniature, low-cost *Integrity Beacon* pseudolites were used to carry out 110 successful automatic landings of a United Boeing 737-300 aircraft. The goal was to demonstrate Required Navigation Performance (RNP)—including accuracy and integrity—for Category III Precision Landing using GNSS. These autopilot-in-the-loop flight tests using GNSS Integrity Beacons (low-power, ground-based marker beacon pseudolites placed under the approach path) furnish evidence that GNSS can provide the full performance necessary to meet the stringent specifications of Category III.

Figure 1: United Boeing 737 GPS Autoland

It has been demonstrated that Integrity Beacons can provide consistent accuracies on the order of a few centimeters. But perhaps even more important, this centimeter-level accuracy coupled with the built-in geometrical redundancy provided by Integrity Beacon ranging provides an exceptional level of system integrity. This integrity is calculated to be easily better than the required one part in a billion probability of missed detection. This high level of integrity is achieved independently from ground-based monitors through Receiver Autonomous Integrity Monitoring (RAIM).

The GPS receiver and single-channel navigation computer calculated precise positions and calculated glide path deviations. An analog interface provided ILS localizer and glideslope signals to the autopilot. The 737 was equipped with a dual-channel flight control system which was previously certified for Category IIIA landings. The autolands were performed through touchdown without rollout guidance. The series of 110 automatic landings were carried out at NASA's Crows Landing facility in California over a four-day period during the week of October 10, 1994. A laser tracker was used as an independent means for characterizing flight performance. The feasibility demonstration was sponsored by the FAA.

Presented at the ION National Technical Meeting, Anaheim, California, January 18-20, 1995.

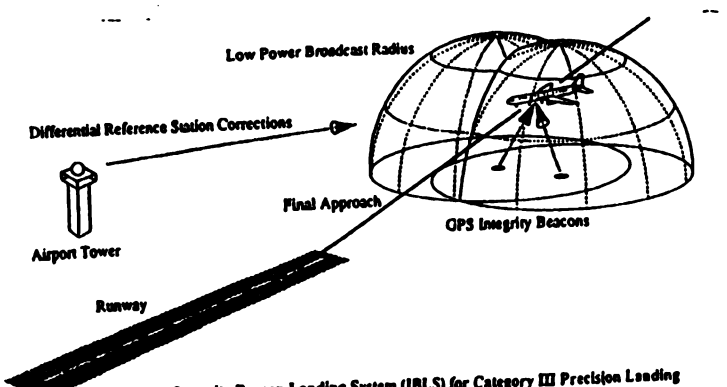


Figure 2: The Integrity Beacon Landing System (IBLS) for Category III Precision Landing

INTRODUCTION
Landing aircraft in poor visibility imposes the very highest standards of performance for a navigation system. Required to work under extreme weather conditions to the highest standards of performance, a Category III (lowest visibility) landing system must meet a vertical position accuracy requirement of 2 ft (95%) with extremely demanding integrity. For each approach, the probability of missed detection of failure cannot exceed 5×10^{-9}.

This paper presents the results from an October, 1994 demonstration of such a landing system based on GPS using a commercial passenger airliner, a United Airlines Boeing 737. The landing system was founded on augmenting GPS with *Integrity Beacons*—a special type of pseudolite—to achieve the Required Navigation Performance (RNP) for Category III precision landing of aircraft.

The series of 110 autolands were carried out in the 737 (shown in Figure 1) at Crows Landing to test the Integrity Beacon concept. These tests were intended to demonstrate both the accuracy and integrity built into the Integrity Beacon Landing System (IBLS).

FAA Category III Feasibility Program
The Federal Aviation Administration began to test GPS as a precision approach landing system through an FAA/Industry cooperative program in 1991. Since then, advancements in technology have shown that using GPS for Category III precision approach and landing applications is feasible. The FAA Category III program has participants from both industry and research institutions.

On the industry side, a Request For Proposals (RFP) was issued by the FAA Satellite Program Office in September 1993. The RFP solicited proposals to demonstrate, based on stringent measures of success, Category IIIB feasibility based on GPS. Two contractors have been selected, and demonstration flight tests are planned for Spring 1995.

Meanwhile, research institutions under FAA sponsorship—including Stanford University, Ohio University, and NASA Ames—are carrying out independent flight test programs to demonstrate the feasibility of Category III precision landing using GPS.

Overview of Integrity Beacon Landing System
Stanford University has been developing the Integrity Beacon as a means of augmenting GPS to provide the performance required to achieve Category III specifications [1-4]. Through flight tests and analysis, Stanford University and the Federal Aviation Administration (FAA) have sought to demonstrate that the Integrity Beacon Landing System provides more than adequate accuracy (by any standard, U.S. or international) and that it has fail-proof integrity built upon the centimeter-level precision of carrier phase and the natural redundant cross checks provided by its architecture.

IBLS (for which two patent applications have been filed) is illustrated in Figure 2. It is founded on using GPS augmented with Integrity Beacons—compact, low-power, ground-based marker beacon "pseudolites" (transmitters used as pseudo-GPS satellites). Integrity Beacons are nominally situated in pairs on either side of the approach path to a runway. The power is set low so that the broadcast signal is measurable only inside of the "bubble" shown in the figure. The bubble radius (determined by the

Ex. 18

In response to a comment from Leventhal, Lehr replied that Pullman traffic could, of course, fly to New York from Boise if the market were large enough to support a Boise-New York route, "which it isn't. That is how hubs and connecting places grow up. They grow up relating to the market size."

Louise Bjornson believed that, if city center to city center Amtrak service were available, it would be more convenient and cheaper than flying. "I think it is important that we start looking at cost more often."

Lehr explained that there is a substantial federal subsidy for Amtrak.

System Mgmt
4 Governance FAA

In response to a comment from McLaughlin regarding the impact of technological advances, such as microwave landing systems and global positioning systems, Mahoney replied that the report addresses the microwave landing system. "Basically, there was an estimate made . . . as to how you can increase the capacity and operations . . . using improved landing systems and some of these new technologies." He recalled that it amounted to about eight flights per hour. "I think what the consultants tried to stick with were things that are going to happen. The microwave landing system is going to happen."

X 44% IFR X make 16 hours X 350 days = 20,000 ops/year = how much as a percent?

McLaughlin next quoted from page 6-17, which stated that, "with current use at Paine Field, the roads provide adequate access, but the addition of new aviation activity may well be constricted by poor surface access." She believed that road access is "inadequate even now." She added that, if it were adequate, "we wouldn't be spending millions to upgrade it just to take care of what is there now."

Leventhal believed there was merit to McLaughlin's comment, given that the road "is not a single-use highway. . . . It may be adequate now for aviation access, but there are other things occurring on those roads. . . ." He thought her concern should be investigated.

Mahoney noted: "There are impacts in the vicinity of Paine Field which are current [and which] are going to happen. You are having to do some mitigation." One participant in this mitigation is "the Boeing Company, which I think is helping pay for some of that. I think what the consultant was trying to say, though, was that, given the terminal and given the access to the Field as it exists today, that is what they called adequate."

Brief commentary followed.

Demand Commuter

In response to a question from Creighton about the percentage of commuter traffic destined for Seattle, Lehr replied that the figure is "as much as half."

Creighton believed that amount might therefore be shifted to, for example, Boeing Field.

Lehr replied that a Horizon Air presentation to the Commission indicated that, to do so, "would split one airplane into two airplanes. As opposed to one economic load, you now have two uneconomic loads."

Leventhal added that the speaker had also added in that presentation that "you must have the traffic to fill the plane going back."

In response to another question from Creighton, Lehr replied that all of the Metroliners will be replaced by the newer, larger Dornier aircraft.

Demand

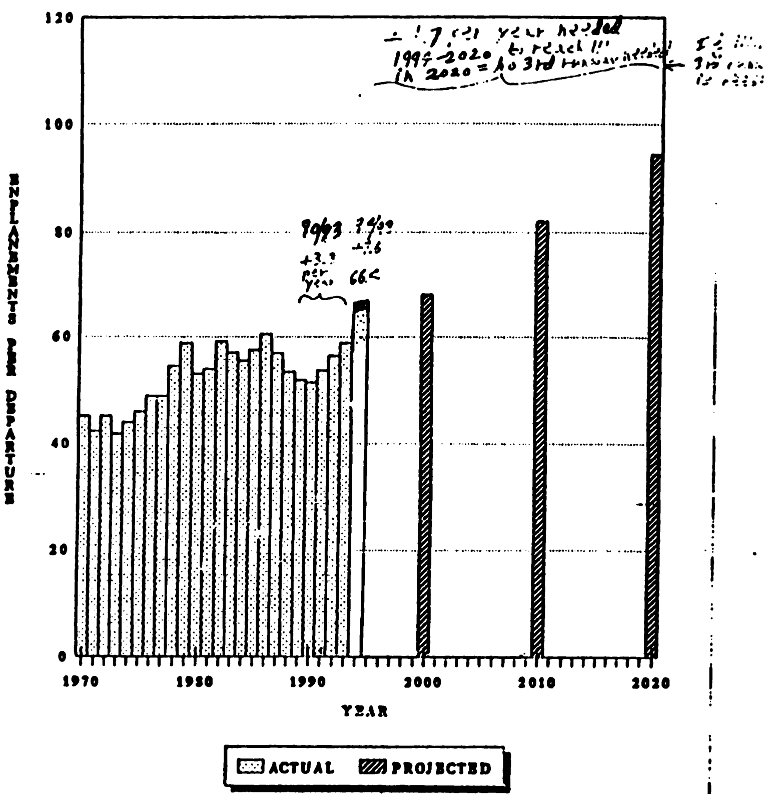
Miller added: "That is why, as you look at the projections for Sea-Tac, the percentage of aircraft that is commuter aircraft will decrease. Two things will happen. An airplane will become a jet rather than

AIRPORT MASTER PLAN UPDATE

SEATTLE - TACOMA INTERNATIONAL AIRPORT

Ex. 1.B

FIGURE 5-5
ENPLANEMENTS PER PASSENGER DEPARTURE AT SEATTLE-TACOMA INTERNATIONAL AIRPORT



AIRPORT MASTER PLAN UPDATE

SEATTLE - TACOMA INTERNATIONAL AIRPORT

Ex. 2

TABLE 2-5
AIRCRAFT OPERATIONS AT SEATTLE-TACOMA INTERNATIONAL AIRPORT, 1970 TO 2020 [a]

Year	Air Carrier Aircraft [h]	Air Taxi/ Commuter Aircraft [b]	Air Taxi/ Commuter Percent of Airline	General Aviation Aircraft [c]	Military Aircraft	Total
Actual						
1970	104.414	6.202	5.6	38.893	1.167	150.676
1971	114.372	5.215	4.3	33.874	1.683	155.144
1972	109.278	4.353	3.8	36.335	2.378	152.344
1973	115.445	17.866	13.4	22.878	1.942	158.289
1974	106.466	31.654	22.9	21.492	1.304	161.077
1975	109.962	30.896	21.9	21.888	1.013	163.923
1976	114.998	31.818	21.7	25.865	844	173.699
1977	119.166	39.143	24.7	30.835	882	190.216
1978	119.850	41.747	25.8	32.787	607	195.186
1979	131.647	45.739	25.8	33.988	568	211.942
1980	143.646	40.681	22.1	27.876	541	212.744
1981	141.015	39.400	21.8	27.053	477	208.153
1982	138.415	49.040	26.1	23.583	356	211.605
1983	137.920	48.757	26.1	22.247	329	209.462
1984	142.717	59.824	29.5	20.878	409	224.052
1985	158.904	56.954	26.4	18.537	327	234.957
1986	187.870	54.977	22.6	16.606	286	260.199
1987	178.682	95.337	34.8	17.671	355	292.337
1988	176.732	124.245	41.3	14.520	447	316.260
1989	182.460	139.215	43.3	12.865	384	335.259
1990	193.482	150.376	43.7 Max	10.844	305	355.007
1991	186.717	142.828	43.3	8.773	289	338.607
1992	196.141	140.744	41.8	8.800	310	345.995
1993	17% 200.040	131.0[illegible]	39.6	3% 8.097	278	339.459
Forecast						
2000	237.000	133.600	35.9	8.900	300	379.200
2010	272.000	124.000	31.3	9.500	300	405.800
2020	309.000	122.000	28.3	10.300	300	441.600
1994	212,616	132,160	37.4	8358	371	353,052

[a] Source: Seattle-Tacoma International Airport, Traffic and Operations Report.

[b] Horizon Airlines has flown both air carrier and air taxi/commuter aircraft from 1985 to 1993. Operations by each aircraft type are included in the appropriate column.

[c] Includes training flights.

1/ ACTUAL: 37.4% is 2.2% less than 39.6% in 1993 in one year

2/ FORECAST BY P&D: 1993-2020 decrease from 39.6% to 35.9% = 3.7% in 7 years or .53% per year

3/ P&D's forecast is off by 316% (2.2% ÷ .53%) in ONE year

2.2
.53
1.74

REPORT NUM: OP0100-01 SEA-TAC INTERNATIONAL AIRPORT DEC. 1994
DATE-TIME: 01/19/95-11:24 TRAFFIC AND OPERATIONS REPORT

	MONTHLY STATISTICS				YEAR TO DATE			
	DEC. 1994	DEC. 1993	AMOUNT CHANGE	PERCNT CHANGE	1994	1993	AMOUNT CHANGE	PERCNT CHANGE
PASSENGERS								
Domestic Passengers - IN	823,441	728,219	95,222	13.1	9,747,373	8,693,003	1,054,370	[illegible]
Domestic Passengers - OUT	831,954	734,023	97,931	13.3	9,735,598	8,700,108	1,035,490	[illegible]
Subtotal-Domestic Passengers	1,655,395	1,462,242	193,153	13.2	19,482,971	17,393,111	2,089,860	[illegible]
International Passengers - IN	57,473	51,653	5,820	11.3	754,296	722,956	31,340	[illegible]
International Passengers - OUT	56,286	50,050	6,236	12.5	735,552	684,457	51,095	[illegible]
Subtotal-Intl Passengers	113,759	101,703	12,056	11.9	1,489,848	1,407,413	82,435	[illegible]
TOTAL PASSENGERS - IN	880,914	779,872	101,042	13.0	10,501,669	9,415,959	1,085,710	[illegible]
TOTAL PASSENGERS - OUT	888,240	784,073	104,167	13.3	10,471,150	9,384,565	1,086,585	[illegible]
PASSENGER GRAND TOTAL	1,769,154	1,563,945	205,209	13.1	20,972,819	18,800,524	2,172,295	[illegible]
CARGO (METRIC TONS)								
Domestic Air Freight - IN	10,229	10,568	-339	-3.2	132,292	119,323	12,969	[illegible]
Domestic Air Freight - OUT	11,256	11,084	172	1.6	142,190	126,957	15,233	[illegible]
Subtotal-Domestic Air Freight	21,485	21,652	-167	-0.8	274,482	246,280	28,202	[illegible]
International Air Freight - IN	1,615	1,435	180	12.5	19,725	[illegible]	[illegible]	[illegible]
International Air Freight - OUT	2,990	2,361	629	26.6	30,825	33,050	-2,225	[illegible]
Subtotal-Intl Air Freight	4,605	3,796	809	21.3	50,550	51,046	-496	[illegible]
TOTAL AIR FREIGHT - IN	11,844	12,003	-159	-1.3	152,017	137,319	14,698	[illegible]
TOTAL AIR FREIGHT - OUT	14,246	13,445	801	6.0	173,015	160,007	13,008	[illegible]
AIRFREIGHT GRAND TOTAL	26,090	25,448	642	2.5	325,032	297,326	27,706	[illegible]
Air Mail - IN	8,119	6,994	1,125	16.1	48,893	44,201	4,692	[illegible]
Air Mail - OUT	7,465	6,596	[illegible]	[illegible]	41,216	40,015	1,201	[illegible]
Subtotal Air Mail	15,584	13,590	1,994	14.7	90,109	84,216	5,893	[illegible]
TOTAL CARGO - IN	19,963	18,997	966	5.1	200,910	181,520	19,390	[illegible]
TOTAL CARGO - OUT	21,711	20,041	1,670	8.3	214,231	200,022	14,209	[illegible]
CARGO GRAND TOTAL	41,674	39,038	2,636	6.8	415,141	381,542	33,599	[illegible]
OPERATIONS								
Air Carrier	18,492	16,978	1,514	8.9	212,016	200,040	11,976	[illegible]
[illegible]	12,030	10,389	1,641	15.8	132,160 = 37%	131,046	1,114	[illegible]
General Aviation	712	454	258	56.8	8,358	7,929	429	[illegible]
Military	63	18	45	250.0	371	276	95	[illegible]
Training Flights	8	30	-22	-73.3	147	168	-21	[illegible]
TOTAL OPERATIONS	31,305	27,869	3,436	12.3	353,052	339,459	13,593	[illegible]

See reverse side for sources.
Prepared by Port of Seattle Operations Department.

Executive Summary
Exh. 22

pavement is the only runway paving alternate chosen for the analysis at this stage; this material is the likely choice for construction. PCC pavements have performed well at the Sea-Tac airport, and this is the only material that has the capacity to perform for at least forty years, the surfacing life span required for this runway.

Project Phasing

Implementation of the Third Runway will require a major programming and scheduling effort. The complexity and magnitude of the project will demand that there be close coordination of all administrative, permitting, planning, property acquisition, design, and construction activities. Preliminary analyses of the sequencing of major construction and design elements of the project have been undertaken. The basic schedule parameters assumed in these analyses were that construction would begin at the start of the 1996 construction season and would be complete, with an operating Third Runway, by late 2001. It is acknowledged that these dates are subject to change.

The major project elements are listed below:

- Property Acquisition and Relocation Program
- Other Property Interests and Improvements
- Permitting and Environmental Requirements
- Existing Airport Facilities to be Maintained, Relocated or Replaced
- Relocation or Modification of Public Roads
- Off-Site Fill Sources, Transportation and Stockpiling
- Relocation or Modification of Major Drainage and Utility Lines
- Security Fencing and Site Access
- Demolition and Clearing
- Airfield Site Development
- Airfield Pavement, Electrical and Final Grading
- New Navigational Aids and Other FAA Facilities for Third Runway
- Other New Airfield Support Facilities

These major project elements were isolated for discussion and evaluation only, without suggesting that they will become separate development or construction packages. A development or construction package may include several of these elements, as dictated by site area characteristics, phasing, scheduling, operational requirements, funding, etc. For some of the facilities and site areas, the process of site selection, corridor and alignment study, property acquisition, design and procurement may be more time consuming than the construction. The lead times for these activities must be realistically estimated and incorporated into the phasing and scheduling plan.

In order to meet any construction phasing concept, it will be essential to analyze the planning and design phasing activities to ensure that all documents are available to proceed with the project. This preliminary engineering report describes the baseline concepts to be analyzed during the Master Plan Update and EIS studies. As the project evolves, it will be necessary to evaluate options and refine the preferred concept. Property acquisitions would be a principal factor in the design and construction schedules. Ample time and data, as well as legal requirements, must be built into the planning and design schedule to avoid future delays. Upon completion of the planning phase, final design for the project would begin.

In order to allow the Port the ability to start construction in 1996, the planning and engineering activities must parallel the Master Plan Update and EIS projects. Upon acceptance of the preliminary engineering did they begin?

report, the 15 percent design activities would begin in order to provide adequate schedule duration for property acquisition and final design.

XII

Preliminary Construction Cost Estimate

In order to establish a preliminary estimate of probable construction cost for the baseline runway options, it was necessary to assume specific elements for inclusion in the project. As the project is further refined through EIS studies, Master Plan, and 15 percent design, cost estimates and project alternatives will be more accurately defined. Estimates should be considered as order of magnitude conceptual costs used for comparative purposes. Costs for property acquisition and relocation, as well as mitigation costs, are excluded from this estimate. The Port of Seattle will develop these project costs based on information provided in the 15 percent design phase of the project.

Total estimated project cost for the 7,000-foot concept is $278,000,000 and $298,000,000 for the 8,500-foot concept. These order of magnitude estimates include costs for new and relocated FAA facilities. Airport, costs such as additional ARFF equipment and support facilities, have been excluded from this preliminary estimate. Future studies will be conducted to define the types of other equipment and other facilities required for the project.

Airport Rescue and Firefighting Facilities

Estimates of probable construction cost are based on currently available data and concept level analysis completed to date. Final project cost may vary substantially depending on the final project design. Information relative to project costs developed on preliminary engineering concepts must be used with caution, with a thorough understanding of the level of accuracy and intended purpose.

XI. PROJECT PHASING

Implementation of the Third Runway will require a major programming and scheduling effort. The complexity and magnitude of the project will demand that there be close coordination of all administrative, permitting, planning, property acquisition, design, and construction activities. Preliminary analyses of the sequencing of major construction and design elements of the project have been undertaken. The basic schedule parameters assumed in these analyses were that construction will begin at the start of the 1996 construction season and will be complete, with an operating Third Runway, by late 2001. It is acknowledged that these dates are subject to change.

Preliminary Construction Phasing Concept

Considerable work has been done on developing a preliminary construction phasing concept for the Third Runway. A draft working paper on construction phasing concepts is contained in Appendix 5 of this report. This work is summarized in the following text.

For the purposes of developing a preliminary construction phasing concept, major elements of the project were identified and investigated.

These major project elements were isolated for discussion and evaluation only, without suggesting that they will become separate development or construction packages. A development or construction package may include several of these elements, as dictated by site area characteristics, phasing, scheduling, operational requirements, funding, etc. For some of the facilities and site areas, the process of site selection, corridor and alignment study, property acquisition, design and procurement may be more time consuming than the construction. The lead times for these activities must be realistically estimated and incorporated into the phasing and scheduling plan.

The major project elements are listed below:

- Property Acquisition and Relocation Program
- Other Property Interests and Improvements
- Permitting and Environmental Requirements
- Existing Airport Facilities to be Maintained, Relocated or Replaced
- Relocation or Modification of Public Roads
- Off-Site Fill Sources, Transportation and Stockpiling
- Relocation or Modification of Major Drainage and Utility Lines
- Security Fencing and Site Access
- Demolition and Clearing
- Airfield Site Development
- Airfield Pavement, Electrical and Final Grading
- New Navigational Aids and Other FAA Facilities for Third Runway
- Other New Airfield Support Facilities

Project Zones and Preliminary Site Areas

Within the Third Runway project area, there will be sub-areas of "zones" in which the work conducted in each zone will have a different level of impact on airport operations, on property interests and acquisition, or on the schedule. The project area can be divided into five such major zones. The zones cover the airfield construction site as well as all other areas affected by the construction. the zones consist of the following:

- Zone A - Includes the airside area east of Grid Line E 12,600. work at various locations within this zone will require short-term closing of existing runway and taxiway segments which are essential to current airport operations.

- Zone B - Includes the airport area west of Grid Line E 12,600 but inside the existing AOA security fence. All work in this zone will be at least 400 feet west of the Runway 16R-34L centerline, thus not preventing runway operations during construction. Work requirements in this zone are still critical to operations.

- Zone C - Includes all existing Port property which is not in either Zone A or Zone B. All of Zone C is "landside" (outside the AOA security fence).

- Zone D - Includes all land not currently owned by the Port on which construction of the runway and related facilities, such as relocated roads, will be accomplished. Construction within Zone D may also include indirectly related items, such as berms and landscaping to reduce noise impacts on the community.

- Zone E - Includes property which the Port is not necessarily required to acquire in fee for the project, but which may be affected by the project. The Port or others may obtain some interest in properties in Zone E to control activities, or may require certain improvements. For some properties, actions will be required before construction of the runway can begin. For other properties, actions will be needed only prior to the beginning of operations on the new runway.

Each zone can be subdivided into preliminary site areas to enable a more detailed examination of work requirements. A plan indicating the zones and preliminary site areas for the 8,500-foot runway concept is shown in Figure X-1. Each of the site areas is unique in its relationship to phasing development, because of the zone it is in, the existing facilities in the area and the new facilities to be constructed in the area. An evaluation of the various activities within each area and their relationship to other activities leads to the formulation of preliminary sequencing and phasing concepts. However, all of the work within each site area may not actually be accomplished in one phase or one construction package. For example, the site area containing the existing ASR is identified as an area in which runway construction must be delayed until the new ASR is in service, but the removal of the existing ASR, earthwork, paving, etc. in that area will probably be in several contracts. As more information is developed in later phases of design, the site areas can be rearranged and further subdivided as necessary for the management of information and refinement of phasing and scheduling. Eventually, construction packages including various work activities in several areas will be developed.

Preliminary Construction Phasing and Scheduling Concepts

Each preliminary site area has been evaluated with respect to the major project elements. From this evaluation, preliminary phasing concepts have emerged. A summary of major project elements and preliminary phasing concepts for each site area is provided in Appendix 5. Phase numbers have been assigned to the property acquisition and construction in each site area. The phase numbers indicate when work starts in a site area and the general priorities and sequencing of work. They are not meant to imply that all work in one site area or phase must be completed before work in the next area or phase begins. The summary also includes lines for the phasing of FAA facilities and other new support facilities. However, at this time there is insufficient information on some the facilities that may be required, and their proposed locations, to indicate phasing numbers. Rough schedules for construction of some FAA facilities are included in Appendix 5.

Appendix 5 provides a preliminary project schedule, based on rough time estimates for the various work elements in each site area. The schedule includes the following major milestones:

Area

- April, 1996 - Decision to build runway
- May, 1996 - Start property acquisition and construction on airport property for relocation of South 156th Street. D
- May, 1996 - Complete property acquisition program for other Zone D areas. Too optimistic! D
- June, 1996 - Start clearing of existing Port property and hauling of borrow material in Zone C. If this constitutes "start of runway construction," as discussed in the Flight Plan report, then up to 5000 eligible homes must be insulated by this date.
- August, 1996 - Construct first stage of temporary security fence, to convert Areas B-2 and B-3 to landside.
- September, 1996 - Divert normal west side vehicle traffic to temporary perimeter road.
- March, 1997 - If relocation of Miller Creek in Area D-11 is required, complete environmental and permitting requirements and begin relocation. D
- March, 1997 - Start construction of relocated South 156th Street alignment outside existing airport property. D
- September, 1997 - Divert public traffic to relocated South 156th Street alignment. D
- April, 1998 - If relocation of Miller Creek in Area D-12 is required, complete environmental and permitting requirements and begin relocation. D
- May, 1998 - Start construction of new ASR and ASDE facilities. D
- March, 1999 - Construct second stage of temporary security fence, to convert Areas B-4, B-5, B-6 and B-7 to landside.
- June, 1999 - New ASR and ASDE facilities in service.
- July, 1999 - First night work in Zone A, adjacent to Runway 16R-34L.
- September, 1999 - Start construction of new Weyerhaeuser facility.
- April, 2000 - Start construction of new FAA VHF transmitter and receiver facilities.
- July, 2000 - Start construction of FAA approach lights and other facilities at north end of runway.
- September, 2000 - New FAA VHF transmitter and receiver facilities in service.
- September, 2000 - Weyerhaeuser completes move to new facility.

- October, 2000 - Construct third stage of temporary security fence, to convert Areas B-8 and B-9 to landside.

- October, 2000 - Airfield construction complete in Areas A-1 through A-6, B-1 through B-7, C-2 through C-6, D-2, D-3, D-5 and D-6. Security fence constructed to make all of these areas airside and open to aircraft, for ground movement only.

- February, 2001 - Start construction of FAA approach lights and other facilities at south end of runway.

- October, 2001 - Project complete. Begin operations on new runway. According to the statement in the Flight Plan report, "another 5000 homes" must be insulated by this date.

Phasing and scheduling concepts will be refined as design proceeds and more information on the project is developed. The preliminary phasing concepts will help to identify design and management priorities. The direction of efforts according to these priorities will lead to phasing alternatives and improvements, which should provide time and cost savings. The ongoing process of information exchange, evaluation of alternatives and concept refinement should continue during the early design stages until a firm concept for overall project phasing and scheduling is established. This milestone must be reached fairly early to allow the development of budgets, property acquisition schedules, construction packages, final design details, etc.

Planning and Design Phasing

a/ In order to meet the anticipated construction phasing concept described above, it is essential to analyze the planning and design phasing activities to insure that all documents are available to proceed with the project. This preliminary engineering report develops the baseline concepts to be analyzed during the Master Plan Update and EIS studies. As the project evolves, it will be necessary to evaluate options and b/ refine the preferred concept. Property acquisitions will be a principal factor in the design and c/ construction schedules. Ample time and data, as well as legal requirements, must be built into the planning and design schedule to avoid future delays. Upon completion of the planning phase, final design for the project will begin. The following text describes activities which would occur during the planning and design phases of the project.

Preliminary Engineering 15 Percent Design

During this phase of the project, engineering support for the Master Plan Update and EIS would occur. It is anticipated that refinements and alternate concepts would be evaluated in relation to engineering feasibility and cost. A preferred alternative would be selected during the EIS process. The baseline concepts developed to date would be refined into the preferred alternative. It is recognized that parallel tracks for the Master Plan Update, EIS, and preliminary engineering would result in an iterative process and evolve into a preferred alternative.

In addition, formal siting studies would be required for navigational aids and radar systems. Specific sites would be identified and evaluated so that any impacts could be included in the Third Runway EIS. This would avoid possible complications caused by segmentation of the project.

The final tasks to be accomplished in the 15 percent design would be the construction and funding phasing. The preferred alternative would be the basis for defining sequence of activities, construction

packages, and funding requirements. Establishing cash flow projections and funding sources/revenue forecasts may dictate how the project would be constructed. Will it be done by 6/95 per PS schedule? We need copy

Property Acquisition

The property acquisition process could be very lengthy. Establishing the required property acquisition limits would be done during the 15 percent design phase. The next task would be the development of legal descriptions with survey data, title reports, and meets and bounds descriptions. Real estate appraisals would then be conducted to establish fair market value for the property. Purchase negotiation would then begin. If the Port was unable to come to terms with the seller, condemnation proceedings would occur. If a large number of properties were to go to condemnation, the schedule for property acquisition would be substantially longer than with willing sellers.

Final Design

Based on available data, it is assumed that some wetland mitigation and stream relocations would be required. The sequence of mitigation construction and project construction would be determined during the permitting process. For the purpose of this analysis, it is assumed that concurrent activities would occur.

Initial site development would begin with utility relocations and public road relocations. It is desirable to create the largest construction area practicable to allow contractors maximum flexibility for construction operations. By completing the relocation of South 156th Street, the construction site could be unified for continuous site preparation operations. It should be noted that property acquisition could affect the schedule for public road relocations. Access must be maintained to all properties not yet under the ownership of the Port.

The largest portion of design and construction work is the site preparation contract, which would install drainage and embankment for the runway. The site-preparation contract would be divided into phases to minimize impacts on airport operations and the public at large. Access to and from the site would be sequenced with the public road construction.

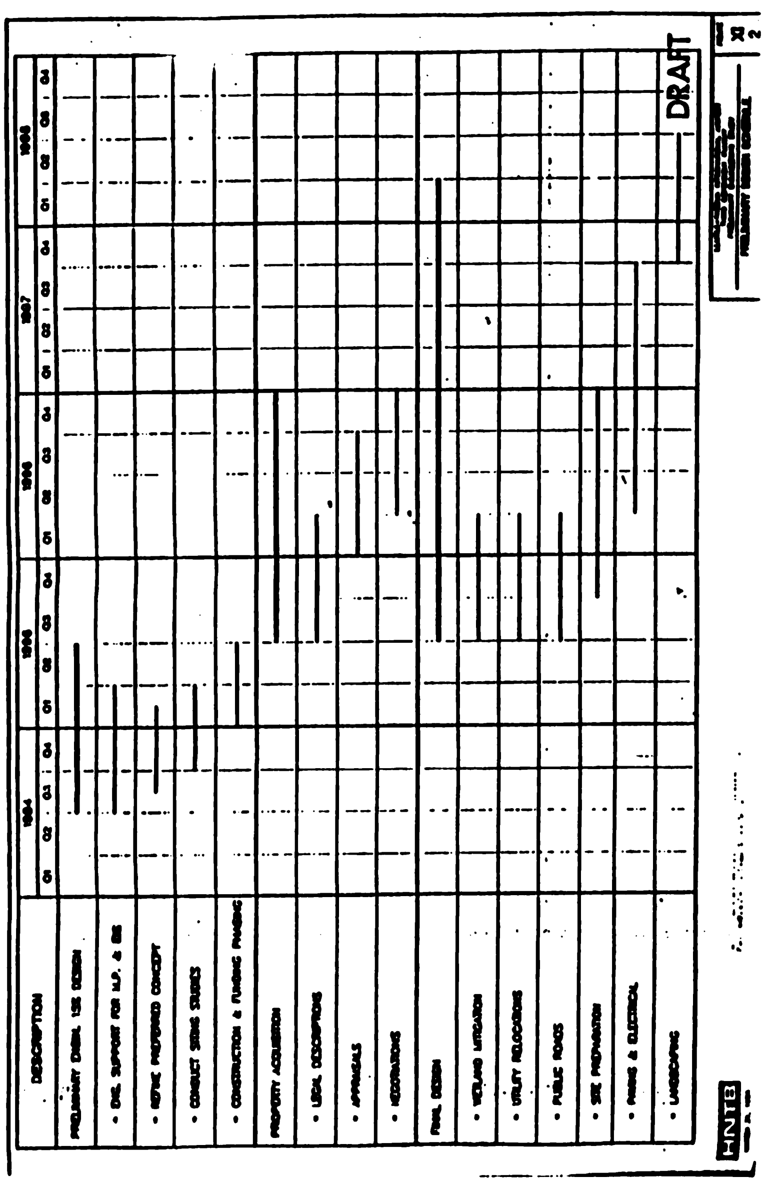
The final element of the runway project would be the paving and electrical contract. This contract would include placement of base material, airfield pavement, lighting and signing, and all other items required to provide an operational runway. Depending on project sequencing, the paving and electrical element could be divided into multiple contracts for funding or ease of construction. Information related to specific contract packages would be developed during the preliminary engineering 15 percent design phase.

In addition to the runway construction, there is a potential need for landscaping buffers and airport beautification to soften the visual impact of the new embankment slopes. A landscaping contract, if required, would be the last design and construction activity.

Preliminary Design Schedule

Figure XI-2 shows a conceptual design schedule for the project. It is intended to be a starting point for future scheduling activities. In order to allow the Port the ability to start construction in 1996, the planning and engineering activities must parallel the Master Plan Update and EIS projects. Upon acceptance of the preliminary engineering report, the 15 percent design activities would begin in order to provide adequate schedule duration for property acquisition and final design.

Did they? Thx.



243

Runway's future hinges on report

Crucial document to be out next week

By Stephen Clutter
Seattle Times South bureau

SEATAC — The debate over a proposed third runway at Seattle-Tacoma International Airport has been loud, long and expensive.

What's happened so far, though, is little more than a schoolyard skirmish compared with the battle that will begin next week when the Federal Aviation Administration releases a report that will help launch the project or kill it.

The best way to describe the environmental-impact statement to be released April 27 is to think of the Port of Seattle, which operates Sea-Tac, as a neighbor wanting to build a fence. The Port, after years of talking about the fence, finally is going around the block showing neighbors what it would look like, how disruptive it would be to build and what the Port might do to lessen some of the inconvenience.

But instead of a fence under construction, it's a runway — nearly two miles of pavement that would produce eight Kingdomes of fill dirt that would be trucked through neighborhoods, and more noise over the homes and schools of South King County residents, who say their lives are disrupted enough by jet noise from Sea-Tac.

[illegible] project can withstand legal challenges.

A coalition of opponents — including the cities of Burien, Federal Way, Tukwila, Des Moines and Normandy Park, as well as thousands of residents and several civic groups and schools — have a $1.9 million war chest to fight the runway.

The battle lines are likely to be drawn over major areas in the report such as these:

- **Air quality:** Concerns range from pollution from jet exhaust to fuel smelling up the air.

Although Port officials say the third runway would not contribute to many additional flights (they argue it simply would handle flights that would be coming anyway but which would be backed up without a third runway), the Port estimates an increase of 80,000 flights a year by 2020 even without a third runway. There now are 345,000 flights a year.

Opponents are bound to argue the third runway would contribute to the increase, not simply absorb it.

- **Noise:** Opponents expect the study to use Port computer-generated noise maps to show, even with the increase in aircraft traffic, the noise would be less because of quieter jet engines.

"They'll be saying black is white," said Matt Rosenberg, executive director of the Regional Commission on Airport Affairs, an anti-third-runway group.

- **Fill dirt:** Because 12th Avenue South, where the runway would be built, is lower in elevation than the existing runways,

PLEASE SEE Runway ON B 3

Report available

The full report [illegible] hundred pages [illegible] available [illegible] and at Kinko's [illegible] stores, where individuals can pay to have copies made.

A full report is [illegible] to cost $200 [illegible]

Upcoming report by FAA is crucial in runway debate

Runway

CONTINUED FROM B 1

nearly 17 million cubic feet of fill dirt would be needed.

Opponents will contend trucking that much dirt around South King County would be too disruptive and potentially dangerous to residents and the environment.

- **Land use:** Estimates vary depending upon whether Sea-Tac will build a 7,000-foot runway, 7,500-foot runway or 8,500-foot runway, but roughly 420 properties, including 320 residential pieces west of the airport, would be condemned, and not all the people living in those houses want to move.

The study is expected to be 200 pages long, with several hundred more pages of technical data.

"The problem with any EIS (environmental-impact statement) is it's not written in English but agency technical-babble that is difficult to understand," Rosenberg said.

Because of the size of the study and intense public interest, the public-comment period has been increased from the required 45 days to 90 days, said Michael Feldman, the Port's director of aviation planning.

After the public and various government agencies have a chance to comment, their concerns will be addressed in a final environmental-impact study to be released later this year. The draft and the final study eventually will help Port commissioners in their decision next year.

Commission President Paul Schell said the five-member panel is divided on the third runway and the environmental-impact statement will help commissioners make up their minds.

243

EXH. -24

Air freight carriers leave Sea-Tac for Boeing Field

By STEVE WILHELM

Two air cargo carriers are fleeing Sea-Tac International Airport's congestion for the more open skies of Boeing Field, and more carriers hope to follow.

The two, Airborne Freight Corp. and Burlington Air Express, say they're moving to avoid delays, which have become a growing problem as the volume of passenger traffic through Sea-Tac has mounted to record levels.

Overnight freight firms are particularly sensitive to delays, because their flights must mesh with delivery vehicles and sorting operations at hubs.

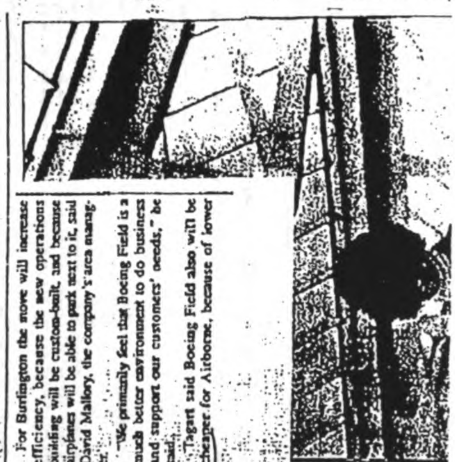
"Ten minutes is a lifetime in the airline business," said Tom Tagart, Airborne manager of express support services, adding that that Airborne planes have increasingly been forced to sit on taxiways, waiting for clearance to take off. "That is an advantage at Boeing Field: we don't have that long wait."

Other established carriers, including DHL Worldwide Express, Federal Express and "two or three others," have contacted Boeing Field executives to explore the possibility of moving, said airport manager Cal Hoggard.

"We're actually trying to turn people away, because we don't have capacity," said Hoggard. He said one of the goals of the airport's upcoming master plan will be to reshuffle airport land use to generate more space there.

"We're interested in cargo, and finding some space for them," he said. "We feel it generates 10 times the economic benefit of any other function in there, in terms of jobs."

Boeing Field is formally called King County International Airport, and is operated by the county.



Airborne Freight expects its planes to suffer fewer delays at Boeing Field, as does Burlington Air Express.

For Burlington the move will increase efficiency, because the new operations building will be custom-built, and because airplanes will be able to park next to it, said David Mallory, the company's area manager.

"We primarily feel that Boeing Field is a much better environment to do business and support our customers' needs," he said.

Tagart said Boeing Field also will be cheaper for Airborne, because of lower landing fees and lease costs, but Mallory said Burlington's costs will be about the same.

Neither expects to move back to Sea-Tac, even if the proposed third runway is built.

The two companies join United Parcel Service, which has run its cargo operations out of Boeing Field for many years. Federal Express moved the other way five years ago, from Boeing Field to Sea-Tac, after purchasing Flying Tiger, an international cargo carrier.

Boeing Field planning manager Julie Rodwell said the cargo moving through Boeing Field grew 10.9 percent last year, while it increased 5.5 percent at Sea-Tac. However, Boeing Field's overall volume is far smaller, and the airport is ranked 75th in the nation, compared to Sea-Tac's 17th-place ranking, she said.

Burlington operates a daily DC-8 flight, arriving in the morning and leaving in the evening, connecting to its hub in Toledo, Ohio. It employs about 100 in the area.

Airborne operates three flights daily to California, Alaska and its hub in Wilmington, Ohio.

(2)

Bill Liddicoat, Sea-Tac manager of market development, said he believes Sea-Tac will remain dominant in international cargo handling, even if it loses some of the strictly domestic cargo carriers to Boeing Field.

This is because most international air cargo is carried in the bellies of passenger planes, and must be able to move cargo quickly to connect with other flights. But domestic cargo carriers, like the ones that have moved, tend to operate their own fleets of planes and to carry cargo between specific domestic points.

"It's unlikely that anything like all of the carriers will elect to follow Airborne and Burlington down there," Liddicoat said.

All-cargo flights represent less than 5 percent of Sea-Tac's 353,000 annual flight operations, which grew 6 percent last year.

Airborne relocated to existing facilities at Boeing Field in February, while Burlington will move later this year, after it builds a new 35,000-square-foot warehouse center.

243

EXH. 25

Recent efforts have helped improve the understanding of wake vortices by obtaining the wake vortex signatures of B-757 and B-767 aircraft and by measuring the characteristics of wake vortices under varying meteorological conditions. However, much more research is required before wake vortex associated spacing criteria can be revised.

Capacity

3.2 Improved Longitudinal Separation on Wet Runways

Air traffic control procedures include minimum longitudinal separation standards for aircraft in approach streams inside the final approach fix (FAF). The separation distances vary from 2.5 to 6 nm, depending on the relative sizes of the leading and trailing aircraft. The minimum separations are intended to protect the trailing aircraft from the leading aircraft wake vortices. The minimum separation is also set to avoid situations in which the trailing aircraft lands before the leading aircraft has exited the runway.

In 1986, the FAA implemented a procedure that allowed a reduction of separation inside the FAF from 3 nm to 2.5 nm, provided that the runways were clear and dry and the runway occupancy time was 50 seconds or less. An effort was then undertaken to determine if the procedure could be used for arrivals on wet runways. Studies conducted in 1989 at Atlanta Hartsfield International Airport and Dallas-Fort Worth International Airport indicated that wet runway occupancy times are the same or less than dry runway occupancy times.

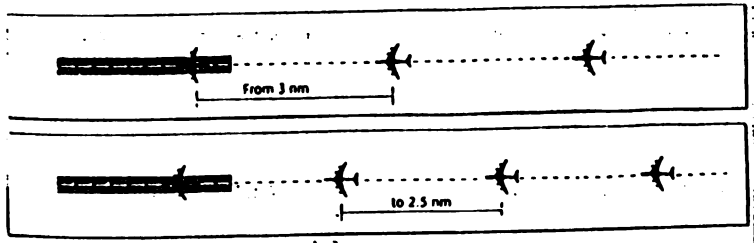
$3 \div 2.5 = 1.2 = 20\% \times 29$ AAR for 1 RW (Ch. 3-3) = +5.8 AAR

The FAA amended the national standard in June 1992 to allow reduced in-trail separation of 2.5 nm when runways are wet. The average capacity gain expected from this improvement is 3 to 5 arrivals per hour.

The FAA then initiated demonstrations at selected airports to determine the feasibility of allowing reduced longitudinal separation inside the FAF when runways are wet. Due to the success of the demonstrations, the FAA amended the national standard in June 1992 to allow reduced in-trail separation of 2.5 nm when runways are wet, and this new minimum separation was extended to a point 10 nm from the airport. The average capacity gain expected from this improvement is 3 to 5 arrivals per hour.

ATCH, fig 5-72 ... why not 5.8 AAR per hour?

Improved Longitudinal Spacing on Wet Runways



U.S. DEPARTMENT OF TRANSPORTATION FEDERAL AVIATION ADMINISTRATION
LDA/DME SPECIAL INSTRUMENT APPROACH PROCEDURE
FLIGHT STANDARDS SERVICE

Bearings, headings, courses and radials are magnetic. Elevations and altitudes are in feet, MSL, except HAT, HAA, TCH and RA. Altitudes are minimum altitudes unless otherwise indicated. Ceilings are in feet above airport elevation. Distances are in nautical miles unless otherwise indicated, except visibilities which are in statute miles or in feet RVR.

ATTENTION ALL USERS OF THE LDA/DME RWY 28R

The LDA approach has a steep descent gradient and requires careful planning to ensure a stabilized approach. Avoid crossing over into the runway 28L final approach course. The Runway 28 Right Precision Approach Path Indicator (PAPI) must be operational. The PAPI glide path is coincident with the ILS RWY 28R Glide Slope. Simultaneous LDA/DME RWY 28R and BAY ILS/DME RWY 28L approaches may be conducted during daylight hours only, when the weather is reported as follows:

1. A ceiling of at least 2,100 feet and visibility of 6 miles is reported by the Automated Weather Observing System (AWOS) located at BRIJJ outer compass locator, and a ceiling of at least 1,900 feet and visibility of at least 6 miles is reported at SFO. Or, if the AWOS is inoperative.

2. A ceiling of at least 2,100 feet and visibility of 6 miles is reported by SFO Tower.

Simultaneous approaches will not be used when the crosswind component at SFO is greater than 10 knots. RADAR monitoring will be terminated when visual separation is accepted by the pilot on either approach. The distance between the LDA course and the runway 28L localizer course is 6317 feet abeam the LDA/DME RWY 28R missed approach point (MAP). The distance between the runway centerlines is 750 feet.

The trailing aircraft on either approach will be instructed to maintain visual separation from the leading aircraft after that traffic has been reported in sight. A clearance to maintain visual separation requires the pilot to see and avoid the other aircraft, to keep that aircraft in sight at all times, and to provide wake turbulence separation. Promptly notify the controller if you lose sight of the other aircraft, are unable to maintain constant visual contact with it, or cannot accept the responsibility for your own separation for any reason. Aircraft conducting these approaches SHOULD NOT pass each other, fly wingtip to wingtip or abeam, except in the landing phase of flight, i.e., at or below 50 feet AGL. If a passing situation becomes imminent, immediately notify the controller and consider executing a missed approach.

ATC will provide speed information on the leading aircraft. ATC will stagger the following aircraft so that it is at least 3/4 NM behind the leading aircraft when the leading aircraft passes over or abeam the LDA MAP (4.6 NM from runway threshold), regardless of which approach is being flown. This distance does not represent a separation standard, but is used to prevent aircraft from passing.

Heavy jets/B757 will be placed behind lighter aircraft and instructed not to overtake the lighter aircraft regardless of the approach being flown. Other aircraft will be sequenced on either approach to ensure that any aircraft, including another heavy jet/B757, is provided wake turbulence separation behind a heavy jet/B757 on the same or adjacent final approach course (4 miles for a heavy behind a heavy, 5 miles for a large behind a heavy, 6 miles for a small behind a heavy, 4 miles all aircraft behind a B757).
The use of simultaneous approaches is TCAS sensitive.

The 284 degrees - 3.2 NM visual segment is the direction and distance from the MAP to a point 1.4 NM from the runway 28R threshold and does not account for maneuvering necessary to align the aircraft with the runway centerline.

In the event of a go-around/balked landing inside the LDA MAP, a climb gradient of 330 feet per nautical mile has been established to ensure terrain clearance.

It is requested that pilots complete the SFO LDA Approach evaluation form or a NASA ASRS form for each approach flown.

Please direct any questions to the Assistant Manager for Plans and Procedures, Bay TRACON, at (510) 273-6005.

CITY AND STATE	ELEVATION: 11	TDZE: 28R 11 / 28L 10	FACILITY IDENTIFIER	PROCEDURE NO / AMDT NO / EFFECTIVE DATE	SUP:
	AIRPORT NAME:				AMDT: NONE
SAN FRANCISCO, CA	SAN FRANCISCO INTL		I-SXZ	LDA/DME RWY 28R, ORIGINAL	DATED:

FAA FORM 8260-10 / May 1993 (computer generated) Page 2 of 2 Pages

EXH.4

241

243

K Inc. Aviation Marketing & Management Consultants

90-45

c.2

AIRLINE MARKET POTENTIAL
AND OPERATIONAL FEASIBILITY
OF FIVE AIRPORT SYSTEM ALTERNATIVES
IN THE PUGET SOUND REGION

Prepared For The
Puget Sound Council of Governments

April 1990

Kurth & Company, Inc.
4400 MacArthur Boulevard, N.W., Suite 303
Washington, D.C. 20007
(202) 342-1691

243

TABLE OF CONTENTS

KG Inc

243

TABLE OF CONTENTS

KG Inc.

AIRLINE MARKET POTENTIAL AND OPERATIONAL FEASIBILITY OF FIVE AIRPORT SYSTEM ALTERNATIVES IN THE PUGET SOUND REGION

I. Introduction and Executive Summary

A. Introduction

The Puget Sound Council of Governments (PSCOG), the regional planning organization for the central Puget Sound region, in conjunction with the Port of Seattle, the operator of Sea-Tac Airport, will jointly prepare a long-term air carrier airport system plan for the region. The project includes evaluation of five alternatives for providing an air carrier airport system to meet the needs of the region through the year 2020.

The five alternatives include (1) the base case, (2) an expanded Sea-Tac, (3) resource management, (4) multiple air carrier airports and (5) a new primary airport.[1]

The overall purpose of this study is to provide an assessment of the airlines' likely reactions to these alternatives. It includes identifying the airline market and operational factors that should be considered by PSCOG in developing and evaluating the alternatives. The primary focus of the study is a survey of airlines to determine which alternatives offer sufficient promise to justify a detailed evaluation.

Market factors include an overview historic and forecast socioeconomic trends, overall and major markets' passenger demand, market distance and airport access and proximity within the Puget Sound region. Operational factors include runway configuration, the number and size of markets served, the types of aircraft used and existing airside and landside facilities.

B. Executive Summary

The Puget Sound region is characterized by a healthy socioeconomic base that is forecast to continue to grow. By the year 2020 end date for the airport system plan, the region's population is estimated to total 4.1 million. This level will exceed the 1987 population of the San Francisco/San Jose area which supports a vibrant multiple airport system.

1. *See Table IV-4, p. 13 for an explanation of each alternative.*

In the year 2000, the region is forecast to generate 26.2 million total passengers (locally generated passengers plus passengers from other cities connecting at Sea-Tac). Locally generated passengers are estimated to reach 19.4 million, a level which will exceed the year end September 1988 counts of many multiple airport metro areas including Dallas/Ft. Worth, Washington, DC and Houston.

Unless facilities action is taken, the region's primary air carrier airport, Sea-Tac, is forecast to experience increasing and significant flight delays by the year 2000. Delays will average 30 to 45 minutes is clear weather conditions and 90 minutes or more in poor weather. To address the consequences of these forecasts, PSCOG has proposed exploring the five outlined airport system alternatives.

As part of this process, a survey of incumbent Sea-Tac airlines was conducted. Nine of thirteen carriers responded for a significant rate of 69%. Importantly, the majority of responding carriers indicated that the year 2000 forecast of Sea-Tac passengers was realistic.

Implementation of either of the two alternatives which avoid expansion of the air field (the base case and resource management) likely could result in the loss of flights and passengers.

X On the critical question of the preferred airport system alternative, no alternative won a clear majority. The Expanded Sea-Tac option was the most popular. Of the expansion choices, this option is the potentially least disruptive to incumbent carriers.

X Regarding the preferred site for the second airport under the multiple airport alternative, nearby Boeing Field was the most popular. This choice was followed by Paine Field. McChord and Bremerton ranked third and fourth, respectively. Importantly, two of five carriers responding to the shift question indicated they would move some services to another airport.

Assuming the new primary airport alternative, two carriers said they would shift all Sea-Tac services while four indicated some services would be shifted.

X In light of the forecasts of continued growth in passengers, the consequent increases in Sea-Tac flight delays and the carriers' lack of carrier agreement at this juncture on a preferred airport system alternative, it is recommended that PSCOG preserve its options. Accordingly, PSCOG should continue to evaluate all airport system alternatives, with the possible exception of the base case.

Although some of the major U.S. hub cities are not listed among Seattle's top 10 O&D markets, extensive single-plane services are available in these markets. This is due to the increased emphasis on development of connecting traffic over carrier system hubs, thus providing Seattle passengers with an increased number of service and fare options for reaching their final destinations.

3. Airport Access and Proximity within the Puget Sound Region

Airport ground access is a major concern of airlines in planning future service. Over time, road congestion will cause area passengers to utilize other modes of transport or other airports.

A PSCOG study of the accessibility of selected airport locations in the Puget Sound region revealed clearly that certain airports are more conveniently located to a majority of the region's population.[6]

In 1985 Sea-Tac, located 13 miles south of downtown Seattle, and Boeing Field, 5 miles south of the downtown area, provided the greatest number of travelers with minimum airport access times. Over 88% of the region's population could reach Sea-Tac in under 60 minutes average travel time, 70% in under 45 minutes. Nearly 91% could reach Boeing Field in under an hour, 69% in less than 45 minutes (see Map on following page).

Paine Field in Snohomish County had the best access rating among the airports outside King County, including McChord (Pierce) and Bremerton (Kitsap). Approximately 61% of the regional population could reach Paine in under 60 minutes compared to 45% for McChord and 25% for Bremerton. McChord, a military field, is located south of Tacoma, approximately 35 miles from downtown Seattle. Bremerton, in Kitsap County, is relatively isolated from the bulk of the regional passenger pool, accessible either by ferry across Puget Sound or via circuitous highway routing for much of the population.

---

6. *Assumes that air travel propensity is directly related to population density.*

CHART II-4

Percent and Amount of 1987 Regional Population Within Each Travel Time Category for Various Airport Locations

1985 Average Daily Travel Times

Airport	County	< 45 minutes %	< 45 minutes Amount (000)	< 60 minutes %	< 60 minutes Amount (000)
Sea-Tac	King	70	1,762	88	2,215
Boeing	King	69	1,737	91	2,290
Paine	Snohomish	45	1,133	61	1,535
McChord	Pierce	28	705	45	1,133
Bremerton	Kitsap	12	302	25	629

SOURCE: PSCOG Regional Airport System Plan, October 1987. Table II-1, this study (Population).

Chart II-5 shows that, in the year 2000, 85 - 88% of the region's population will be able to reach Sea-Tac or Boeing in under an hour. Paine will be accessible to 56% in under an hour while McChord and Bremerton will be accessible to 42 and 25% of the region's population, respectively. Even under congested conditions, Sea-Tac and Boeing will be reachable in under an hour by 73 to 84% of the population.

Comparison of access percentages between the base and forecast periods shows that increased road congestion in the Puget Sound region is expected to reduce the accessibility of all airport locations. The impact of increased access time to a regions primary airport(s) is illustrated by the increasing amounts of service available at secondary and even tertiary airports in major multiple-airport metro areas such the San Francisco Bay, Los Angeles, Baltimore/Washington and New York/Newark areas. Easier access and the availability of comparable quality services at a secondary facility are clearly significant factors weighed by regional passengers in making travel decisions and thus airlines in making service decisions.

3. Expanded Sea-Tac

Under this alternative, additional IFR capacity will be provided by a new runway within the existing airport boundaries. The additional capacity is expected to substantially reduce delays at the airport compared to those that would occur under the Base case.

Sea-Tac capacity enhancements will technically enable it to handle the region's forecast demand. From this standpoint, airline planners may find service to an expanded Sea-Tac an acceptable alternative for the future. However, as discussed earlier, forecast increases in Sea-Tac access times from surrounding areas in conjunction with population growth around other airports in these same surrounding areas may cause some creative airline planners to widen the focus of their service planning to the region to include a second Puget Sound region airport.

While somewhat removed geographically, Bellingham is a case in-point. Once one airline began service, a second Sea-Tac carrier followed. In short, while none of the established carriers necessarily want to be first, likewise, none want to be the last to expand.

Since Sea-Tac already has runways adequate for long range services to the Far East and Europe, a new runway likely will not have a perceptible impact on the types of markets serviced by Sea-Tac carriers.

4. A New Primary Airport

This alternative assumes that a new primary airport facility will be constructed with capacity to handle the region's air transportation demands through the year 2020. Land acquisition requirements and noise considerations likely will result in the airport being located at least thirty miles from the most intensely developed areas of the region.

Comparisons with the experiences of existing airport systems are not possible because no major new airports have been constructed since Dallas/Ft. Worth International in the early 70's. However, recent efforts by the City of Denver, the Twin Cities, and State of Arizona authorities for the development of new major jetports are instructive.

In January 1985, Denver officials approved plans to develop a new primary Denver airport to replace overcrowded Stapleton. The airport, to be located on 45 square miles of land 17 miles northeast of downtown Denver, will serve an estimated 80 million passengers by the year 2010. The existing Stapleton facility occupies 7.3 square miles and handled 32.4 million passengers in

H. Conclusions

The demographic and passenger data demonstrate a strong and growing socioeconomic/passenger base in the Puget Sound region. Port projections of year 2000 Sea-Tac passenger volume place it among metro areas such as Atlanta, Boston, Dallas/Ft. Worth, Denver and San Francisco based on those airports' actual YE 3Q88 O&D passengers. Even with its planned landside improvements, Sea-Tac's existing air/landside capacity will be inadequate to handle this growth, causing increasing congestion and delays before the year 2000.

PSCOG projections show a gradual change in the distribution of population within the Puget Sound region with Snohomish County (Paine Field) gaining 3 share points and King County (Sea-Tac) loosing the same amount. The overall concentration of population, and thus the air travel market, will continue to be centered around Sea-Tac in King County, followed by Snohomish (Paine Field) and Pierce (McChord) counties and then Bremerton.

In terms of airport access from around the region, Sea-Tac and Boeing Field will continue to be the most conveniently located for the greatest portion of the Puget Sound area's population. Paine Field, in Snohomish County, is the most accessible to the region's population in terms of access among the alternative airports outside King County, followed by McChord Air Force Base and Bremerton National.

The accessibility of a new airport cannot be determined since no potential sites have been identified. However, it would likely be less accessible than any of the existing airports discussed above, with the possible exception of Bremerton National.

1. Single-Airport Alternatives

As delays increase at Sea-Tac under the Base alternative, airport authorities and the airlines will be compelled to implement demand management procedures such as those prescribed by the Resource Management alternative. The severity and timing of this response will be a function of how much of the Sea-Tac service and Puget Sound passenger base and economic benefits local officials are willing to concede to other airports in the region.

Markets served with turboprop/smaller seat capacity aircraft likely will be among the first to feel the effects of such measures at Sea-Tac. The Port's forecast anticipates continuing near-term increases to 1995 in flight frequency followed by a frequency decline as traffic in these short-haul markets matures.

2. Service Under Multiple Airport Alternative

The market analyses of San Francisco and San Jose illustrate the likely role of a second airport in the Puget Sound Area. Sea-Tac would continue to be the area's primary commercial airport and international gateway.[19]

As noted at the beginning of this section, carrier post-deregulation marketing tactics focus on attracting both local and connecting passengers to maximize loads and revenues. In order to attract the required mix of local and through passengers/revenue, a viable alternate airport must either be a spoke providing service to and beyond a hub city or geographically located to be a hub (mini-hub) airport.

The Seattle/Tacoma area's geographic location makes establishment of a hub and spoke operation unlikely. Thus, only the largest markets with significant pure local passenger traffic components are candidates for shifting some existing demand to an alternate airport within the region. A second airport would primarily handle passengers in the short/intermediate range, i.e. under 1,000 nonstop miles. This could include Sea-Tac's largest O&D markets, Los Angeles, Portland, San Francisco, San Diego and Spokane, and other points in the western U.S. such as Denver, Las Vegas, Phoenix and Reno. Service would also likely be provided to major national hubs such as ORD and DFW.

Passengers drawn to this type of airport would be similar to SJC. In the year 2000-2020 timeframe, population bases surrounding both Paine and McChord will approach San Jose's 1987 population of 1.4 million.

Both Paine and Boeing have adequate runway facilities to handle the type of equipment that would be used in the above service alternatives (narrowbody jets such as the B-737 and MD-80's and commuter turboprop aircraft). Bremerton Airport in Kitsap County currently has a 6,200 foot runway that could accommodate larger commuter turboprops. An extension of Bremerton's runway to 7,500 ft. is planned which will permit air carrier operations. However, Bremerton is the least accessible airport for the majority of the Puget Sound population. McChord located in the southern portion of the region, has a 10,000+ ft. runway, but usage by commercial carriers would entail negotiation of joint civil/military use of the field, an unlikely occurrence while other alternatives exist.

---

19. Though San Jose accounts for 20% of the combined SFO/SJC O&D, SJC service has had a number of years to grow and mature. As recently as 1984, SJC captured only 15% of the combined SFO/SJC passenger pool.

7. Facilities/Staff/Vendor Support

Fundamental to the success of a second airport in any community is the determination by both passengers and carriers that adequate airport facilities and services are available to ensure efficient carrier operations and convenient passenger handling.

Passengers will expect all primary amenities of the "big" airport. Services such as adequate, convenient and reasonably priced parking, car rentals, downtown/hotel/motel taxi/shuttle services, restaurant/snack bar, business facilities (telephones, fax machines, meeting rooms), etc. are among the essential elements passengers expect at commercial airports.

From the carriers' perspective, adequate ticket counter/passenger check-in space and gatehold areas, "Jetway"-style loading bridges for passenger convenience and efficient aircraft turnarounds, clerical/support office facilities and cargo and small-package handling space, all at reasonable cost per unit (e.g., sq. ft.) and per traffic unit of measure (e.g., passenger, departure, pound, cubic ft.), are among the key items that prospective carriers will look for in assessing service to a second facility.

E. Conclusions

1. Single Airport Alternatives

The single airport alternatives have a common theme: airline service to handle forecast traffic by the year 2000 and beyond would be focused on one airport in the region. As such, each single airport alternative involves a different level of operational relief to the carriers currently serving Sea-Tac.

Implementation of the Base alternative likely will have the greatest (negative) impact of the three single airport alternatives on Sea-Tac airlines' airside operating costs. Congestion and delays resulting from overcrowded runway/airspace systems will increase airline personnel, fuel and maintenance expenses and disrupt schedule reliability at Sea-Tac and downline airports.

The Expanded Sea-Tac alternative will provide added runway capacity, thus enhancing airside operations for all airlines. While clearly an operational asset, the addition of a new runway at Sea-Tac will not eliminate the operational problems and surely will generate environmental/political problems that have led SFO and BOS to decide against adding runway capacity in the immediate future.

2. Airfield Capacity Problems

Two carriers stated in response to Question 5 that Sea-Tac delays were attributable to airfield capacity while seven indicated that airfield capacity was not the cause of the delay problem. As compared with other airports' delays, no carriers indicated that Sea-Tac was one of the best, four indicated it was about average and one carrier (a regional) stated that Sea-Tac was one of its worst delay airports.

Regarding reactions to future delays at Sea-Tac, three carriers indicated they would make no adjustments, three stated they would avoid peak hours, seven (including the responding regional) would use larger aircraft, one would reduce Sea-Tac service and two (the cargo carriers) would opt to serve a second area airport.

Finally, eight of the carriers indicated that airport capacity was a major concern to their companies while only one stated it was not a concern.

3. Area Airport Alternatives

In ranking the airport system alternatives, the carriers not surprisingly, opted for the status quo over more significant changes (Question 9). Specifically, on a composite basis, the carriers preferred an expanded Sea-Tac. This alternative was followed by the base case and resource management, which were tied as the second selection. The new airport alternative ranked third, and the multiple airport alternative ranked fourth.

There was no consensus on alternatives not worth pursuing (Question 10). The largest response (only three carriers) indicated that the base case alternative was not worth pursuing. Two voted for the new airport alternative while one each opted for the multiple airports and for the resource management alternatives. Overall, three of the seven responses to this question were posted by the cargo carriers, which suggests that the passenger carriers are not ready to make a decision on this point.

Likewise, there does not appear to be a consensus on adjustments to nonstop service under the various alternatives (Question 11). Of the large passenger carriers, three would and three would not adjust nonstop service under the base case, expanded Sea-Tac and resource management alternatives. The regional carrier would adjust nonstop under the expanded Sea-Tac alternative. The multiple airport alternative would cause two carriers to adjust nonstop service but four would not. Finally, under the new airport alternative, four carriers would adjust service and four would not.

4/90 Kd

Again responses varied to the service adjustment and aircraft mix questions (12 and 13 respectively) relating to the three Sea-Tac based alternatives.

Regarding the preliminary satellite airport preference, Boeing Field ranked first (despite the prospect of airspace conflict with Sea-Tac), followed by Paine Field. McChord Air Force Base ranked third and Bremerton fourth (Question 14).

In response to Question 15, regarding shifting of services, under the multiple airports alternative, no carrier would shift all of their services, two would consider shifting some services and five stated they would shift none of their services. Under the new airport alternative, two carriers consider would shifting all of their services, four would shift some and two (the all cargo carriers) would not shift any services.

primary airport, but it has not decided whether STIA will remain open in this alternative!

Of those carriers responding to Question 16 regarding the types of services to be shifted, under the multiple airport alternative, the one responding carrier indicated it would shift domestic medium haul services. Under the new airport alternative, of the three responding carriers, two would shift domestic medium haul services and one opted for a shift of domestic medium and long haul services.

Finally, all nine carriers wish to be kept informed on the progress of the plan.

4. Conclusion

A number of conclusions can be drawn from the survey results. First, four of the seven (57%) responding passenger carriers thought the year 2000 forecast was about right. In addition, eight of the nine (89%) responding carriers indicated that adequate airport capacity at major hubs such as Seattle will be a major concern to their companies.

In spite of these facts, the carriers, not surprisingly, generally opt for the closest status quo (lower cost) alternatives of expanding Sea-Tac over other options, particularly when large amounts of money appear to be involved. The satellite airport preference for Boeing Field (despite prospective airspace conflict with Sea-Tac) reinforces this preference and again appears to reflect the preference for as little change as possible for as long as possible.

Importantly, a number of carriers have indicated a willingness to shift some flights to an alternate or new facility. This is significant because traditionally it has been important to cause the first carrier to take the initiative on new services and, once that occurs, others follow for competitive response reasons. In fact this has occurred in the elongated Puget Sound area recently.

For years, no carrier was willing to serve Bellingham. Once PSA (now USAir) decided to serve the community, in competitive responses, Alaska Airlines and its feed carrier Horizon and United Express have decided to add Bellingham as a spoke on their Seattle hubs.

X Similar circumstances have prevailed at larger airports as well. Historically, both Newark and Washington Dulles airports had been underserved and no carrier was willing to make a major commitment to them. Once the initial carriers made major commitments to the facilities, other carriers followed and both airports now enjoy a full array of services.

Thus, the Flight Plan Steering Committee should recognize that it is not out of character that no carrier will take the lead either on a new or an alternative facility at this relatively early juncture. The Flight Plan Steering Committee nonetheless should continue its planning process, including all viable alternatives, with the understanding that the carriers will make the best competitive use of all economically viable facilities.

INDIVIDUAL CARRIER RESPONSES

	LARGE PASSENGER CARRIERS						REGIONAL PASSENGER	CARGO CARRIERS	
	AA	CO	DL	NW	UA	US	UAX	CO	FM
Preliminary Satellite Airport Preference?									
d. Multiple Airports									
i. Boeing Field	1	1	1	1	1			1	4
ii. Bremerton Airport	4	4	2	4	4			3	2
iii. McChord AFB	3	3	3	2	3			4	1
iv. Paine Field	2	2	4	2	2			2	3
Would you shift service to a new/alternate airport?									
d. Multiple Airports									
i. All									
ii. Some	MAYBE			X					
iii. None		X	X		X			X	X
e. New Airport									
i. All	MAYBE	X							
ii. Some	MAYBE		X	X	X				
iii. None								X	X
#15 = "Some", Type of Market To Be Served From new/ Alternative Airport									
d. Multiple Airports									
i. Market Mix									
- Domestic				3					
- International									
- Short-Haul									
- Medium-Haul				X					
- Long-Haul									
ii. Aircraft Mix									
- Narrowbody				35%					
- New Gen. Narrowbody				65%					
- Widebody									
- Total				100%					

K
qn

Exh. 28

did they begin?

report, the 15 percent design activities would begin in order to provide adequate schedule duration for property acquisition and final design.

XII. Preliminary Construction Cost Estimate

In order to establish a preliminary estimate of probable construction cost for the baseline runway options, it was necessary to assume specific elements for inclusion in the project. As the project is further refined through EIS studies, Master Plan, and 15 percent design, cost estimates and project alternatives will be more accurately defined. Estimates should be considered as order of magnitude conceptual costs used for comparative purposes. Costs for property acquisition and relocation, as well as mitigation costs, are excluded from this estimate. The Port of Seattle will develop these project costs based on information provided in the 15 percent design phase of the project.

Total estimated project cost for the 7,000-foot concept is $278,000,000 and $298,000,000 for the 8,500-foot concept. These order of magnitude estimates include costs for new and relocated FAA facilities. Airport, costs such as additional ARFF equipment and support facilities, have been excluded from this preliminary estimate. Future studies will be conducted to define the types of other equipment and other facilities required for the project. → Airport Rescue and Firefighting Facilities

Estimates of probable construction cost are based on currently available data and concept level analysis completed to date. Final project cost may vary substantially depending on the final project design. Information relative to project costs developed on preliminary engineering concepts must be used with caution, with a thorough understanding of the level of accuracy and intended purpose.

Exh. 29

Figure 2

Evaluation Summary of Airfield Options
Seattle-Tacoma International Airport Master Plan Update

	Options				Costs				Benefits	
#	New Runway Description	New Runway Length	Separation (from Rwy 16L/34R)	Stagger (north end)	Land Acquisition Cost (millions)	Runway Development Cost (millions)	RSA Upgrades, East Rwy Extension, Navaids (millions)	Total Option Cost (millions)	2015 Annual Delay Savings (millions)	% of 2020 Fleet Capable of Landing on this Length Runway
1	(Existing)	-	-	-	$0	$0	$0	$0	$ 0	-
2	Commuter	5,200'	1,500'	950'	$0	$29 - $33	$50 - $58	$79 - $91	$ 21	31%
3	Commuter	5,200'	2,500'	1435'	$42 - $48	$197 - $227	$58 - $67	$297 - $341	$ 116	31%
4A	Air Carrier	7,000'	2,500'	0'	$64 - $74	$271 - $312	$76 - $87	$411 - $473	$ 246	91%
4B	Air Carrier	7,000'	2,500'	1,435'	$69 - $79	$219 - $252	$60 - $69	$348 - $401	$ 246	91%
4C	Air Carrier	7,500'	2,500'	935'	$75 - $86	$234 - $269	$60 - $69	$369 - $425	$ 258	97%
5	Air Carrier	8,500'	2,500'	0'	$91 - $105	$288 - $331	$76 - $87	$456 - $524	$ 270	99%
6	Air Carrier	8,500'	3,300'	0'	$177 - $204	$520 - $598	$76 - $87	$773 - $889	$ 270	99%

243

Exh. 30

Seattle-Tacoma International Airport Capacity Design Team Project Summary

Recommendations

Improvements to Existing Airfield

1. Improved exit and taxiway construction
2. Reduce in-trail spacing to 2.5 nm
3. CAT I ILS on Runway 16L (IFR-1)
4. LDA approach to Runway 16L/34R and ILS to Runway 16R/34L
5. Noise abatement effect on departures
6. Install wake vortex advisory system

New Runway Improvements

Commuter Runway

7. Commuter Runway 17C/35C (converted Taxiway D)
8. LDA to Runways 17C/35C and ILS to Runway 16L/34R
9. Install wake vortex advisory system

Dependent Runway

10. Air carrier (dependent) Runway 16W/34W
11. LDA approaches to Runway 16W/34W
12. CAT I ILS on Runway 16W (IFR-1)
13. CAT II ILS on Runway 16W (over CAT I)
14. CAT I ILS on Runway 34W (IFR-1)
15. Staggered approaches to Runways 16L & 16W and 34R & 34W - 2.0 nm stagger
16. Staggered approaches to Runways 16L & 16W and 34R & 34W - 1.5 nm stagger
17. Operate Runway 16R/34L as primary runway versus Runway 16L/34R with Runway 16W/34W
18. Install wake vortex advisory system

Independent Runway

19. Air carrier (independent) Runway 16W/34W
20. CAT II on Runway 16W (only)

Demand Management

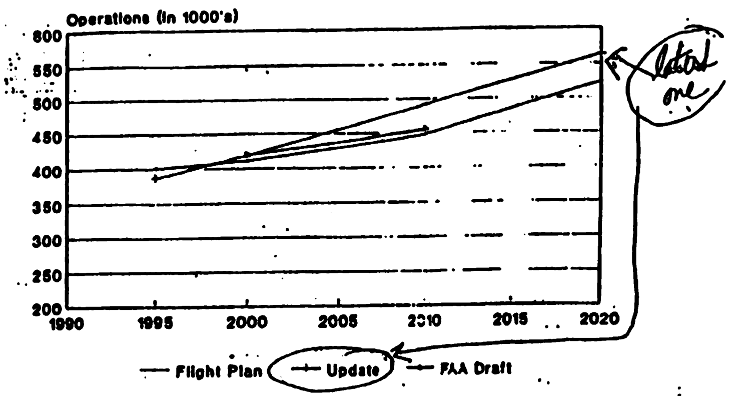
21. Uniformly distribute scheduled commercial operations

243

Exh. :

Figure 2-5

Range of Forecasts of Operations



Sources: Flight Plan Draft Final Report, 17 January 1992. Appendix B-71.

Flight Plan: Phase I Report, Phase II Report (Appendix J), and Airport Activity Report, Port of Seattle, 1990, p. 24.

Update: "Update of Passenger and Operations Forecasts for Seattle Tacoma International Airport" P & D Aviation, March 11, 1992.

FAA Draft: "Seattle-Tacoma Hub Forecast" (Draft), FAA Office of Aviation Policy and Plans, June 1992.

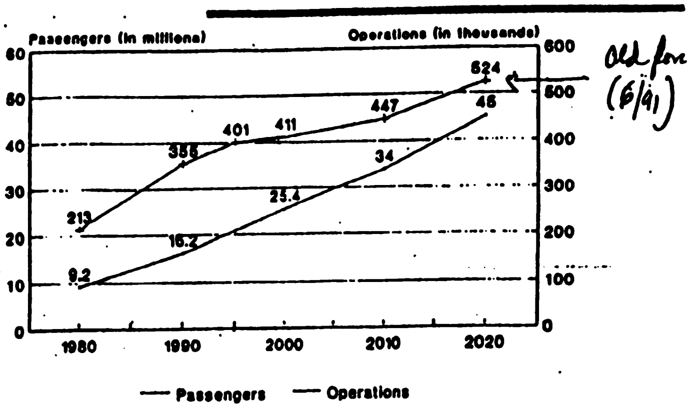
Same company that did 3/94 forecast

243

Exh. 31

Figure 2-2 -

Forecast of Air Travel Demand Passenger and Operations



Source: Phase I Demand and Forecasts, Flight Plan, July 1990 (as amended in Phase II Development of Alternatives, Appendix J, June 1991)

Note: Efficient Sea-Tac operating level is 380,000 operations per year.

243

Exh. 32

TABLE 2-1
SUMMARY OF AVIATION FORECASTS FOR
SEATTLE-TACOMA INTERNATIONAL AIRPORT,
1993 TO 2020 [a]

Page 2 of 3

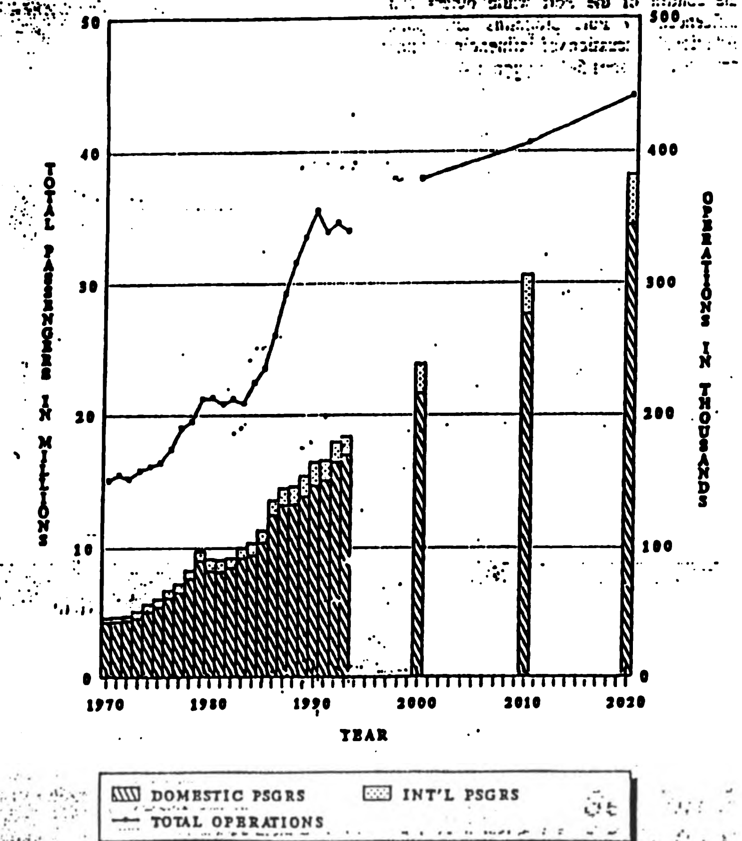
Forecast Element	Actual 1993	Forecast 2000	Forecast 2010	Forecast 2020
Annual Aircraft Operations (Thousands) and Annual Growth Rates				
Total Annual Operations	339.5	379.2	405.8	441.6
(Average Annual Growth Rate)		(1.6%)	(0.7%)	(0.8%)
Annual Operations by Type Aircraft				
Air Carrier	200.0	237.0	272.0	309.0
(Average Annual Growth Rate)		(2.5%)	(1.4%)	(1.3%)
Air Taxi/Commuter	131.0	133.0	124.0	122.0
(Average Annual Growth Rate)		(0.2%)	(-0.7%)	(-0.2%)
General Aviation	8.1	8.9	9.5	10.3
(Average Annual Growth Rate)		(1.4%)	(0.7%)	(0.8%)
Military	0.3	0.3	0.3	0.3
(Average Annual Growth Rate)		(0%)	(0%)	(0%)
Total	339.5	379.2	405.8	441.6
Annual Airline Operations by Type Service				
Passenger Service				
Domestic Air Carrier	180	210	238	266
Domestic Air Taxi/Commuter	106	100	88	86
International to Canada	26	34	40	44
Other International	3	6	7	8
Subtotal Passenger	315	350	373	404
All-Cargo Service	16	20	23	27
Total Airline	331	370	396	431
Peak Hour and Daily Aircraft Operations				
Operations in Peak Hour of Average Day				
Peak Month				
Air Carrier	48	57	65	74
Air Taxi/Commuter	26	26	24	24
General Aviation	2	2	2	3
Military	0	0	0	0
Total	76	85	91	101

480,c plan'd. STIA w/3rd runw. schedule 2030 (478. will grow

SEATTLE-TACOMA INTERNATIONAL AIRPORT

Exh. 32

FIGURE 2-1
TOTAL PASSENGER AND OPERATIONS FORECASTS FOR SEATTLE-TACOMA INTERNATIONAL AIRPORT



December 9, 1992 Meeting Minutes/23

Ex. 1.33

Miller commented: With respect to hub airports, "we may be moving away from the hub-and-spoke system and that would be a main reason for doing so. As those hubs start to become chokepoints, then if you can have a flight that goes directly from a less congested airport to another less congested airport, that is the way the system would start to move."

Poor predictability

In response to a question from Bob Evans regarding whether the proposed third runway could later be expanded, Field replied that "one of the objectives the Port of Seattle's planning would undertake would likely be to determine that."

Miller added: "That westernmost runway is going to require a significant amount of fill at the length proposed. I don't know whether, if it were longer, the topography on the west side that drops off would allow for that or not. For a while, if you only have a few superlarge aircraft, the FAA can handle that by making sure that those aircraft are slotted to land on the eastern runway and that those lighter or smaller aircraft are slotted to land on the western runway. If you start getting a heavy mix of really big planes, then they are going to get very annoyed at trying to do gyrations in the sky to get them on the right side of the airport." The matter will be examined within the EIS, because "one issue for us to consider in dealing in an interlocal agreement with the communities is whether there is a way to agree to cap the length of that runway, to make sure that those who are concerned about the future have some predictability that [the runway] will not be expanded."

In response to another question from Evans, Miller replied that she has not heard "any serious discussion about regulations which would lead back to an old Civil Aeronautics Board-type situation where we actually have the federal government determining slots. I have asked that question and I have heard nothing to indicate that it is likely." Since the main problem is weather-related, however, Miller added that "you would have to see a radical [downward] change in the number of operations before a third runway would not be needed."

Demand Mgmt, Gate controls

In response to another question from Evans, Miller stated that airlines may be assigned routes at specific times. "As long as you keep that number of slots relatively restricted, you can be sure that those airplanes are going to be full, or virtually full."

Field added: "Airplanes are flying fuller now than they were under regulation."

<u>Work Session and Project III Status Report (*Cambridge Systematics, Inc.*)</u>

Present from Cambridge Systematics were Lance Neumann, President, and Tom Harvey, Project Manager.

Neumann began: "We were engaged to conduct Project III, entitled 'a transportation systems evaluation of air transportation policy options in Washington.' What that means in terms of focus is what the interconnections between the air mode and other modes in transportation serving the state of Washington are, whether we need to think about some issues that relate these modes together, and how we deal with them now and in the future. In essence, that is the focus of what we are doing. What I will do is to identify key issues in the work program, describe the project approach, and identify some of these intermodal issues." Those issues were provided in the project's draft task 1, element 1 working paper. "We are happy to take your written comments on that report, as well as your questions and comments today. I will then talk a bit about the next task that we will be conducting—identifying opportunities on a system planning basis to look at the connections between the air transportation system and other modes in the state of Washington."

244

July 1995

REC'D ANM-610
PLAN, PGM, & CAP BR
AUG -7 1995
ANM-610

Federal Aviation Administration
Dennis Ossenkop
Airports Division, ANM-611
1601 Lind Ave. S.W.
Renton, WA 98055-4056

Dear Sir:

As a part of the ongoing debate on the third runway issue and Environmental Impact Study comment period, I wish to register my objection to the change in air-traffic patterns over Southeast Seattle in advance of the final decision on the third runway.

Recent changes in air-traffic patterns are adversely affecting our way of life. Noise levels are increasingly oppressive. It is our understanding that changes in air-traffic patterns are prohibited without an Environmental Impact Study. We are concerned that our community was not included in any study of the air-traffic patterns current or future. R-5-4

Please record my objection to the change which has occurred in air-traffic patterns and which is adversely affecting the quality of life in and around the communities of Southeast Seattle. R-5-5

Respectfully,

Signature

Amy Shinyeda
Name

3245 S. Ferdinand
Address

Seattle, Wa 98118
City, State, Zip

245

19635 Marine View Drive SW
Normandy Park, WA 98166

REC'D ANM-610
PLAN, PGM, & CAP BR
AUG -7 1995
ANM-610

August 3, 1995

Mr. Dennis Ossenkop
ANM-611, Federal Aviation Administration
Northwest Region, Room 540
1601 Lind Avenue SW
Renton, WA 98055-4056

Dear Mr. Ossenkop:

We have reviewed the Draft Environmental Impact Statement for Proposed Master Plan Update Development Actions at Seattle-Tacoma International Airport. In general, this document clearly shows that the airport communities will continue to be assaulted by the unavoidable and unmitigatable environmental and social impacts of SeaTac Airport as it exists today and as it is proposed to be expanded. The EIS's numerous unsubstantiated pronouncements and narrow-minded analyses show that there is a lack of understanding about how people live, work and play within the airport communities.

Do the authors think that all people do here is seek refuge from the incessant aircraft noise by holing up in our homes and never going outside or opening windows and doors? Do they think that we don't care about displacement of up to 649 neighbors and 105 businesses? Do they think that because a very unique farm nestled in a sea of asphalt doesn't bring joy to our hearts when we annually purchase pumpkins and Christmas trees, or even when we simply walk/drive by? Our comments center on the added undue and unfair burden that the Proposed Master Plan Update Develoment Actions will place on the people of the airport communities who are already significantly impacted by the airport.

Chapter IV, Section 1, Noise Impacts

We live in Normandy Park which is almost entirely excluded from the General Study Area (Exhibit III-2). Therefore, except for some general statements that residents who are disturbed by noise less than DNL 65 could continue to be impacted, it is impossible to ascertain the noise impacts that would be incurred by most Normandy Park residences. We are currently significantly impacted by aircraft noise. Indeed, as we write these sentences in our basement we are disturbed by aircraft noise every two to three minutes. And yet, no homes in Normandy Park qualify for the touted Noise Remedy Program. At a minimum, under all alternatives, including Alternative 1 (Do Nothing), the Noise Remedy Program should be expanded to include homes in Normandy Park and other neighborhoods which are subject to similar aircraft noise levels. We disagree that no additional mitigation would be needed. R-5-2 R-7-38

Moreover, even though the Noise Remedy Program helps to reduce noise levels in homes, it does absolutely nothing to reduce noise outside homes and within homes R-6-31

1

with open doors and windows. Under all alternatives, other noise abatement and mitigation planning efforts must be agressively and continuously implemented to reduce noise heard outside homes. This mitigation should include installing noise barriers and berms where applicable and extensive planting of trees throughout the affected communities and the airport. R-6-31

Chapter IV, Section 2, Land Use

The EIS is selective about which relevant portions of local and regional land use plans to examine for compatibility with the Master Plan Update alternatives. All mandatory comprehensive plan elements of RCW 36.70A.070 have provisions which apply to the proposal. For example, how is the Master Plan Update Development Actions compatible with housing affordability given the loss of up to 649 homes, many (if not all) of which qualify as affordable? How does their displacement impact affordable housing targets established by the King County Countywide Planning Policies and City and County comprehensive plans? What does the displacement of 649 homes and 105 businesses do to the growth targets for households and employment established by the Countywide Planning Policies? R-8-20

Another example of analysis and impacts overlooked is the critical area and resource lands designations and regulations required by RCW 36.70A.170 and .060. All of the local comprehensive plans cited by the EIS have (or will have) designated critical areas and, if applicable, resource lands (including designated mineral resource sites). These jurisdictions also have (will have) regulations for critical area and resource lands protection. The EIS should identify these critical area and resource lands designations and discuss how the regulations will be used to mitigate impacts caused by the Master Plan Update alternatives. R-7-11

The EIS does not show that the Master Plan Update Development Actions are compatible with the essential public facility policies of the King County Comprehensive Plan. Namely, it cannot pass the test of F-220 which states in part, "...No single community should absorb an inequitable share of the facilities and their impacts...". Indeed, by the EIS's own description of the affected environment it is clear that the airport communities already have absorbed an inequitable share of this facility and its impacts! Additional airport development actions will only skew equity further as evidenced by the numerous unavoidable and unmitigatable adverse imacts proclaimed by the EIS. The Update Development Actions are inconsistent with policy F-220 which means the EIS has failed to satisfy F-222. This policy requires siting of essential public facilities to consist, among other requirements, of "an analysis of the proposal's consistency with policies F-217 through F-221".

Chapter IV, Section 5, Prime and Unique Farmland

While the Vacca Farm may not qualify for protection under FPPA criteria, it is nonetheless an outstanding and unique asset to the airport communities, if not the region. The farm is obviously economically viable to its owners if it hasn't been converted into apartment houses as it is zoned. The row crops produced by the farm provide food to local markets, and pumpkins and Christmas trees are provided directly to residents seasonally. It is a joy to have this farm as part of our communities. To proclaim that no mitigation is necessary by its acquisition is an outrage! Losing this farm should be addressed under the social impacts of Chapter IV, Section 6. Mitigation under all alternatives should include keeping the farm and R-7-19

its operation intact into perpetuity; a demonstration farm funded and maintained by the Port of Seattle. R-7-19

Chapter IV, Section 6, Social Impacts

Please understand that acquiring homes to mitigate adverse noise impacts may mitigate such impacts to the individual home owners involved, but it permanently degrades the airport communities. Displacement areas become unmaintained barren wastelands imprisoned by imposing chain-link fences while they are "held in reserve for future compatible uses". Displacement significantly changes community character. Residents, visitors, potential home buyers, etc. are certainly negatively influenced by this dramatic exiling of homes and entire neighborhoods. Moreover, the "future compatible uses" are hardly compatible to residential land usē, such as the proposed Des Moines Creek Technology Campus. In the case of the North SeaTac Park, no jurisdiction can afford to develop, operate and maintain it, so it is a monkey on everyone's back. The displacement of the West SeaTac neighborhood will be no exception. There is no possible way that the loss of this wonderful neighborhood can be mitigated, particularly if the West SeaTac Subarea Plan recommends any land use other than open space. Mitigation under all alternatives should include keeping displacement areas as safe, clean, well-maintained, public accessible open spaces which are fully funded into perpetuity by the Port of Seattle. R-8-11

Chapter IV, Section 11, Wetlands

If weland compensatory mitigation for the "worst-case scenario" or otherwise cannot be achieved within the same watershed as the impacted wetlands, then by no means should alternatives 2, 3 or 4 be allowed. Wetland mitigation outside the watersheds is simply and clearly unacceptable given existing environmental problems in these watersheds, let alone the added impacts due to any of the "with project" alternatives. It is absolutely shameful to even suggest "opportunities in the lower Green River Valley". To do so is a slap in the face to us who live in the airport communities and deal with these environmental problems every day. Perhaps the lower Green should be considered as a site for a major supplemental airport if such opportunities exist. In the event in-basin wetland compensatory mitigation is pursued under all alternatives, it should be carried out, monitored, and proven successful in advance of any construction. R-14-7

Chapter IV, Section 16, Plants and Animals

Again, this section shows continued degradation of the natural environment of the airport communities. Its astounding and inadequate that the EIS only offers mitigation as a series of "coulds". Indeed, if in fact the impacts as outlined in this section cannot be fully mitigated, then no "with project" alternatives should be considered. Our communities do not need more starlings, house sparrows, raccoons, opposums and deer mice.

Please note that we often observe red-tailed hawks in the vicinity of SR-509 and South 176th Street (wetland #43). The red-tailed hawk is a raptor of local importance in the King County Comprehensive Plan and a State listed Priority Species and Habitats of King County. How will all alternatives impact this species and its habitat? How will impacts be mitigated? R-15-1

245

Chapter IV, Section 19, Earth and Section 23, Construction Impacts

R-12-15

The EIS significantly overlooks the impacts of excavating and transporting fill from the 16 potential off-site borrow sources. Indeed, Section 19 conflicts with Section 23. In Section 19, the EIS pronounces that off-site borrow sources are not addressed. However, 16 sites are listed in Section 23. The location of off-site borrow sources must be identified. The EIS admits that there would be from 379,400 to 571,200 trips to /from the off-site borrow locations. The EIS must specifically show how and where the fill from off-site sources will be transported. Anything less than full disclosure renders the EIS inadequate.

923,000 truck loads of fill is simply staggering! This construction activity, occurring for 2.5 years, 16 hours per day, six days per week, 50 weeks per year, will cause great disruption, pollution and depletion of mineral resources that could be used for other development, contrary to the EIS's unsubstantiated pronouncement that "no significant impacts would result".

What will be the impact to our roads and streets caused by this amount of truck traffic? The Port of Seattle should be responsible for all resurfacing costs.

Chapter V, Unavoidable Adverse Impacts and Mitigation

In conclusion, the EIS clearly shows that impacts to the full range of issues analyzed cannot be adequately mitigated. Therefore, "with project" alternatives should be denied. The EIS sponsors should choose Alternative 1, Do Nothing, and continue to agressively mitigate the existing unmitigated impacts on the airport communities of its current facility. These communities, as well documented in the EIS, have been and continue to be severely and negatively impacted by Seattle-Tacoma International Airport.

In the event that any of the "with project" alternatives are chosen and eventually allowed, an absolute imperative mitigation measure is to significantly compensate the airport communities with money. All users of the airport should be assessed a fee which is turned over to the airport communities. The communities could use the money to help build schools, parks, streets, etc, or to do other community enhancement projects, such as stream restoration or street tree plantings. This funding needs to continue throughout the life of SeaTac Airport. This compensation only seems reasonable in light of the EIS's proclamation that the airport is for the socio-economic good of the region and State. If this outweighs the drastic impacts to the airport communities, then the Port of Seattle, region, and State must pay us lucratively over the life of the airport.

Thank you for the opportunity to comment on the EIS.

Sincerely,

Doug, Julie and Mitchell Osterman

Doug, Julie and Mitchell Osterman

4

246

July 1995

REC'D ANM-610
PLAN, PGM, & CAP BR
AUG -7 1995
ANM-610

Federal Aviation Administration
Dennis Ossenkop
Airports Division, ANM-611
1601 Lind Ave. S.W.
Renton, WA 98055-4056

Dear Sir:

As a part of the ongoing debate on the third runway issue and Environmental Impact Study comment period, I wish to register my objection to the change in air-traffic patterns over Southeast Seattle in advance of the final decision on the third runway.

R-5-4

Recent changes in air-traffic patterns are adversely affecting our way of life. Noise levels are increasingly oppressive. It is our understanding that changes in air-traffic patterns are prohibited without an Environmental Impact Study. We are concerned that our community was not included in any study of the air-traffic patterns current or future.

R-5-5

Please record my objection to the change which has occurred in air-traffic patterns and which is adversely affecting the quality of life in and around the communities of Southeast Seattle.

Respectfully,

James M Browne
Signature

JAMES M. BROWNE
Name

4410 - 33RD AVE. SO.
Address

SEATTLE, WA 98118
City, State, Zip

247

July 1995

REC'D ANM-610
PLAN, PGM, & CAP BR
AUG - 7 1995
ANM-610

Federal Aviation Administration
Dennis Ossenkop
Airports Division, ANM-611
1601 Lind Ave. S.W.
Renton, WA 98055-4056

Dear Sir:

As a part of the ongoing debate on the third runway issue and Environmental Impact Study comment period, I wish to register my objection to the change in air-traffic patterns over Southeast Seattle in advance of the final decision on the third runway.

Recent changes in air-traffic patterns are adversely affecting our way of life. Noise levels are increasingly oppressive. It is our understanding that changes in air-traffic patterns are prohibited without an Environmental Impact Study. We are concerned that our community was not included in any study of the air-traffic patterns current or future. R-5-4

Please record my objection to the change which has occurred in air-traffic patterns and which is adversely affecting the quality of life in and around the communities of Southeast Seattle. R-5-5

Respectfully,

Harriet I Browne
Signature

HARRIET I Browne
Name

4410 - 33rd Ave So
Address

Seattle WA 98118
City, State, Zip

248

July 1995

REC'D ANM-610
PLAN, PGM, & CAP BR
AUG - 7 1995
ANM-610

Federal Aviation Administration
Dennis Ossenkop
Airports Division, ANM-611
1601 Lind Ave. S.W.
Renton, WA 98055-4056

Dear Sir:

As a part of the ongoing debate on the third runway issue and Environmental Impact Study comment period, I wish to register my objection to the change in air-traffic patterns over Southeast Seattle in advance of the final decision on the third runway.

Recent changes in air-traffic patterns are adversely affecting our way of life. Noise levels are increasingly oppressive. It is our understanding that changes in air-traffic patterns are prohibited without an Environmental Impact Study. We are concerned that our community was not included in any study of the air-traffic patterns current or future. R-5-4

Please record my objection to the change which has occurred in air-traffic patterns and which is adversely affecting the quality of life in and around the communities of Southeast Seattle. R-5-5

Respectfully,

Almyra E. Browne
Signature

Almyra E. Browne
Name

4410 - 33 rd. Ave. So
Address

Seattle, WA 98118-1302
City, State, Zip

249

PIERRE AND VIVIAN MATTHEWS
15929 Maple Wild Ave. S.W.
Burien, WA 98166

REC'D ANM-610 1995
PLAN, PGM, & CAP DR
AUG - 8 1995
ANM-610

To: Mr. Dennis Ossenkop
Federal Aviation Administration
Northwest Region, Room 540
1601 Lind Ave. S.W.
Renton, WA 98053-4056

Re: Draft Environmental Impact Statement for Proposed Master Plan Update Development Actions at Seattle-Tacoma International Airport

The subject Draft Environmental Impact Statement is flawed and inadequate in miriad ways. It reveals arrogance, callousness and disregard for the health and welfare of already impacted residents by condemning them to even more unacceptably high noise levels, polluted air and destruction of their wetlands, fish habitats, etc.

R-12-26

The most wasteful aspect of the Third Runway plan is the moving of twenty-six million cubic yards of structural fill to the airport. Mining, transporting and reburying of this valuable construction material makes less sense than, for example, grinding up prime first-growth timber to make toilet paper. Competition for the structural fill that would be necessary to complete many other construction projects in this area over the next two and one-half years or more will cause escallation of construction costs to the detriment of other more worthwhile projects. Furthermore, the depletion by the Port of large volumes of raw material for mixing concrete will have a negative impact on future construction costs. Therefore, the DEIS should address the real impact of these costs on the construction industry and the possible loss of area quarries, necessitating longer haul times.

R-12-25

The time frame allocated in the DEIS for transporting and placing the runway fill material is unrealistic considering the vagaries of Pacific Northwest weather. To achieve the proper compaction of 95%; an optimum moisture content is necessary in the fill material. This will be unobtainable for weeks at a time during winter and spring months. These probable construction delays are not addressed in the DEIS and should be included as well as the added costs.

R-18-2

The enormous cost of 1.5 billion dollars for squeezing a substandard dependent runway onto a small airport (by national standards) that is totally surrounded by dense population is outrageous.

The Port and FAA have not published detailed cost estimates for the Third Runway in the DEIS, thereby denying citizens critical information.

The Port is afraid of losing control of regional aviation. Hence the DEIS is biased and self-serving and fails to recognize the region's aviation needs for the future.

PIERRE MATTHEWS
Pierre Matthews
VIVIAN MATTHEWS
Vivian Matthews

250

July 1995

REC'D ANM-610
PLAN, PGM, & CAP DR
AUG 1 0 1995
ANM-610

Federal Aviation Administration
Dennis Ossenkop
Airports Division, ANM-611
1601 Lind Ave. S.W.
Renton, WA 98055-4056

Dear Sir:

As a part of the ongoing debate on the third runway issue and Environmental Impact Study comment period, I wish to register my objection to the change in air-traffic patterns over Southeast and Central Seattle in advance of the final decision on the third runway.

R-5-4

Recent changes in air-traffic patterns are adversely affecting our way of life. Noise levels are increasingly oppressive. It is our understanding that changes in air-traffic patterns are prohibited without an Environmental Impact Study. We are concerned that our community was not included in any study of the air-traffic patterns current or future.

R-5-5

Please record my objection to the change which has occurred in air-traffic patterns and which is adversely affecting the quality of life in and around the communities of Central and Southeast Seattle.

Respectfully,

[signature]
Signature

Elizabeth A. Kennedy
Name

927- 15th Avenue
Address

Seattle, WA 98122
City, State, Zip

I live in the Central District. My husband and I cannot carry on a conversation in our house. They fly over about every 60 seconds sometimes.

251

KENT CHAMBER
OF • COMMERCE

AUG 1995

August 1, 1995

To: FAA

From: Robert L. Cannon, III, President
Barbara Ivanov, Executive Director

RE: SeaTac Airport Expansion

The Board of Directors of the Kent Chamber of Commerce have voted unanimously to endorse the recommendations of the SeaTac Airport draft EIS published in 1995, and the proposed airport expansion.

Background: The growth of traffic at SeaTac Airport will outstrip capacity in the near future. Best estimates place the crunch around the year 2000. One cause of the capacity failure is that the two runways at SeaTac are too close together to use during poor weather when instrument rules are required. This condition occurs about five months out of the year.

In 1993 the Port of Seattle initiated a 25-year master plan which calls for a third runway to be built at SeaTac. The third runway would be at least 2,500 feet away from existing runways to allow use in all weather conditions. The plan also calls for extending the main runway at SeaTac to handle heavy planes flying full on hot days.

The Kent Chamber of Commerce supports the conclusions of the SeaTac Airport Draft EIS indicating a need for expansion of SeaTac Airport.

Robert L. Cannon, III
President

Barbara Ivanov
Executive Director

524 WEST MEEKER STREET • SUITE #1 • P.O. BOX 128 • KENT, WASHINGTON 98035-0128 • (206) 854-1770 • FAX (206) 854-8567

252

July 1995

REC'D ANM-610
PLAN, PGM, & CAP BR
AUG 15 1995
ANM-610

Federal Aviation Administration
Dennis Ossenkop
Airports Division, ANM-611
1601 Lind Ave. S.W.
Renton, WA 98055-4056

Dear Sir:

As a part of the ongoing debate on the third runway issue and Environmental Impact Study comment period, I wish to register my objection to the change in air-traffic patterns over Southeast Seattle in advance of the final decision on the third runway.

Recent changes in air-traffic patterns are adversely affecting our way of life. Noise levels are increasingly oppressive. It is our understanding that changes in air-traffic patterns are prohibited without an Environmental Impact Study. We are concerned that our community was not included in any study of the air-traffic patterns current or future. R-5-4

Please record my objection to the change which has occurred in air-traffic patterns and which is adversely affecting the quality of life in and around the communities of Southeast Seattle. R-5-5

Respectfully,

Susan Pichereau
Signature

SUSAN PICHEREAU
Name

2903 South Estelle St.
Address

Seattle, WA 98144
City, State, Zip

253

July 1995

REC'D ANM-610
PLAN, PGM, & CAP BR
AUG 15 1995
ANM-610

Federal Aviation Administration
Dennis Ossenkop
Airports Division, ANM-611
1601 Lind Ave. S.W.
Renton, WA 98055-4056

Dear Sir:

As a part of the ongoing debate on the third runway issue and Environmental Impact Study comment period, I wish to register my objection to the change in air-traffic patterns over Southeast Seattle in advance of the final decision on the third runway.

R-S-4

Recent changes in air-traffic patterns are adversely affecting our way of life. Noise levels are increasingly oppressive. It is our understanding that changes in air-traffic patterns are prohibited without an Environmental Impact Study. We are concerned that our community was not included in any study of the air-traffic patterns current or future.

R-S-5

Please record my objection to the change which has occurred in air-traffic patterns and which is adversely affecting the quality of life in and around the communities of Southeast Seattle.

Respectfully,

Troy Yoshikawa
Signature

TROY YOSHIKAWA
Name

7703 37TH AVE S
Address

SEATTLE WA 98118
City, State, Zip

254

DEPARTMENT OF THE ARMY
SEATTLE DISTRICT, CORPS OF ENGINEERS
P.O. BOX 3755
SEATTLE, WASHINGTON 98124-2255

REPLY TO
ATTENTION OF

AUG 31 1995

Regulatory Branch

REC'D ANM-610
PLAN, PGM, & CAP BR
SEP 06 1995
ANM-610

Mr. Dennis Ossenkop
Federal Aviation Administration
1601 Lind Avenue SW
Renton, Washington 98055

Reference: Seattle, Port of
SEATAC Master Plan EIS

Dear Mr. Ossenkop:

The Seattle District, U.S. Army Corps of Engineers, has had various District elements review your draft Federal Environmental Impact Statement entitled Draft Environmental Impact Statement for Proposed Master Plan Update Development Actions at Seattle-Tacoma International Airport. Comments from District elements are on the enclosed memorandum. We had earlier commented on a preliminary draft version of the document, and note that our comments had been generally incorporated. These current comments offer some suggestions and refinements.

The EIS's generalized purpose and need statements, and its selection of alternatives to be further evaluated, appear to be reasonable. Since all the alternatives involve substantial work within the Corps' regulatory jurisdiction, we presume that an individual Department of the Army permit will be required. During the permit process, we will use a condensed version of your purpose and need statements in our first public notice.

Any excavation or fill in waters of the United States-- wetlands and streams, in this case-- fall within our regulatory jurisdiction. Section 11 of the EIS catalogs wetland acres and wetland impact areas, and discusses mitigation in a general sense. We need that section to assess the wetland impacts, by function. At a minimum, the EIS should assess the wetland functions listed in the Wetland Evaluation Technique. We expect the mitigation plan to have an element of compensatory mitigation that would recreate the impacted functions at a site where they do not currently occur.

Jack Kennedy is the Corps staff contact person for this project. If you have any questions on these comments, please contact him at (206) 764-6907.

Sincerely,

for Robert H. Martin
Thomas F. Mueller
Chief, Regulatory Branch

Enclosures

CENPS-EN-PL-ER 14 July 1995

MEMORANDUM FOR RECORD

SUBJECT: Level A No. 1503: NEPA and 404 Evaluation. Engineering Division Review of FAA/Port of Seattle Sea-Tac International Airport Proposal Master Plan Update Draft EIS (EIS)

1. Reference.

a. CENPS-OP-RG Memorandum of 22 May 1995 (enclosure 1).

b. CENPS-EN-PL-ER 14 March 1995 Memorandum of Comment on "Draft Deliberative Material" for subject project.

2. Review of Draft EIS in accordance with request in referenced memorandum is complete. Comments by category are furnished in paragraph 3 below. Subject EIS has been returned, and electronic file delivered, separately.

3. Comments on Subject Draft EIS:

a. Need and Purpose. POC: Kathy Kunz (x3624). Content is acceptable. It appears wetland acreage has been reduced, but the narrative path to this conclusion is circuitous. The report is hard to follow.

b. Alternatives. POC: Kathy Kunz (x3624). The reader is forced to flip around between tables and diagrams. They really need to have clear diagrams of each alternative to demonstrate the difference between the three runway lengths and why the wetland acreage differs for each. It appears that it would be the same for all three scenarios (most of the wetlands are right under the main portion of the runway).

Also, there is confusion related to borrow area 8. The major wetland impacts come from this borrow source. Statements that the Port will not use this area due to wetland impacts are followed later by statements that seem to indicate the site still may be considered as a borrow area. We assume the former, but suggest that be made very clear. If they ever intend to use Area 8 as borrow, then that should be clearly stated and included in the impact analysis. If not, then they should also clearly state that they won't use it.

It appears that they are setting this up to look like they've offered 19 acres of mitigation by avoiding borrow area 8. We should let them know that this will not be considered compensatory mitigation.

c. Historic and Cultural Resources. POC: Mike McNeely (x3624). Based on our review of the "Draft Deliberative Materials", content is acceptable.

d. Endangered Species. POC: Mike McNeely (x3624). Based on our review of the "Draft Deliberative Materials", content is acceptable.

e. Floodplain Impacts. POC: Kim Scattarella (x6701).

(1) Executive Order (EO) 11988 on Floodplain Management must be followed (unless local requirements are more stringent), such as the zero rise requirement that is imposed by King County, to ensure that storm runoff from the development does not impact the 100-year floodplain within the limitations specified in the order. This should be documented in the EIS.

(2) Water quality mitigation is being handled by a Storm Water Pollution Prevention Plan (SWPPP) and Spill Prevention Plan, which are necessary components for the required NPDES permit.

(3) Detailed hydrologic calculations are enclosed in Appendix G, using the HSPF model, which was calibrated using approximately five years of streamflow record compiled by King County SWM. The modeling effort appears to adequately address the hydrology of this area. However, HSPF results suggest that routing flows through local detention ponds would produce a slight increase in peak flows for future conditions. It is recommended that additional storage be provided and documented so that no increase is shown in peak 100-year flows for future conditions using the HSPF model.

(4) Appendix P-B documents the relocation of two sections of the Miller Creek stream channel. This adequately addresses future floodplain impacts. The hydraulic evaluation of the downstream impacts by HEC-2 show that additional floodplain storage by the new channels will be able to offset additional flows, resulting in no loss of in-stream storage or floodplain encroachment in Miller of Des Moines Creek basins.

254

CENPS-OP-RG 14 August 1995

Memorandum for: Record

Subject: Seatac EIS

1. I have reviewed this EIS for its suitability for possible use in our own regulatory documents-- an initial public notice, eventual decision documents, etc.

2. Need/Purpose statement involves providing adequate air service to the Puget Sound area through 2020. It is a comprehensive, direct statement of purpose, with no apparent omission or hidden meanings. We can use a condensed form of the EIS's Need/Purpose statement in our eventual regulatory process.

3. The alternatives present different ways of achieving the purpose:

a. Use of other modes of transportation
b. Use of other airports or construct a new one
c. Activity/Demand management
d. Runway development at Seatac
e. Use of technology
f. Blended alternative
g. Do nothing/no build

These appear to represent an appropriate spread of alternatives. It is certainly possible that other alternatives could arise during our public interest review.

4. Wetland data, Section 11 of the first volume of the EIS, lists wetlands and areas, but is silent on impacts- other than elimination-- and the rest of the kinds of information we will need to make a permit decision. We will need them to discuss the functions performed by each wetland, and get the Port to provide compensatory mitigation with a rationale of replicating the displaced functions in an appropriate amount in a place where they do not presently occur. The draft EIS's discussion of mitigation relies on ratios from WSDOE's *Model Wetland Protection Ordinance*, and states that the Port is presently investigating compensatory mitigation sites in the lower Green River Valley, because mitigation for wetland impacts can not take place elsewhere in the impacted watersheds for two reasons:

(1) the majority of the area surrounding the airport is developed, and not enough land exists within the watershed to create compensatory mitigation wetlands, and (2) the FAA will not certify airports that have "wildlife attractions" within 10,000 feet of the edge of any active runway. For these reasons, the Port proposes to conduct wetland mitigation outside of the watershed where these constraints do not exist.

The EIS must supply multi-functional justification for the first reason. For the second reason, they cite an unsigned FAA Draft Advisory Circular, to which the Corps cannot give undue deference. Seatac is bounded on three sides by limited access highways or very dense urban and suburban development, and I-5 is less than 10,000 feet from most of the easternmost runway. We can concede the nondesireability of bird attractants within certain distances from the runways. But "wildlife attractions" is an unduly broad category that is not synonymous with "compensatory mitigation wetlands." Wetland function such as ground water recharge, floodflow alteration, sediment stabilization, production export, and aquatic diversity/abundance are all functions which will be impacted by jurisdictional activities. The Port will have to explain why it is neither practicable nor in the public interest to replicate them within the impacted watershed.

Jack Kennedy
Regulatory Branch

PUBLIC HEARING TRANSCRIPT INDEX

Speaker Number	Name	Transcript Page	Organization
HT 1	Vigilante, Mary	2	Landrum & Brown
HT 2	Miller, Dave	6	Normandy Park
HT 3	Priest, Skip	8	Federal Way
HT 4	Gates, Mary	10	Federal Way
HT 5	Hoult, Linda	12	Snohomish County Citizens Group
HT 6	Thompson, John	14	
HT 7	Richter, Audrey	15	
HT 8	Fornar, Elmira	17	
HT 9	Pompeo, Pat	19	
HT 10	Smith, Adam	20	State Senator
HT 11	Bartlemay, James	24	
HT 12	Frause, Sophie	26	
HT 13	DesMarais, Debbie	29	
HT 14	Caldwell, Dan	34	
HT 15	Prichart, Janet	36	Tacoma Pierce County Chamber
HT 16	Lindsay, John N.	38	Tri City Industrial Dev. Council
HT 17	Giles, Robert	43	Perkins & Coie
HT 18	Walker, George	45	
HT 19	Rees, Mike	46	Magnolia Community Club
HT 20	Bakst, Jay	50	Kent Chamber of Commerce
HT 21	Wordian, Laurie	52	
HT 22	Christy, Stephanie	55	
HT 23	Cunningham, Guy	56	Pacific Northwest Lab/Battelle
HT 24	Etkin, Mayer	60	
HT 25	Berger, Dorian	63	Mt. Ranier High Student Body
HT 26	Thornton, Dean	67	
HT 27	Kennedy, Richard	69	Mayor Des Moines
HT 28	Brazil, Terry	74	
HT 29	Watanabe, Stan	75	
HT 30	Yamamoto, Amy	77	
HT 31	Pomeroy, Vernon	79	
HT 32	Gilespie, Bob	82	
HT 33	Jones, Bill	85	Sea-Tac Firefighters
HT 34	LaFramboise, Bob	88	Heath Techna Aerospace
HT 35	Brasher, Minnie	90	
HT 36	Springer, Elizabeth	92	
HT 37	Allmon, Rebecca	96	Expediters Inter. WASH
HT 38	Nelson, Robert	98	
HT 39	Hoglund, Eugene	100	
HT 40	Woosley, T.J.	105	Greater Kirkland Chamber
HT 41	Jhaveri, Arun	106	Mayor Burien
HT 42	Milne, Kitty	109	Burien City Council
HT 43	Matthews, Pierre	111	
HT 44	Newby, Don	114	Burien City Council
HT 45	Heavey, Mike	116	State Representative
HT 46	Patterson, Julia	120	State Representative
HT 47	Brown, Arlene	127	
HT 48	Tate, Randy	130	U.S. Congressman

PUBLIC HEARING TRANSCRIPT INDEX

Speaker Number	Name	Transcript Page	Organization
HT 49	Burrage, Janett	134	Des Moines City Council
HT 50	Thomson, Leslie	135	
HT 51	McGeehan, Dr. Joseph	138	Highline School District
HT 52	Brown, Derek	141	
HT 53	Feldman, Richard	142	King Co.Labor Co. AFL/CIO
HT 54	Ellison, Robert	145	
HT 55	Bonney, Ann	146	
HT 56	Hetzel, Carol	150	ANAC
HT 57	Rants, John	152	Mayor Tukwila
HT 58	Dodge, Clark	154	Normandy Park City Council
HT 59	Hagstrom, Claes	156	Seattle RCA
HT 60	Clifford, Chris	160	
HT 61	Wichert, Erhard	164	
HT 62	Docherty, Don	167	
HT 63	Moeller, Jeanne	169	
HT 64	Mealy, Carl	171	
HT 65	Rozdilsky, John	173	
HT 66	Vermeler, Kathleen	178	Normandy Park City Council
HT 67	Clark, Rose	180	
HT 68	Rosenberg, Matt	183	Regional Comm. on Airport Affairs
HT 69	Gould, Trina	187	Air Washington
HT 70	Thompson, Lewis	191	
HT 71	Thompson, John	193	
HT 72	Carpenter, James	194	
HT 73	Creighton, Stuart	196	Regional Comm. on Airport Affairs
HT 74	Stark, Ben	200	
HT 75	Furney, Al	201	
HT 76	Parker, Kathy	204	
HT 77	Ayres, Marilyn	206	
HT 78	Tinker, Carey	209	
HT 79	Tinker, Jane	213	
HT 80	Vigilante, Mary	218	Landrum & Brown
HT 81	Dolvey, Jack	221	Federal Way City Council
HT 82	Elder, Hope	223	Federal Way City Council
HT 83	Millsaps, Joe	225	
HT 84	Vance, Chris	229	Met. King County Council
HT 85	Towe, Gary	232	Des Moines City Council
HT 86	Wiberg, Roy	234	
HT 87	Graham, Jerry,	237	
HT 88	Allen, Frank	240	
HT 89	DesMarais, Debbie	245	
HT 90	Feuerstein, Joe	251	
HT 91	Vonesh, Bob	253	
HT 92	Webb, Kris	255	
HT 93	Townsend, Peter	259	
HT 94	Matthews, Peter	263	
HT 95	Matthews, Vivian	267	
HT 96	Copies of Display Boards	273	Copies of Display Boards

PUBLIC HEARING TRANSCRIPT INDEX

Speaker Number	Name	Transcript Page	Organization
HT 97	Jhaveri, Arun	325	City of Burien
HT 98	Brown, Derek	327	
HT 99	Cunningham, Guy	328	Battelle
HT 100	Gates, Mary & Priest, Skip	331	City of Federal Way
HT 101	Brown, Arlene	340	
HT 102	McGeehan, Dr. Joseph	376	
HT 103	Tate, Randy	404	U.S Congressman
HT 104	Tri Cities Industrial Development Council	407	Tri Cities Industrial Development Council
HT 105	Kennedy, Richard	410	Talking Points
HT 106	Rants, John	413	Talking Points
HT 107	Springer, Elizabeth	415	
HT 108	Rees, Mike	417	
HT 109	Watanabe, Stan	419	
HT 110	Frause, Henry	420	
HT 111	Taylor, Ralph	422	
HT 112	Bolles, R.C.	423	
HT 113	Chapin, Ed	425	
HT 114	Clark, Margaret	426	
HT 115	Overholt, Mark	428	
HT 116	Ott, Frank	429	
HT 117	Vaa, Robert K.	430	
HT 118	Berg, Avill	432	
HT 119	Zembruski, Victor	433	

COPY

FEDERAL AVIATION ADMINISTRATION

and

PORT OF SEATTLE

PUBLIC HEARING ON

DRAFT ENVIRONMENTAL IMPACT STATEMENT
FOR PROPOSED MASTER PLAN UPDATE
SEATTLE-TACOMA INTERNATIONAL AIRPORT

Moderator: JOHN GALT

Hearing at: Red Lion Hotel
18740 Pacific Highway South
Seattle, Washington

Date: June 1, 1995

Reported by: Karen L. Larsen, RPR CSR# LARSEKL637B7
Toni L. Christy, RPR CSR #CHRISTL408NM

MR. GALT: Good afternoon, ladies and gentlemen. Our hearing will come to order, please. It's 1:01 p.m. On behalf of the Federal Aviation Administration and the Port of Seattle, I welcome you to this public hearing regarding the draft EIS for the Seattle-Tacoma International Airport proposed master plan update. I'm John Galt, the moderator for today's hearing. I've been retained to moderate this hearing expressly because I don't work for the Port of Seattle or the FAA, I don't work for any of their consultants, and I have no role in any of the decision-making involved in this project.

Mary Vigilante, who is a representative of the study team, would like to begin this afternoon by officially entering into the record certain documents. Ms. Vigilante.

MARY VIGILANTE: Yes. My name is Mary Vigilante. I'm the project manager for the consulting team doing the environmental impact statement.

I'd like to kick off today's hearing by introducing into the hearing record copies of the display boards that are available in the room adjacent to the hearing, actually across the corridor from the hearing room. We want this to be available into the public record so that there is an official identification of all the boards that were available for presentation to the general public.

Actually the hearing has been identified into three specific rooms. The first room individuals will see a 5-minute video that was prepared by the FAA to introduce what the hearing process is all about. The room adjacent to that contains a series of about 60 display boards, which I've entered the copies into the record of what those display boards contain, and that's where our staff is available to work one on one with citizens to answer questions about the findings, the contents of the environmental impact statement.

The third room for this hearing is the actual testimony room where we have allocated the first half an hour of each hour for prereserved testimony. Individuals could call in on phone lines where we kept a log of all the individuals requesting time and receive an allocation within the first half an hour of each hour. The second half an hour we're allocating to walk-in testimony that will be a first come first serve in an attempt to try to provide a balance of allowing individuals as much time and capability to provide their testimony.

With that, that's the contents of what I wish to say.

MR. GALT: Thank you.

We're allocating members of the general public three-minute testimony time slots. Representatives of groups and elected officials will be allocated up to five minutes. We will not be allowing any transferance of testimony time, and individuals may not trade their speaking slots. If somebody is not here when I call their name, I will come back to their name after we've gone a few people further on to see if they just were delayed and have arrived.

When I call your name, please come to the front of the room and sit in the chair that Mary just was in. Speak into the microphone. That's quite important in this proceeding because the court reporters are taking your testimony and they need to be able to hear you, and it sometimes helps them to actually be able to see the movement of your mouth. It's important to note that the spoken testimony you give this afternoon will be transcribed into a written document which will then be available to all of the people involved in the preparation of this EIS.

Part of my job is to insure that as many people as possible have the opportunity to present oral comments on the draft EIS. I have been asked therefore to fairly strictly follow the time limits that have been published in the ground rules for the hearing. I will let you know when your time is nearly up by holding up this little sign, and then I'll let you know when your time is over by flipping the sign over. I would appreciate it if you would conclude your comments as quickly as you can after you see the double zeros come up.

If you don't speak today or if the three minutes or five minutes that you have allotted to you is simply not long enough for you to cover the issues that you would like to cover regarding the draft EIS, I as well the study team would encourage you to submit written comments. There's a comment form that you can use for that. Y in leave it here with me, and I'll make sure the study team gets it. There's a box on the table outside that you can put the comments in. There is a mailing address on the bottom of it and you can mail it as well.

All written comments must be received by the FAA not later than August 3rd of this year in order to be considered in the preparation of the final EIS.

I'm going to call three names at a time. The first person of course will be the next speaker, and then the next two, to use a baseball analogy, will be in the on-deck circle. So the second and third names

that I call, if you would sort of be aware that your turn is coming very quickly and be prepared to move to the front of the room. My first speaker is Dave Miller, mayor of Normandy Park, who will be followed by Skip Priest of Federal Way and Mary Gates of Federal Way. Mr. Miller.

DAVE MILLER: Thanks, Mr. Galt. I'm going to speak about the alternatives discussed in the draft EIS. Before I came down here, I read the draft EIS, and I looked up in Webster's what an alternative is. An alternative is when someone gets to choose between two or more choices. The draft EIS of course doesn't give two or more choices. It gives one. The choice it makes is to make a third runway.

R-4-2

There are actually two kinds of choices that could have been made, and each of those would have had alternatives. One would have been on-site improvements or changes. The other would have been off-site changes. The PSRC, the Puget Sound Regional Council, decided to punt on this issue. They did not investigate alternatives, but instead they said they chose not to investigate them. In turn the draft EIS deferred to the PSRC in deciding that there were no alternatives. So they used a circuitous logic which was flawed.

R-4-3

There are federally funded available alternatives. They exist at Paine Field, McChord Air Force Base, and Fort Lewis. Paine Field was built with FAA money and could be used. There are on-site availabilities that were not discussed, and these involve technical improvements such as IFR changes, computer-enhanced ways to land aircraft. There are also things that can be done with separating general aviation and commuter aircraft. Those alternatives on site were also not investigated. R44 R44

The draft EIS also relies on the flight plan FEIS for certain environmental effects of the project. But the flight plan FEIS in turn does nothing as an analysis of alternatives. R43

So what we have is when it comes to alternatives and the environmental affect of them, it isn't studied. No alternatives are discussed, and we're left with a political decision not to look elsewhere.

The FAA is required to study alternatives, and I think that they need to recognize that the PSRC was incapable of doing that, and they need to examine what some of the existing alternatives are which I've discussed, Paine Field, McChord, Fort Lewis, and on-site alternatives, and I think if they do that, R44

they'll realize that the draft EIS needs to be radically altered. Thank you.

MR. GALT: Thank you, Mr. Miller. The next witness is Skip Priest of Federal Way, who will then be followed by Mary Gates and Linda Hoult. Mr. Priest.

SKIP PRIEST: Thank you. My name is Skip Priest for the Federal Way City Council. I'm joined by Mayor Mary Gates. Our remarks will be brief, and We would like to submit a complete statement for the record. Also for the record, we would like to thank Congressman Randy Tate and his staff, and his commitment to ensure that there's a complete and fair review of this third runway DEIS is greatly appreciated by the council and the residents of Federal Way.

For the past several years those of us in south King County have been called territorialists or provincialists. Yet the Port of Seattle's solution to one of these region's most critical issues lies almost entirely within its own ownership. If the issue wasn't so serious, one would smile at the irony.

We've also been called NMBY's by those supporters who profess to be regionalists, and yet the survival of the region's long-term economic future may rest in fact in the south end of King County. We're the ones who have the quality schools, we're the ones who have the portable housing, we are the ones who have available land, we are the ones who have location between the two major ports of a Seattle and Tacoma, and we are in fact the ones that can compete nationally against the Witchitas and the Raleighs and the others that are competing for the same types of quality jobs and businesses that we are looking for in this region, and yet it's this quality of life of our area and economic competitiveness that is threatened by this proposed runway.

R-5-4 — R-16-33

The potential consequences of noise, health, congestion, property values are easy to identify, and yet is there one word in the EIS about these impacts on Federal Way? No. In fact, most of the graphics lop off entirely the third largest city in the county and the sixth largest city in the state.

The time for name calling is over. It is time for a thoughtful and common sense analysis of the impacts of this mega mistake. Have no doubt whether it costs $1,000 or $500,000 or a million dollars, the City of Federal Way is committed to insuring that our city does not become an airport ghetto. The fate of our city and the region's economic competitiveness requires us to do no less.

Thank you, very much, and I will provide this

for the record.

MR. GALT: Thank you, Mr. Priest. Thank you, sir.

The next speaker then is Mary Gates, mayor of Federal Way, who will be followed by Linda Hoult and then John Thompson. Ms. Gates.

MARY GATES: I'd like to thank you for your opportunity to testify. I am Mary Gates from the city of Federal Way.

I'm here more to provide a lot of perspective. From the inception of our city 5 years ago, when we were not included at the table for any of the initial planning for the alternatives analysis, nor were we at the table to deal with the four-post pattern which the FAA created and which brought noise over our neighborhoods in Federal Way. When I talk about neighborhoods, I'm talking about 75,000 people in the city incorporated area, and over 100,000 people in the sphere of influence of the community. So when we're talking about noise over neighborhoods, we're talking about a huge number. We're also talking about noise over 20,000 school children, so we are talking about real impact on real people.

R-18-29 — R-5-4

I was part of the transportation policy board when the RASP was amended, and I guess I want to remind everybody that there were two very specific conditions of that RASP: one that the expert arbitration panel must find that the Port has scheduled, pursued, and achieved noise reduction performance objectives based on measurement of real noise impacts, not the measurement process that had previously been used and had not been found to actually measure the impact on human beings; and, second, that the expert arbitration panel must find the demand and system management programs have been pursued and achieved or that they are infeasible. I would submit to you that both of those have not been met at this point, and I am very, very concerned that in the process of this that the RASP has not been adhered to.

I want to talk with you for a minute about the display boards. Before the lights went out next door, I was looking at them, and I guess the comment I want to make sure that is in this hearing today is the fact that for the City of Federal Way there is absolutely no mitigation intended or planned. The display boards drop at about 304th, some of them at 272nd. 272nd is our northern most boundry. We extend all the way to 373rd Street as our southernmost boundary. So it is very important to take a look at an entire city that has basically been left out of the

R-18-29
R-2-5
R-5-2

concern for mitigation in any manner.

I also wanted to point out that as a member of the RTA, I also note that you have not in any way looked at the impact of ground transportation on any kind of a new runway facility in the Sea-Tac area, and with that in mind, I think it's amazing that the determination has been that it will not notably alter ground transportation.

So a reminder that the RASP does have requirements that have not been fullfilled and that the City of Federal Way has essentially been left off the maps. We have great concerns over the third runway, and we have been consistent in our option since we incorporated the city in 1990.

MR. GALT: Thank you, Ms. Gates. The next speaker is Linda Hoult who will then be followed by John Thompson and Audrey Richter. Ms. Hoult.

LINDA HOULT: Thank you for this opportunity to speak. My name is Linda Hoult. I'm president of the Snohomish County Community Citizens Group. I'm representing 4,500 members.

We are looking for a win-win solution to our air transportation needs. We are very impressed by how comprehensive draft EIS on the third runway has been. We feel all significant issues have been addressed. It

R-18-29
R-0-9
R-5-2

is good to see that only ten acres of wetlands would need to be moved, thus no net loss.

In addition, we're pleased to see how the Port of Seattle noise reduction program would overall decline the noise contour of the airport even with the construction of the third runway. It is important that airports be responsive to the surrounding communities, so let's get Sea-Tac to a full functioning, all weather airport and build the 8,500 foot runway. It is the most cost efficient option for the long term to serve the needs of the four-county area.

This issue has cost the taxpayers so far $950,324 spent by the Puget Sound Regional Council, 1.2 million dollars for preliminary engineering on the third runway, 1.4 million on the State Air Transportation Commission, 1.8 million by the Port master plan update, 2 million by the Puget Sound Air-- Transportation Committee between '89 and '92, 4.2 million so far on this EIS on the third runway, which totals approximately 11.5 million dollars of our tax dollars. Enough already. Let's get on with it.

Thank you for your time.

MR. GALT: Thank you, Ms. Hoult. The next speaker is John Thompson, who will then be followed by Audrey Richter and Kit Narodick. I apologize if I

don't have that name correct. John Thompson.

JOHN THOMPSON: My name is John Thompson. I live at 24 -- 2504 South 148th Street. I've lived there for 38 years. I've watched the airport grow, I've seen the homes disappear right across the street from me and three houses to my right. I know you're going to be hearing from all the naysayers today, but I figure I'm speaking not only for myself but for those quiet few who won't speak. I think we need the third runway, In order to remain competitive. Denver went and built their big airport to try to take away what business we do have.

In reading the EIS, I do hope that the -- when they start hauling the dirt, that they will use a chemical treatment on the roads to keep the dust down rather than just water.

Also, in the group of maps that you were ... given earlier by Mary, there's an error in there. They're showing the detention center on the north end of the airport, where it's actually being built on the south end of the airport.

R-18-5

Like I say, I for one hope to see that new airport come in, the new runway come in at the airport. We need it to remain competitive. Thank you.

MR. GALT: Thank you, Mr. Thompson. The next speaker is Audrey Richter who will be followed by Kit Narodick and Elmira Fornar. Ms. Richter.

AUDREY RICHTER: I will read from a review that was done by Debbie DesMarais of the McCulley Frick and Gilman air quality survey for Sea-Tac Airport, which was done in 1993.

An estimation of cancer risk increase developed -- cancer increase developed for the Midway Airport in Chicago by the EPA has been analyzed for Sea-Tac emission values of benzene, formaldehyde, and the model grates are of particulates from the emission and dispersion modeling system.

R-5-4
R-10-65

This evaluation shows that Sea-Tac Airport contributes a cancer risk increase in the area and should be monitored as a source and controlled by agencies responsible for protecting the public health from exposures to cancer-causing air pollutants. The data also shows that the determinant factor in the emissions is not the engine design but the fuel. Since fuel has not changed, it is inconsistent for the DEIS or any other source to claim that the newer engines emit less emissions. The newer engines are larger and may emit more.

R-10-3

My concern is that the effects of jet fuel emissions at Sea-Tac Airport are being ignored in the

R-10-4
R-10-65

EIS. I personally have had four friends who have died of glioblastoma brain tumors. According to European health studies, 8.2 glioblastoma brain tumors occur in a population of 100,000. According to this, I would have to know about 50,000 people to have four friends die with this rare brain tumor. What makes it even more strange is that all four lived and worked within the high noise contours north of Sea-Tac Airport, and even more strange, two of them were husband and wife and they lived just northeast of the airport.

There is a lack of data on jet fuel emissions. Emissions studies are few, and there seems to be no definitive data which encompasses all components of jet fuel. This lack is puzzling considering the power and authority of agencies involved in the nation's air transportation industry. Unfortunately for those living near airports this lack may not be an accident. Airport communities are suffering from high cancer rates and high incidences of respiratory illness. Why are these issues not addressed in the EIS?

MR. GALT: Thank you, Ms. Richter. The next speaker is going to be Kit Narodick, followed by Elmira Fornar and then Pat Pompeo. Is Kit here? Kit is not here. Is Elmira here? Okay, we'll take Ms. Fornar next, then.

ELMIRA FORNAR: Thank you. For the record, my name is Elmira Fornar, and I have lived on the east hill of Kent for 33 years. I'm a former member of the Washington State House of Representatives and was ranking member of the trade and economic development committee for four years.

I am here in support of the draft environmental impact statement. There are five points I want to cover that support the conclusion of the DEIS. Number 1, expanding our airport capacity is consistent with the findings of the Washington State Air Transportation Commission.

Number 2, adding capacity to an existing facility is consistent with the intent and goals of the Growth Management Act of 1990. I, along with four other members of the house, Senate and governor's office, spent over 90 hours in conference committee drafting the statewide growth management policy. The intent of the GMA act of 1990 was to encourage development within the highly populated urban areas of our counties and preserve the rural areas. The expansion of the existing facility at Sea-Tac follows these principles.

Number 3, expanding the capacity at Sea-Tac

is consistent with the ideal of facilitating economic development through air transportation and integrating air and surface transportation. With many large companies downsizing and laying off employees, our economic growth must come from expanded international trade to small and medium sized businesses. Adding air capacity to our existing facility is crucial to the success of these businesses.

Number four, expanding our capacity to compete for new markets and better paying jobs is consistent with our welfare reform policy: getting people off welfare and into the work force. The best welfare reform is a good family wage job. Some of the most heart breaking stories I heard as a legislator was talented people unable to find a decent paying job. The expansion of Sea-Tac will help create those needed jobs.

Number 5, expanding air capacity at Sea-Tac is also consistent with our concern for air safety. I live within a stone's throw of Highway 18, often referred to as blood alley. Many accidents are caused by inadequate road capacity. We are now going through expansion of that highway, and it is going to affect myself personally and my neighbors, but when it is complete, it will be a much safer place to drive.

Sea-Tac will be a safer place to land and depart with the additional runways.

In conclusion, the document set forth by the Federal Aviation Administration should be supported, and the involved agencies should move with a sense of urgency to prevent unnecessary and costly delays. This is not just an issue of a third runway for Sea-Tac but a huge economic driver for all of Washington state. Thank you.

MR. GALT: Thank you, Ms. Fornar. The next speaker will be Pat Pompeo, followed by Adam Smith. Ms. Pompeo.

PAT POMPEO: Thank you. I'm a resident of the area for over 45 years, and I've been reading the transportation and construction part of the EIS project, and it is a fact that our population is on the increase, it is a fact that the airport use is on the increase without addition of the third runway. So our traffic is on increase in every direction, and yet all these trucks trips that are listed in the report from miles around, some at least as far as away as 50 miles, will not notably alter the traffic patterns as it's quoted in the report?

R-12-11

What would be the impact on the transportation plan if other major projects not related

to the airport are occurring at the same time, such as intersection updates, roadway rerouting or widening, and maybe the start of the rapid transit system? What effects would accidents or inclement weather have on this plan? Will these delays beyond the 16-hour days? Which 16 hours are involved anyway?

No mention has been made of alternate side roads that motorists will seek out, overloading local roads, which will result in extra road repair, additional noise, and safety issues for those areas. What about the water shortages we already experience, especially during the summertime, and the airport would require 700 percent more water than what they're using already?

R-12-16

R-13-4

The airport and it's commercialism are encroaching on one of the most beautiful, scenic residential areas. By the time they destroy us, then they'll decide to construct another airport somewhere else. Thank you.

MR. GALT: Thank you, Ms. Pompeo. The last preregistered speaker for this hour is Adam Smith. Mr. Smith.

ADAM SMITH: Thank you very much. My name is Adam Smith. I'm the state senator for the 33rd district, and I have quite a few concerns actually with the EIS. I think it's sort of the next step in a process that many of us have been frustrated about in this district, a process of basically trying to put a square peg in a round hole and build that runway where it creates a lot of problems.

The specific concerns that I have in looking at the EIS are, number one, having to do with the already existing hazardous chemicals that are geneerated on the airport. We had a major problem in the Miller Creek area with the deicing fluid that they use and how that runs off and how it affects the watershed in the area, local creeks and so forth. We don't believe that under the current airport that that sort of thing has been adequately addressed. We don't believe the DEIS adequately addresses it at this time either when you consider that adding a new runway will no doubt exacerbate the problem. We are concerned about that.

R-13-15

We're also concerned about the whole dump truck dirt issue, if you will, and that is the fill that is going to be required and what impact that's going to have on the community. I think the EIS also soft-pedals that. I forget exactly how many dump trucks for how many hours for how many years it was going to take to fill this, but suffice it to say that

R-12-11

it's a lot, and that is going to have an impact not just on the area around the airport but on any one of those sites that they go out to get the dirt and haul it back and forth with all those dump trucks all hours of the day and night.

Those two points sort of lead into the larger point, and that is the sheer magnitude of this project and the fact that I feel the EIS doesn't adequately address that. We're talking about probably one of the largest projects in the King County area in many, many years and the impact that it's going to have on people, and it sort of gets to the heart of the fallacy of trying to build a third runway in the first place in such an incredibly populated area.

A few previous speakers have mentioned the impacts of noise and health and the buy-outs and what that's going to do to our community, and as Federal Way mentioned, the EIS doesn't even mention them. There's a magic line there at 272nd where the runways stop having impacts, and I guess what I have said all along is if you're going to build this, if that is the plan, then at least be honest about the impacts and deal with that, and I don't think this EIS steps up to that.

R-6-2

I don't think the EIS understands the damage that it's going to have on the community and the sheer impact of it, and I personally as a representative of this area am concerned that if the EIS is sort of a harbinger of the future, then we're not going to get the compensation that's needs to solve some of these problems.

If they're going to pretend that they don't exist, if they're going to pretend that they can haul all that dirt without impacting surrounding communities, if they're going to pretend that they can generate all those chemicals without affecting the water, if they're going to pretend that they can build that big a runway and wipe out that many homes and impact that many schools and local communities without more of an impact than is reflected in the EIS, then I'm afraid that it's going to leave a lot of people that I represent and a lot of people that I grew up with on the short end of the stick.

So if I had sort of a general way to summarize my comments, it's that the EIS needs to consider a little bit more carefully the true impact of this and plan for how to deal with it. Thank you.

MR. GALT: Thank you, Mr. Smith. The first person on the walk-in testimony signup sheet for this hour is Jon Devick. Am I saying that name right? He couldn't have given up in 20 minutes. Is Mr. Devick

not here? Mary, are there any other names on the sign-up sheet out there?

MARY: No.

MR. GALT: In theory I'm supposed to restrict testimony to those people who have signed in and who have a little orange card, but there are a number of you in the room who presumably don't have a little orange card and maybe you do want to testify. We have some time before the next group of preregistered speakers is scheduled to begin. That would be at two o'clock, and if there is someone who has not signed in, who maybe didn't quite understand the process, and who would like to be heard at this time, I would be happy to give you a standard block of time.

If there isn't, then we'll take a recess and come back at two. I have a taker. For those of you who have not presigned in, if you would help the court reporter by giving your name, spell your last name and then your mailing address, if you would, please.

JAMES BARTLEMAY: I'm sorry that I didn't get signed up ahead of time. I wasn't quite sure how this was going to be run. My name is Jim Bartlemay, I'm a retired chief engineer of the Boeing Company of one of the larger programs in the defense division.

I've lived in Des Moines under the flight pattern for 34 years, and, you know, I listen to the planes that take off in the morning, around the lunchtime, and then in the evening. One of the beliefs I have is that we don't need the third runway, that for the interim period there is plenty of time during the day that they could reschedule their planes that are now currently taking off half full or less and do away with the impact of the third runway altogether until they do have a new site selected outside, of the unpopulated area.

I believe that the populated area around Sea-Tac is probably one of the dumbest places to put an expansion of a runway. Not only do we have a transportation problem getting out of there with the lack of roads and that sort of thing, but also there's no room for industry to expand around an airport. I was recently in Colorado and flew in and out of the Denver airport, and I think the foresightedness of the communities down there were very, very smart in that they put that airport 10 miles out away from the populated area. That's got the convenience that it's not bothering people that live around there, and there is room for industry to expand, and you don't have the transportation problems that we are creating by expanding Sea-Tac in the place where it is.

I actively support the not building of the third runway and not expanding Sea-Tac any further, and Adam Smith and his group that had the siting bill that was killed in Olympia this last fall was a big mistake, and I think the total state of Washington ought to get behind locating a bigger airport that's going to be needed in the future outside of the Puget Sound area, if necessary. R-44

And that's all I got. I didn't prepare anything, and I'm sorry I wasn't better prepared.

MR. GALT: That's fine. Mr. Bartlemay, Would you mind giving your address for the clerk, please?

JAMES BARTLEMAY: Yeah. It's a P.O. Box in Des Moines at P.O. Box 98732 in Des Moines, 98198.

MR. GALT: Thank you, sir. Lady with the red jacket on here in the second row would like to speak also. If you'd do the same thing, give us your name, spell your last name, then your address, please?

SOPHIE FRAUSE: Okay. I'm Sophie Frause, 411 Southwest 186th, Normandy Park. This was written by my husband Henry Frause. He is handicapped, so he was writing this to Mr. Dennis Ossenkop and --

Dear Mr. Ossenkop. I hope I'm pronouncing this correctly. Landrum and Brown, Incorporated identified the location and the demographics of the

DEIS for Sea-Tac Airport operated by the Port of Seattle, a municipal corporation of the state of Washington. They also indicated that the two existing runways at Sea-Tac would not be adequate to meet future travel needs, although the PSRC general assembly adopted resolution number A-93-03 in April 1993 to amend the regional aviation system plan to conduct site-specific studies including a DEIS for Sea-Tac third runway. The resolution was initially prepared by a corporation which is not a governmental agency, per se.

This step in reality became a quasi-legislative function and, as such, superseded and by-passed the constitutional process of the state legislature and took away the constitutional rights of the citizens. My understanding of civics does not include the empowerment of a corporation to act as a legislative body. I'm unable to find evidence where the state legislature actually participated in the legalities of the resolution. As I recall, the original, flight plan was never signed by any of the formers of that document nor any member of the PSRC and is still not signed. Did Landrum & Brown, Incorporation ever clarify this part of the resolution before proceeding with the subject DEIS?

R-2-1

In chapter 3 under the title of the affected environment, the incorporated city of Normandy Park was omitted. I'm proud of my city, so you will please include Normandy Park along with Des Moines, Tukwila and Burien. Thank you. I remain -- this was Henry Frause, my husband.

R-5-2

MR. GALT: Did you want to turn that letter in?

SOPHIE FRAUSE: Well, We have one over there at the desk.

MR. GALT: If you've already turned one in, that's fine.

SOPHIE FRAUSE: But I can turn that in to you.

MR. GALT: Thank you. Has Kit Narodick arrived? No. Okay, Jon Devick? No. Is there anybody else here right now who would like to offer some testimony regarding the draft EIS who has not done so yet?

LAURIE WORDIAN: I have a spot at 2:28. Can I do it now?

MR. GALT: In theory I'm not supposed to allow time changes, but if you want to, I don't see any problem with it. If we were crowded, I wouldn't let you do it, but we're not crowded.

LAURIE WORDIAN: I'll keep my spot.

MR. GALT: She's going to keep her spot. Can I sell this time slot to anybody else? Lady in the back. Like the two speakers before, I would ask that you start with your name, et cetera.

DEBBIE DesMARAIS: My name is Debbie L. DesMarais. I live at 24322 22nd Avenue South in Des Moines, my zip is 98198.

I'd like to say that I reviewed the McCulley Frick and Gilman air quality survey that was done at Sea-Tac Airport in 1993, and they detected some very high levels of some extremely carcinogenic compounds, including benzene and formaldehyde. They were both at times detected 100 times over the Washington Administrative Code acceptable source impact levels, and these compounds, along with numerous other polycyclic and polynuclear aromatic hydrocarbons, are expected to cause a significant number of cancer case increases in the area and could affect residents living nearby Sea-Tac Airport.

R-10-29

Any expansion of the airport and additional flights accompanying a third runway would also substantially increase these statistics. The people living nearby have put up with an awful lot of abuse. They have suffered ill-health effects in the past.

R-10-65

People have been made ill with respiratory illnesses. Some people have died from strange cancers at early ages.

My family in particular, my two sons were diagnosed with asthma this year. We live in the flight path, and all my plants are covered a fuel residue. My plants are dying in my yard. I've had to take out four plants this year, and last year we took out others. I have a vegetable garden that I can't plant in anymore because the dirt in the ground is potentially contaminated by a lot of this fuel residue. Our children are being awakened in the night by aircraft noise when the planes are taking off, particularly one very loud heavy aircraft at 4:00 a.m.

R-10-65

And I know that the expansion project includes extending the first runway another 600 or 900 feet -- I'm sorry, I have too much information -- and I would like to tell everybody what that means when they can already put a fully loaded 747-400 off the 11,900 900 foot runway that we already have, but I'm really afraid that it would scare the hell out of all the people that have waived their rights that are living under the flight path nearby.

I'd also like to say that the problem with this whole process is that we were mediated out of our constitutional and civil rights, as Ms. Frause was talking about a little bit ago, so we don't have any protection from any of the agencies environmentally or as far as our rights go that we would normally have if we hadn't agreed to mediation. So our cities, our county, and our government agencies in the state have sold the people down the river that live in the area to suffer and take all this abuse with no normal recourse that anyone else under a civil government would have normally. Did I say normally, twice? I don't know.

And that's not all I have to say but I think my time is up.

MR. GALT: I think you've run out of time. Thank you, Ms. DesMarais.

DEBBIE DesMARAIS: Right.

(Applause.)

MR. GALT: Is there anybody else here at this time who hasn't signed up but who maybe has had a change of mind and would like to offer testimony this afternoon? The record will show there is not. It's now approximately 1:45 the next prescheduled people are scheduled to begin at 2 clock the hearing stands at recess until that time.

(Recess.)

MR. GALT: We'll reconvene our hearing. We

had recessed about 15 minutes ago until 2:00, and my watch says it's 2, so let's get going and not keep you waiting. I'm John Galt, the moderator for today's hearing. On behalf of the Federal Aviation Administration and the Port of Seattle, I welcome you.

We have assigned time slots for the first half of each hour, and then we are taking walk-in testimony during the second half of each hour today. Members of the general public are allocated 3 minutes each, and persons who are representing organizations or elected officials are allowed up to 5 minutes each. We, according to the rules that have been published, are not allowing transference of testimony time, and individuals may not trade their speaking slots.

When you're called to testify, please come to the front of the room, sit in the chair opposite me so that you can talk into the microphone so that everybody can hear you and so that the court reporter can also transcribe accurately what you are saying. Your testimony this afternoon is going to be transcribed, and the written document will be available to the FAA and Port staff as they prepare the final EIS.

If you don't speak today or if you have a lot of detailed or technical comments, or if a 3 to 5 minute block of time is just simply too brief for you to fully express your views, I, as well as the FAA and Port staff, want to assure you that written comments are equally valuable. There's a comment sheet that's available in several piles out there on the tables in the lobby. You can leave the sheet with me if you'd like to, you can leave the sheet at a box that says "comment forms" on it, or you can mail it to the address that's on the bottom. There are a number of ways that you can get written comments into the study.

I do wish to highlight the fact that written comments have to be received by the FAA at the address that's provided by August 3rd of this year in order to be considered in the final EIS preparation process. So if you're going to put it in writing, make sure you get it in the mail in time for them to get it.

What I will do as we take testimony is call 3 names. The first name will be the next speaker, and then the next two names, to use a baseball analogy, will be essentially in the on-deck circle, and if those persons would sort of get prepared to come forward or even if you want to, if you're in the back, move up a few rows, and that will help us move more efficiently through the afternoon.

We had one person come in during the first hour of the hearing that I guess literally walked in

and signed up about 30 seconds after I said we're at recess until 2:00, and I hope that those of you who signed up to speak in the first half of this hour don't mind if we give 3 minutes to a person who just barely missed getting in in the first hour.

So assuming that you all will agree with me on that point, we'll begin with Dan Caldwell. Mr. Caldwell, if you would be kind enough, we have your address right here.

DAN CALDWELL: Yes.

MR. GALT: Thank you.

DAN CALDWELL: Yes, I'm Dan Caldwell, and I'm sorry I didn't get an appointment sooner, but I hadn't heard back from the recorder I put in yet.

I spoke to one of the commissioners at Highline, so I think I can speak for them. I am the past president of the Highline Water District, past president of the Regional Water Association of South King County, past president of the Ground Water Advisory Committee of South King County, member of the Pacific Northwest Section of the AWWA, and a member of the AWWA, and I hope I have enough time left.

I am quite concerned about the dumping that's been going from the end of the airport, the overflow of the waste water. Some of the State inspectors have

R-13-11

reported that 30 percent of the liquid content of this overflow water is filled with chemicals. This is flowing into Miller Creek and to Des Moines Creek, which is directly above the aquifers that supply south King County with drinking -- 20 percent of their drinking water.

R-13-11

Highline Water District is at the south end near 188th, and they have an aquifer a hundred feet below sea level which is supplying 20 percent of the water. That water recently has become -- shown signs of corruption. I don't know what's causing it at this point.

The Seattle Water Department has an aquifer at the north end of the airport where they run recharge water in, and this is in danger of being contaminated because if contaminants follow course, they descend about 6 inches per year to the acquifer's level. Once it reaches the aquifer, it is drawn eventually into the pumps. Right now it is in the second aquifer, and that supplies the City of Des Moines Water District 54, Apparently has not reached their pumps yet. Highline, being directly underneath, it could go into the third acquifer somewhat and elsewhere.

R-13-21A
R-13-21B

Also they have been using water like crazy. Last week Highline shut off a water meter they just

discovered that reports up to $200,000 of water that has been drawn by the Port without Highline being aware of it. They draw most of their water from the City of Seattle.

R-13-4

Anyway, the aquifer is probably the more serious situation because with the extensions of runways, they would have to dig out this aquifer, just like they do the service stations around here with their tanks, to chase down this lost oil and contaminants before it gets down to the public drinking water supply, and we're talking about drinking water for 150,000 people.

I won't press the subject any further. Thank you for this opportunity to speak.

MR. GALT: Thank you, Mr. Caldwell. Now, for the 2:00 hour preregistered, we will begin with Janet Prichart, who will then be followed by John Lindsay and Robert Giles. Ms. Pritchart.

JANET PRICHART: I'm Janet Prichart, director of the Tacoma-Pierce County Chamber of Commerce and president of the South County Chamber.

This morning as I was preparing my thoughts, I was skimming through the newspaper and my eye was drawn to my horoscope, and it said that sweetness can get you what you want. So I brought some Almond Roca.

And I just wanted to tell you a little bit about Almond Roca. It's a Tacoma product, and it's exported to 35 countries. It's the largest and most well known import confection in Asia, especially China. Currently exports are outpacing domestic growth, and I think that's a trend that we would like to see continue, and the key to keeping that growth high is in distribution.

We in Tacoma were eager and delighted readers of the draft EIS, the most comprehensive and detailed draft EIS ever completed on an airport expansion project. I was impressed by its accuracy, objectivity, and fairness, and we strongly support the 8500 foot runway as the most sensible and long-term cost effective option. Because of the already fine work accomplished by our northern neighbors at the Port of Seattle, long-term noise at Seattle-Tacoma International Airport is projected to decrease. The draft EIS concludes that there are no major environmental impacts that can't be mitigated. Hallelujah.

Finally, we in Tacoma and all of Washington want businesses like Almond Roca to grow. We simply must increase air capacity at Seattle-Tacoma international airport, and the 8500 foot runway is the

next logical step.

It's like staring at the gold-wrapped candy. There comes a point where you just unwrap it and get to the business at hand. Now's the time to stop the staring at the gold-wrapped EIS. Let's just get to the business at hand. Thank you.

MR. GALT: Thank you, Ms. Prichart. I've never accepted a bribe before, but since I don't have to make a decision on this case, I think I will, and I will share them with other staffers who might be inclined.

The next witness will be John Lindsay, who would then be followed by Robert Giles and George Walker. Mr. Lindsay.

JOHN LINDSAY: Good afternoon. My name is John Lindsay, president and CEO of the Tri-City Industrial Development Council, an economic deveopment organization founded in 1963 and comprised of a membership of nearly 600 industrial and business firms and organizations with an interest in the future of the Tri-cities economy. The council, also known as TRIDEC, has been designated as the spokesman for Tri-Cities business community on economic issues affecting this area.

We appreciate the opportunity to appear

before you today to provide a slightly different perspective on the issue of the proposed third runway at Sea-Tac. For many folks on both the west side of the state and the east side of the Cascade curtain, the issue of the third runway at Sea-Tac has been viewed simply as a local issue. It has captured the attention of the press principally as a local issue focusing on the construction or expansion of the Sea-Tac facility and its impact on the surrounding communities and neighborhood.

Likewise, by many in eastern Washington it has been viewed as a local issue in the Seattle area that at least at first blush is not of any great consequence to many in eastern Washington. But the unmistakable fact is that Sea-Tac is the state's airport. The construction of the third runway at Sea-Tac is an indispensable ingredient for the continued economic growth and vitality of of most, if not all, of eastern Washington. Thus the notion that somehow the proposed third runway expansion at Sea-Tac is a local community issue to be considered only by the citizens of the communities surrounding the Sea-Tac facility is in our view myopic at best.

Indeed, for eastern Washington in general and the Tri-Cities in particular, continued access to

Sea-Tac Airport through the availability of a third runway is an imperative. Likewise we believe it is an imperative for all the other communities in eastern Washington, including Walla Walla, Yakima, Moses Lake, and Wenatchee, that rely on commuter access to Sea-Tac. It is our understanding that the commuter flights from outlying areas into Sea-Tac constitute nearly 40 percent of the activity at the airport.

Further it is our understanding that those who would oppose a third runway believe that the pressure on the existing facilities and thus the need for a third runway can be alleviated by removing commuter traffic to outlying facilities such as Paine Field or McCord Field as possibilities. That is central to our fear, for if we as eastern Washington communities are to maintain our economic viability and air service access, it is simply unacceptable to arbitrarily designate commuter flights as second class passengers and route them to outlying airports with the attendant problems of gaining access to Sea-Tac for continued travel to other destinations.

While there may be many in and around central Puget Sound who seek no growth or development, it is important to note that east of the Cascade curtain there are many communities, including ours, who seek balanced development to increase our standard of life and prosperity of our citizens. It is our recruitment -- in our recruitment efforts, rather, with various companies seeking to site new plants or expand existing facilities, we are frequently asked by siting consultants whether we have access to an international airport within one hour of our community. At present we can answer yes. However, without the third runway expansion and with a plan that dispersers commuter air traffic to outlying airports, our answer will then be no, and we will necessarily be eliminated from competition for those facility sitings that mean so much to us in the long-term development of our communities.

It is not simply an issue of our citizens seeking to gain access to other destinations through Sea-Tac. Rather it is also an issue of whether travelers, both business and otherwise, from other countries and from throughout the United States can gain convenient access to the Tri-Cities and other eastern Washington communities. We believe it will be unacceptable for a visitor, for instance, from the Pacific Rim nations to land at Sea-Tac and then, without a seamless intermodal transportation system in place, to have to find his or her way to a commuter

facility at either McCord or Paine Fields. The result is unacceptable for our international visitors and business folks, and it's unacceptable for those who reside in the Tri-Cities and eastern Washington communities who must go elsewhere.

To better understand the potential impact, I urge you to give your attention to the comments of Mr. Guy Cunningham, who will appear before you on behalf of Battelle Pacific Northwest Laboratories in located in Richland. The supportive statistics that he will provide with respect to P&L's traffic needs offer a compelling reason why the issue of regional access to Sea-Tac and the need for a third runway is so important.

In closing, we appreciate the opportunity to have presented this perspective to you for the record. We reiterate that the issue of the third runway and Sea-Tac expansion is not simply a local issue unique to central Puget Sound, but represents a substantial economic concern on the part of residents and businesses large and small from throughout the eastern Washington area and more specifically the Tri-Cities. Thank you.

MR. GALT: Thank you, Mr. Lindsay. Did you want to submit your statement?

JOHN LINDSAY: Yeah. I'll submit it in written form.

MR. GALT: Okay. Thank you, sir. The next speaker is Robert Giles, who will then be followed by George Walker and Mike Rees. Mr. Giles.

ROBERT GILES: Actually Robert Giles, but that mistake is common.

I'm here on a different perspective. I'm the managing partner of a business located in Seattle, the law firm of Perkins Coie. We're an international law firm with 7 offices in the United States, 2 in Asia and an office in London, and we make extensive use of the airport facility, and to us it's critical that we have an adequate airport facility in the greater Seattle area. We've examined and considered the options and feel that the expansion of the runway at Sea-Tac is the obvious best solution for many of the reasons that others have mentioned here today.

I had our travel agent just pull a record of our flights, and our employees -- we have 600 in the Seattle area -- have taken over a thousand flights in the last 6 months in and out of Sea-Tac. So I think that qualifies us as a fairly major user, and to have regional airports or multiple location airports does not strike us as a reasonable solution.

We also talk frequently with clients who represent many new clients to the Seattle area, and with clients coming into Seattle. High on the list of evaluating Seattle and any other location in the northwest is access by airports, access in and access out, and their idea is a single centralized airport.

I know the main thrust of your efforts is looking at the environmental issues, and I can't claim to be an expert on the entire environmental impact statement. I've scanned parts of it and followed closely the newspaper articles, and it certainly strikes me and the other partners in our firm that the third runway being added to Sea-Tac is by far the most efficient solution, the most cost-effective solution to maintaining an adequate airport, which is our main goal.

Obviously the environmental problems have to be solved, any environmental issues like the water issues that were raised earlier. They exist with the existing airport, and those problems can be solved in a cost-efficient manner, in my opinion, and in our opinion, far more efficiently through expansion of that airport than by trying to add a second airport and probably multiplying the problems.

That's the extent of my comments, and I wish you well in your efforts. Thank you.

MR. GALT: Thank you, Mr. Giles. The next speaker is George Walker, who will then be followed by Mike Rees and Jay Bakst, I believe it is. I hope I'm pronouncing that correctly. Mr. Walker.

MR. WALKER: Good afternoon, Mr. Galt. My name is George Walker, and I am currently the co-chair of Air Washington. Air Washington is a statewide organization of business, labor, and government, dedicated to insuring that we have an adequate air transportation infrastructure for the entire state of Washington. I am also the past chair of the greater Seattle Chamber of Commerce, of the Seattle-King County Economic Development Commission, and the Association of Washington Business.

My experience in economic development over the last 15 years in this state has convinced me that the state of Washington will not be able to capitalize on its outstanding geographical location, being located halfway between Tokyo and London, as a leader in the development of the Pacific Rim. A second all-weather runway is essential if we are going to retain the type of business and industry that we have today as well as encourage other positive type of industry to locate in our area.

The first question that we find that we're asked by somebody who is looking for a site for a high tech type of business these days is tell us about your education system. It's always followed secondly that the question is tell us about your transportation system and tell us about your access to worldwide transportation. So for that reason we were pleased to see the environmental impact statement. We feel that it does a fair job of balancing the pluses and minuses of an expansion at Sea-Tac, and that it shows that mitigation can do away with the negative impacts. Thank you very much.

MR. GALT: Thank you, sir. The next speaker is Mike Rees, who will be followed by Jay Bakst, and then Laurie Wordian. Mr. Rees.

MIKE REES: Thank you. My name is Mike Rees, and I'm here representing the Magnolia Community Club. Magnolia is a residential community of 19,000 people, 12 to 15 miles north-northwest of Sea-Tac.

At a community forum which we held last month on concerns and issues of our neighborhood, aircraft noise was identified as a concern and was categorized as a medium high priority issue. We have made an initial review of the DEIS and plan to forward written comments to the FAA by August 3rd. In the meantime we

R64

have identified 3 areas of deficiency in the DEIS, which we would like to see addressed in the final version.

Comment one. The DEIS does not address the impact of increased flights on all communities who are currently affected by adverse noise from Sea-Tac operations. In particular, Magnolia can expect to experience more noise from overflights as a result of the additional runway since there are more operations planned and that the new runway will be located west of the other two. The required action, therefore, is that the FEIS needs to address noise impacts on all communities within a minimum mile radius of Sea-Tac that includes the 55 dba contours for daytime flights and 45 dba for nighttime flights. This is estimated as a minimum of 20-mile radius from Sea-Tac.

R-5-2

Data should be based on actual flight path experience and not on unrealistic flight paths. Noise monitoring should be undertaken in these communities, and the resulting data evaluated in light of the estimated increase in flight activity. Appendix C, Exhibit C-2 through C-7 show the expanded -- should be expanded to show the noise exposure levels from takeoffs and landings on runways 34L and 34R overlaid on a map of Seattle. The noise contours should include

levels down to the maximum permissible environmental noise levels required by King County and the City of Seattle for residential use.

Second comment. The DEIS does not address reasonable nonaction alternatives such as the effect of airlines increasing their passenger load by varying amounts per flight. With the expected introduction of new larger aircraft into the airline inventory, such as the 777 and larger commuter aircraft, the effect of different passenger load factors on the number of required flights could be substantial. For instance, using the DEIS passenger estimates, it would appear that if each airline added just 2 passengers for each arriving and departing flight for each year from now through 2020, there would be fewer flights required in 2020 than in 1994, thus negating the real need for a third runway.

The required action, therefore, is that the FEIS should include an analysis that shows the number of extra flights per year that would be required when the airlines increase their passenger load from say 1 to 3 passengers per arriving/departing flight per year from 1994 through 2020.

R-4-7

The third and last comment concerns that the DEIS does not address the effect when actual flight paths deviate from planned flight paths. Overflights of Magnolia are supposed to occur only on rare occasions. The flight paths in the vicinity of Magnolia during north flow or south flow days are supposed to be over Elliott Bay and Puget Sound. Actual data shows substantial deviations over Magnolia during both flows.

The required action therefore is that the FEIS should include an analysis that shows the noise effect of increased flights over Magnolia when the deviations to flight paths occur based on current records of overflights as well as ideal flight paths. Projected flight paths should include the 95th percentile areas covered by these flight paths. Appendix C Exhibit C-15 and C-16 which are the future arrival and departure flight tracks should include Magnolia and all communities within a minimum of 20 -- miles from Sea-Tac.

R-5-2
R-6-9

That's all for now, and we'll be sending a formal written comment to you later. Thank you for the opportunity to make these comments.

MR. GALT: Thank you, Mr. Rees. Your comments today will be entered in the record. The next speaker would be Jay Bakst, followed by Laurie Wordian.

MR. GALT: Thank you. If I'm pronouncing it wrong, I'd appreciate being corrected.

JAY BAKST: Thank you. My name is Jay Bakst, and I'm the chair of the transportation committee for the Kent Chamber of Commerce and am here to talk about the draft environmental impact statement on the third runway at Sea-Tac.

The Kent Chamber of Commerce is extremely interested in the viability of transportation systems in the area, and Sea-Tac Airport is of course a major component of that. We, as transportation committee, will be bringing to the Kent Chamber board in mid-June a resolution regarding the third runway, and we expect to send that in written comment to the FAA prior to August 3rd.

In reading through, reviewing the EIS or the draft EIS I found it very thorough. It addressed most of the areas of concern or impact that I could identify. In particular, I was impressed with how they were covering the wetlands to insure no loss of wetlands, the way they covered the noise activities, and some of the points that were made in that regard. I found that many of the concerns presented about the impact or the third runway address issues that I don't find particularly important or relevant to the third runway in particular.

We have seen over the past few years an increase in traffic. Nobody has questioned that the increase in traffic will continue, and within the next or within the period of the environmental impact statement, whether or not there's a third runway seems to impact more how efficiently the airport will handle that increased traffic as opposed to whether it will be there or not. The cost is not a public cost, not a taxpayer cost, and it for the most part is well within the capability of the airport to handle, so I don't see that as a problem.

In previous discussions on transportation areas, the loading of airplanes, what percentage of the airplane is full, has been less of an issue because if you have more people on flights, you just have more flights. If you have fewer people, you have smaller planes. It doesn't seem to affect the number of flights because the airlines are interested in service, and frequency of flights is something that will continue.

As far as having flights in other areas outside of the main Sea-Tac Airport, it has been tried or there is right now no problem with somebody flying to let's say Paine Field, but we have not yet generated

sufficient demand for a flight from Paine Field for people to make that economically viable, and I don't see anything coming up in the future that would change that.

So in conclusion, the EIS is quite thorough. The impact of Sea-Tac Airport on our area is vital. We look forward to the increase in capability, and over the next 10-15 years don't see -- or agree with the environmental impact statement that the most advantageous solution is a third runway, and I thank you very much.

MR. GALT: Thank you, Mr. Bakst. The last preregistered speaker during this block in our hearing is Laurie Wordian. Ms. Wordian.

LAURIE WORDIAN: Before the gentleman from Kent runs off, I just want him to know that Paige Miller told me that Kent was the most polluted city in the state of Washington, and I'll tell you why.

Sea-Tac Airport aircraft operations spew thousands of tons of pollution into the air each day. On any one typical day of operations jets are emitting as much as 11,000 pounds of nitrogen dioxide into the communities surrounding the airport, and it all blows towards Kent.

The expansion project proposed in the DEIS is

R-10-14

expected to increase this amount of pollution. In the study the input was based on only 43.9 takeoffs an hour, when in actuality there is currently closer to 60 to 70 takeoffs. With the third runway takeoff projections in 2020 could be as high as 140 per hour. With the correct input, Sea-Tac will be out of compliance with the national airport air quality standards.

R-10-37

It is also expected that this will cause cancer for airport community residents and will increase respiratory illnesses in the area. Recent studies and testing show that aircraft emissions cause cancer. Just 3 emissions at Sea-Tac Airport that aircraft out of the potentially hundreds are expected to be responsible for over 1300 cancer cases with present conditions. Any increase in aircraft traffic will substantially increase mortality. Many have already died early, mysterious deaths.

Our elected officials have been recently made aware of this, but no one seems to be doing anything about it. Are we to be sacrificed as guinea pigs so commerce can prosper? Is a little insulation our only reward for continual suffering of noise and pollution possible early death?

Knowing our children are breathing toxic

fumes such as high levels of benzene is a very panicky feeling. The Port knows firsthand about this. Just ask them about the benzene levels at Seattle Christian School. Our children are breathing known toxins while being awakened every night so a few who travel can be close to the airport. Should thousands of helpless residents be injured and cast away from law and public health protection to save us seconds in aircraft delay time?

The Port's own documents show that the larger planes, over 60 seats, flying in and out of Sea-Tac are 43 percent empty and the smaller planes under 60 seats are 55 percent empty. What is the problem here? I don't understand it. We're spewing all this pollution around, and our planes are half empty. Many of the people that live around the area, their homes are not sellable. They have lost their opportunity to get out. Are they going to be forced to bear this continuous abuse?

The EIS is not addressing all of the problems. Bad information to start with was used to achieve faulty results of the DEIS. I feel, as many others, a lack of information in the EIS is the FAA's deep dark secret is not to alarm the people living in the shadow of airports.

MR. GALT: Thank you, Ms. Wordian. The first speaker during this hour from the walk-in list is Stephanie Christie, and she will be followed by Guy Cunningham and Mayer Etkin. Ms. Christie.

STEPHANIE CHRISTY: My name is Stephanie Christie, and I'm a resident of Normandy Park. I'm referring to a summary done by Debbie DesMarais on McCulley Frick and Gillman air quality survey. The McCulley Frick and Gillman survey was initially intended to be a follow-up to the emission and dispersion modeling system which was a study conducted by the Department of Ecology completed in May of 1991. However, much of the sampling done by McCulley Frick and Gillman did not follow specific criteria on location or scenario for sampling the worst case predictions. The sampling time of year, the days of the week and weather were more conducive to best case scenario.

R-10-30

The results, many of which are quite alarming, however, captured high levels of benzene despite the above-mentioned conditions. Benzene and formaldehyde were detected at levels far above the Washington Administrative Code acceptable source levels. Since averaging in the codes are based upon yearly figures, an annual amount is difficult to arrive

at using only 4 days of 6 to 8 hour sampling periods. However, using a method suggested by Fred Austin of Puget Sound Air Pollution Control Agency, the yearly is in excess of allowable limits for benzene and formaldehyde, but the 8-hour average for benzene when used as a yearly figure is a hundred times over the allowable safety limit. There is little dispute that these chemicals do put humans at a very high risk for cancer.

R-10-30

In summary, I feel that the air quality issue is of great concern and needs to be addressed in more detail in the EIS statement, particularly since we have an entire school district situated on the perimeter of the airport. This isn't a local problem. This affects air quality of the entire Puget Sound basin. If I was a resident of Kent, Mercer Island, anywhere in the city, I would be really concerned about this issue.

Thank you for your time.

MR. GALT: Thank you, Ms. Christie. The next speaker is Guy Cunningham, who will be followed by Mayer Etkin. Mr. Cunningham.

MR. CUNNINGHAM: Thank you, sir, and Good afternoon. My name is Guy Cunningham, and I'm the general counsel of the Pacific Northwest Laboratory in Richland, Washington, operated by Battelle Memorial

Institute. I was scheduled to testify later today and appreciate the opportunity to appear early.

I'm here this afternoon to express the Laboratory's support and endorsement for the proposal to build a third runway at Sea-Tac. Because we are located in eastern Washington, I believe it would be inappropriate for me to comment on the specific impacts to the Seattle-Tacoma environment such as noise, land use, and so forth, on which you just heard two eloquent local speakers, so I will limit my remarks to the socioeconomic situations as they relate to Battelle and the U.S. Department of Energy's Pacific Northwest Laboratory.

Battelle has operated the Pacific Northwest Laboratory in Richland for the federal government since 1965. We conduct research and development programs in the environment, energy, health, and national security. Currently we have about 4,000 employees, and our business volume in 1994 was 548 million dollars. While our work is funded largely by the United States Department of Energy, our current customer base includes other domestic and foreign government agencies and industries. Our business dealings with these customers involve frequent air travel, on their part as well as ours, and we depend upon the adequacy of

services provided by the Seattle-Tacoma International Airport.

If recent trends continue, we will rely on Sea-Tac even more heavily in the future. In 1991 more than 7500 people, 360 of them from other countries, visited the Pacific Northwest Laboratory. Last year the total exceeded 10,000 and included almost 800 foreign nationals. These visitors come from all 50 states and 65 nations, but the majority of our foreign visitors come through Sea-Tac.

Battelle staff members also travel extensively. Over the past 3 years they have averaged more than 17,000 business trips per year, quite a number of them to the Seattle area where we have many business interests. In fact, our marine sciences laboratory is located at Sequim on the Olympic peninsula.

We value Sea-Tac not only for the air service it provides but also for its convenient proximity to one of our most active customer bases. Our staff also averaged more than 450 business trips to foreign countries in 1993, and the same in 1994. So far this year we've had 360 foreign trips.

Speaking for myself, I can assure you that I appreciate the convenience of having an international airport less an hour's flying time from my home in the Tri-Cities, in April I flew from Sea-Tac to Copenhagen in just 9 hours. I assure you that this was far more convenient than the alternative, flying from Pasco to Salt Lake City to New York or Atlanta before beginning to make international connections.

With the greatest number of our customers traveling from United Kingdom, Japan, Russia, China, India and South Korea, easy access to an international airport that provides nonstop air service to cities such as Copenhagen, London, Tokyo and Seoul is truly an asset to Battelle, to the Pacific Northwest Laboratory, and to the Tri-Cities.

The addition of the 8500 foot runway appears to be the most sensible, cost effective answer to expected increases in aviation demand from regional growth and delays caused by a single arrival stream during poor weather. As northwest businesses and industries become more fully engaged in the global marketplace, convenient, accessible air service becomes an increasingly important asset. Reliable air service enables organizations such as Battelle to do business beyond the boundaries of the United States, and at the same time it helps to establish the Seattle-Tacoma area as a major international hub and stimulates the

economic development of the Pacific Northwest.

Thank you very much for the opportunity to comment this afternoon. I have a copy of my statement which I will leave for the record.

MR. GALT: Thank you, Mr. Cunningham. The next speaker would be Mayer Etkin or Mayer Etkin.

MAYER ETKIN: Take your pick.

MR. GALT: Mr. Etkin.

MAYER ETKIN: Hi, there. Thank you. I'm here as a part-time resident of Seattle and a frequent flier. I fly both domestically and internationally, at least 75,000 miles a year, and have choices of airports as well as routes and airlines, and I appreciate and I'm sensitive to the environmental concerns expressed by a lot of people, and I'd like to urge FAA to adopt what I would consider a broad range of mitigating factors.

For example, there are environmental technologies that are currently in development which will eliminate or perhaps reduce or mitigate some of the circumstances associated with the benzene as an example.

And I'm not a scientist. I'm just a consumer and I'm in business, and we don't live in a perfect world unfortunately, but we do need airports, and we need access to transportation, and I'd just like to say that I hope they build the third runway as quickly as possible, and at the same time from the FAA's point of view, we look at it from a flow control point of view because I think it's absurd take an 8:00 flight and then have to sit there for 30 minutes and wait because you get into the airport you're going to. We don't live in a vacuum. We have to look at it where you're going, how you're going to get there, and when it's going to get there. So it's not just an isolated issue, and that's all I wanted to say.

MR. GALT: Thank you, Mr. Etkin.

MAYER ETKIN: You're welcome. Bye-bye.

MR. GALT: That's the last person who has either preregistered or signed in this afternoon to speak during this block of time. As I did during the first hour, I'm going to ask if there is anybody here that didn't sign up but has perhaps had a change of mind or change of heart and would like to offer comment regarding the adequacy of the draft EIS.

The record will show there is not. The next preregistered people are scheduled to begin at 3:05. I will be repeating some of the introductory comments again, so we will recess our hearing until 3:00, at which time we will reconvene. We are at recess until

3.

(Recess.)

MR. GALT: Good afternoon, we'll reconvene our hearing. It's now 1 minute after 3. On behalf of the Federal Aviation Administration and the Port of Seattle, I welcome you to the third hour of the public hearing regarding the draft EIS for the Seattle-Tacoma International Airport for the proposed master plan update. I'm John Galt, and I'll be the moderator for today's hearing. I've been retained to moderate the hearing today because I'm not an FAA employee I'm not a port of Seattle employee, I don't work for any of the consultants, and I have absolutely no role in any of the decision making. I am simply here to keep things moving and to be your master of ceremonies, as it were.

As you undoubtedly know from looking at the ground rules for the hearing process today, we're allocating members of the general public three-minute testimony time slots and representatives of groups and elected officials five minutes. We are not allowing any transferance of testimony time, and individuals may not trade their speaking slots. The first half of each hour is devoted to testimony by those persons who have preregistered to speak; the second half is devoted to those who are, if you will, walk-in customers.

When I call you to testify, please come forward and take a seat in the chair opposite me so that you can talk right into the microphone here, give us your name and, if you are one of the walk-in customers later on in this hour, and if we don't have you on one of the salmon-colored cards, give us your mailing address, if you would. I'm going to call three names at a time. The first one will be the next person to speak, and then the next two persons that I call, to use a baseball analogy, will essentially be in the on-deck circle and if those people would become prepared to move forward and take their position at the witness table, that would help us move efficiently through the afternoon.

The first speaker during this hour is Mr. Dorian Berger, who will then be followed by Bob Gilespie and Dean Thornton. Dorian Berger.

I'm being asked if there's a place where they can plug in what I would call a boom box. That's a PA jack; you won't be able to plug into that. What you might want to do frankly is submit a copy of the tape because --

DORIAN BERGER: It's just jet noise.

MR. GALT: But the court reporter will not be

able to type a tape with noise on it, so be advised.

DORIAN BERGER: That's okay.

MR. GALT: Go ahead, Mr. Berger.

DORIAN BERGER: According to the environmental impact statement that the Port has put out, a lot of us would believe that benzene helps the soil, that air pollution would help your grandmother live long, and that more airplane noise would help you smell better. But we all know that's wrong, and we know that the reason why the Port of Seattle is able to have such a positive statement is because they were able to write it themselves.

The FAA was partially responsible for putting out the environmental impact statement. Now, the FAA has a vested interest in having the environmental impact statement be positive so more airports get built.

I'm here representing the Mt. Rainier High School student body as vice president of the student body. We at Mt. Rainier oppose the third runway, and the reason that we opposite it is because of air pollution, what it does to our classes, and what comes out of the sky. Probably some of you know that recently a piece of airplane fell on top of the school. Now, that's going to happen more often with a

R-5-4

third runway.

But most importantly it's the airplane noise at our school. Every period we have about three jet planes that travel over our school, and the sound goes right through our classrooms. Now, what I've brought to you is a tape that we have of the jet plane noise at our school, so what I'm asking is I'm going to be reading this statement, just a statement, a piece of writing, while my friend plays the jet plane noise, and I want you to hear that you can't hear anything, just like we can't hear anything in our classrooms.

R-54

Scott, can you play?

MR. GALT: Do be aware that if you really succeed in covering up your voice, the court reporter will have to ask that it be turned down some so she can hear your words.

DORIAN BERGER: Yeah. Well, That's okay. -- I hope I succeed.

(Tape playing.)

This is the sound we hear every day in our classrooms, except it's a hell of a lot louder, much, much louder. We can't hear our classes when we have geometry, we can't tell what we have in chemistry class, and it's a lot louder. If the court reporter were there right now, you couldn't hear any of the

sounds. Also, during class the noise is so loud that the cars out in the parking lot have their alarms turned on by vibrations of the planes. Now, that's a lot of noise. If we had a third runway we'd have more noise and more pollution.

The second thing that a third runway would do to our school is it would dislocate a lot of our students. It would lead to an expansion of the airport which would mean almost 500 families would have to move away. Most of those people live in the Mt. Rainier High School area, and so our school would be severely disrupted. Not only would we have more noise, but we'd have a disrupted school.

So I ask the people who are planning to make the third runway, why do you want it? Most of them probably think that we need a third runway so that we can have the businesses succeed, but all of us know -- that that's not going to happen. Eventually there's not going to be a third -- there's not going to be a a fourth or a fifth runway, and the population is not going to keep on growing and growing and growing, and even then the businesses won't be able to succeed because of the decreased quality of life because of the jet noise, the air pollution, and the huge expanse of land that will be covered up by cement would decrease their profits.

The second thing is that even if the businesses do expand, at what cost will that come? We always say that we want a bigger city, more money going into the city coffers, but I question why do we need that? Why can't we just stay a small city without becoming a huge metropolis? Why do we need to make every business into the future K-Mart and Costco? Why can't we have the businesses stay small? Why can't we keep our community a community and not just a city?

R-3-15

The students of Mt. Rainier and especially the student government stand opposed to the third runway because we want to keep this a community: a community without noise, a community without gas in the air put out by the planes, a community where we can listen to our classes. Thank you.

(Applause.)

MR. GALT: Thank you, Mr. Berger. The next speaker is Bob Gilespie, who will be followed by Dean Thornton and Richard Kennedy. Bob Gilespie? Mr. Gilespie is not here? We will pass over him and come back at the end of the preregistered list and see if he has come. How about Dean Thornton? Mr. Thornton, and then we'll have Richard Kennedy and Terry Brazil.

MR. KENNEDY: Good afternoon. My name is

Dean Thornton. I'm a retired Boeing executive and co-chairman for a coalition of labor and business leaders in the Seattle area, although I'm not speaking for Air Washington at this moment.

I also live on Magnolia, and I understand you had an earlier testimony that it's bad. I live at Magnolia, and the noise does not bother me.

I think there's two economic characteristics of this region, and we're really talking a regional problem. The two characteristics that I see are our tremendous reliance on trade and high tech. There are two requirements for both of those industries, education and transportation, and because of the trade feature, this increasingly means air transportation.

Sea-Tac is growing at double digit rates; the capacity of that airport will be reached before the year 2,000. In bad weather it's worse. The two existing runways are too close together for simultaneous use in bad weather, which is like 40 percent of the time.

For six years we've been studying this. Early 1995 the cognizant governmental authority eliminated an alternative airport and said the expansion of Sea-Tac is the only acceptable answer. The EIS that was put together by the FAA and the Port is the most comprehensive and expensive EIS ever put together for an airport, and its conclusion: no environmental impact which can't be successfully mitigated. So our choice is do nothing or do a third runway, which is not a temporary fix. The region needs it, and we're strongly in favor of it.

MR. GALT: Thank you, Mr. Thornton. Next speaker will be Richard Kennedy, who will be followed then by Terry Brazil and Stan Watanabe. Mayor Kennedy.

RICHARD KENNEDY: Thank you. For the record, my name is Richard Kennedy, mayor of the City of Des Moines and I was a previous member of the Puget Sound Air Transportation Committee who starting in 1989 started looking at air transportation problems in the Puget Sound region. I'm here to speak about four general issues: the timing of these public hearings, the scope of the DEIS, the underlying assumptions of that document, and the role of the independent arbitration panel.

First, I think the timing of these public hearings are inappropriate. The draft EIS is over a thousand pages long, yet the only public meetings are being held at the beginning of the comment period. While this meets the letter of the law, it makes it

R-1-3

very hard for citizens to wade through this massive amount of documentation to make any specific comments. To me this is just another tactic of the Port of Seattle to limit meaningful public input.

R-1-3

The cities of Burien, Des Moines, Federal Way Mercer Island, Normandy Park, and Tukwila and the Highline School District, which represent almost 200,000 people, will be submitting a very detailed written comment near the end of this period.

The draft EIS is a narrow, superficial, incomplete, and most expensive EIS ever done on an airport. At over a thousand pages it gives the impression of being a solid, well-done document; however, a closer review makes it apparent that it's superficial, narrow, and incomplete. There is only a brief summary information about the cumulative impacts of other planned development projects in the airport vicinity. For example, there is no cumulative information about the impacts of the SASA project, the 24th/28th Avenue arterial, South Access Road, the SR509 freeway extension, the Des Moines Creek Biotechnology Center, the hotel being built on the airport property, and the rumored west side terminal.

R-4-18
R-5-3

There is also only a brief summary of relevant alternatives. For example, it is stated that there are no alternative airport sites in the four-county area. That statement was purely a political decision made by cowardly politicians who continue to want to use south King County as the region's dumping grounds for undesirable land uses. The draft environmental impact statement fails to mention that if an airline decides that delays at Sea-Tac Airport are too great, they could, for example, move to Paine Field. Since Paine Field was built with federal funds, there's nothing Snohomish County can do to stop commercial activity. So the free market forces aren't even mentioned in the draft environmental impact statement.

R-4-4

R-4-2

There's also only a very brief summary of the environmental effects of alternative airside options.

The draft document is also baased on a number of unfounded assumptions. It assumes that the number of annual operations at Sea-Tac will increase by more than 100,000 to 441,600 from the years 1993 through the year 2020 whether or not a third runway is built. There is no credible factual basis for this assumption beyond a simple projection of regional population growth.

R-3-7

This document also erroneously assumes that the do-nothing alternative would have the same major

environmental effects and benefits as with project alternatives. This is again I think more propoganda, but if you take this statement at face value, why then spend a billion dollars on a third runway that will give you the same benefits and the same damage to the environment that you would get by doing nothing.

Finally, the DEIS completely ignores the role of the independent arbitration panel, and I think purposely ignores it, too, because the effects of this panel have a great bearing on whether a third runway can or cannot be build. The Port of Seattle cannot proceed with a proposed third runway unless so authorized by the Puget Sound Regional Council. Now, the Puget Sound Regional Council may not amend the Regional Air System Plan, the RASP, unless conditions based on the PSRC General Assembly Resolution A-93-03 have been met, and those relevant criteria are the expert arbitration panel must find that the Port has scheduled and achieved noise reduction performance objectives based on the measurement of real noise impacts, and also the expert arbitration panel must find that demand and system management programs have been pursued or achieved or that they are infeasible.

R-2-5

So that concludes my general remarks. During the rest of the day there will be a number of speakers from the airport communities coalition cities who will expand upon these markets and give additional detail. They'll be talking about the areas of the purpose and need for a third runway, the analysis of alternatives to a third runway, what some of the environmental impacts of a third runway would be, the effectiveness of the proposed mitigation measures, and additional things.

Finally I have heard also stated that a lot of the comment that I have listened to this afternoon has dealt with the need to have air transportation. I don't think anybody in this room, including the airport's community coalition, disagrees with that statement, but the real point here is is the plan to build a third runway the best solution for our region, not only now but in the long term, and I think as we will see both in our oral and in our written comments to come, that we will see that the runway at Sea-Tac is an expensive alternative, costing well over a billion dollars, it will create great deals of economic dysfunction in the immediate area, and within 15 or 20 years would be at capacity again, forcing us to look for additional runway alternatives.

Thank you much.

MR. GALT: Thank you, Mr. Kennedy. The next

speaker is going to be Terry Brazil, followed by Stan Watanabe. Mr. Brazil.

TERRY BRAZIL I'm an elected official, but I'm speaking here today as a citizen and a fisherman, and I'd like to bring up the elements of the impact statement that have to do with water quality and water quantity.

First of all, the impact statement does not adequately consider the impact of the proposed third runway on water quality and water quantity in the Des Moines Creek and Miller Creek, which are adversely affected by this proposal. The statement does not address the low water flows in Des Moines and Miller Creeks which would result from paving the large amount of recharge area. There would be no water going into the soil, it would be going into a holding tank with other chemicals and such with it.

R-13-7

The impact statement pays insufficient attention to the capacity of industrial waste system, the IWS, as its mentioned, drainage improvements to mitigate the effects of increased runoff from the third runway and from a major increase in air carrier operations, and this is what struck my attention.

R-13-12

Since 1965, the airport or Port of Seattle has not been in compliance with the NPDES, that's the National

Pollution Discharge Elimination System. I had to look that up. But I went to a hearing a few months ago and the airport has not been in compliance with that permit, but year after year they continue to issue the compliance and the comments they made were, well, they're trying to do better.

R-13-15

And as a citizen and a fisherman, the streams are already being polluted with the ethylene glycol from deicing airplanes and different that happen to go onto the surface of the runway, and my request is that they fix the existing system before they start building new systems. Thank you.

MR. GALT: Thank you, Mr. Brazil. The last person on the preregistered list for this hour is Stan Watanabe. Mr. Watanabe.

STAN WATANABE: Good afternoon, folks. Thank you very much for letting me speak to you. I have written a short note here. It says: To whom it may concern:

R-4-11

Build a shorter runway on the west side of the airport next to the present runway, only below the present runway level. Being below the present runway, it can be a shorter runway for smaller airplanes. Also, a terminal can be built underneath the present runway and will solve -- be a space for air terminal and parking and other facilities. Even a rail station

R-4-11

R-4-10

can be built for passengers coming from Seattle and Tacoma on the extreme west side, and an underground link rail serving all of the airport passengers' needs. It can be either tunneled under the present runway or go around the runway to the main terminal.

R-4-4

Have noise barriers next to the Burien City below the present level runway. It will save time, money and other needs. If you want another airport, an airport at Enumclaw, Auburn area or on Puget Sound will serve our needs. I thank you very much. I'll leave you a copy.

MR. GALT: Thank you, sir. That's the last person preregistered for this hour of the hearing, and I also do not have any sign-up sheets for walk-in speakers for the last half of this hour. This is becoming a custom of mine when that happens to ask if there's anybody here who, having sat through the first half of the hour has changed their mind and now wishes to speak. We will hear you, even if you haven't signed up outside and even if you don't have one of the salmon cards. So let me ask if there is anybody in the room right now who would like to offer testimony regarding the adequacy of the draft environmental impact statement? Yes, ma'am. Since you haven't signed up, if you'd be kind enough to start by giving us your name, spell your last name and then your mailing address.

AMY YAMAMOTO sure.

MR. GALT: And remember, this is especially true for everybody, talk slow enough that the reporter can get what you're saying.

AMY YAMAMOTO: Thank you. I'll try to talk slowly. My name is Amy Yamamoto, and I'm at 7765 - 37th Avenue South, Seattle, and I'd like to speak or address this situation that affects, you know, just regular people, homeowners.

R-5-4

We have to put up with a lot of noise, and there will be a lot more noise if we have another runway, and there are alternative runways. I know they say they've looked at some of the alternatives, but they've dismissed them, and I think we could look at them a little more seriously instead of building another runway that is not -- it has not been proven to be more efficient or proven to do anything, and the studies that they have right now don't focus on the problems that they're causing for the people that -- it's not just the taxes but also the noise and the pollution and the problems they're causing for the people who live here.

I think that we should focus more on the

R-5-4

taxpayers and the burden that we already have and the problems that we already are subjected to without bringing it to a higher level, because it would make it more unlivable for us and also for the people in the hotels. You know, they would have a lot more noise, it would be maybe more unbearable to stay in where there's lots of jets taking off, and the water may be contaminated or have that runoff pollution like they have at Miller's Creek, and the water tasting not like it does now, and it's already getting worse. You can taste the water even now. In the past few years it's getting worse.

R-1-3

And I think that because of the environmental statement and the environmental reasons that have caused so much damage, not just for the wildlife but for the human beings here, the people who have to pay the taxes, I think we should look at it a second time. And I think we should have evening hours where people can come in after work instead of taking time off and have maybe a smaller or more pinpointed precise statement telling you exactly the real facts that are -- and make it available to everybody a few days in advance before the meeting so you can see both sides of the issues and make their mind up for themselves, make their own minds up.

R-1-3

And one last thing. I would like -- I would like this to be in the newspaper, have more newspaper coverage so that it could reach a larger audience and have it written 1,2,3, you know, in numerically and put it point by point, the pluses and minuses and the alternatives that are available. Thank you.

MR. GALT: Thank you, Ms. Yamamoto.

AMY YAMAMOTO: Thank you.

MR. GALT: Is there anybody else here at this time who would like to offer testimony regarding the draft EIS? The record -- are you coming to speak, sir? Yes, he is.

VERNON POMEROY: I don't know whether it would be the environmental impact statement or not.

MR. GALT: Have you got one of the salmon cards? This is Vernon Pomeroy, and he has his address on the card. Mr. Pomeroy.

VERNON POMEROY: I'm Vern Pomeroy, private citizen, live over here just west of Eighth Avenue, 124th Street.

R-5-4

We tried to put up with this airport noise and eat lunch outside today, and between 12:28 and one o'clock I took down the time each flight went off, and there was 14 flights in that time. Our taxes valuation of our property goes up, and I don't know why, because

R-5-4

we get more airport noise, I guess. More airport, more noise. I don't have -- I'm not familiar with the impact statement, but from comment I got from the paper, it doesn't address or tell us where they're

R-13-15

going to get this water that they're going to use for the airport, not for the expansion time, but for the daily use of the water. Our water at home is so bad that it must come from the swamp. It comes from Seattle Water District, just the same as the other folks, and we have to buy water to drink.

Even the fill dirt that they're talking about hauling in is going to have a very devastating effect on the local streets and communities that way. A number of the schools in Highline District have already been closed, and many of those others, as the Mt. Rainer representative spoke are certainly very much impacted by this airport.

I think that's all I have now.

MR. GALT: Thank you, Mr. Pomeroy. Is there anybody else who would like to offer testimony this hour? The record will show there's not. Our next preregistered speakers are set to begin at four o'clock. We stand at recess until that time.

(Recess.)

MR. GALT: Good afternoon, ladies and

gentlemen, we'll reconvene today's hearing for the fourth hour. On behalf of the Federal Aviation Administration and the Port of Seattle, I welcome you to this public hearing regarding the draft EIS for the Seattle-Tacoma International Airport proposed master plan update.

I'm John Galt, the moderator for today's hearing. I've been retained by the Port and the FAA to moderate this hearing expressly because I don't work for the FAA, I don't work for the Port, I don't work for any of their consultants, and I have no role in the decision-making process for this project.

We are allocating members of the general public 3 minutes of testimony time each and representatives of groups and elected officials up to 5 minutes. The first half of each hour is by prereservation. The second half of the hour is by walk-in testimony. There is a signup sheet outside, and you can get salmon cards -- we had a pile of them here a few minutes ago -- that look like that. If you want to testify during the walk-in portion, you ideally want to pick up one of the salmon color cards.

When I call your name to testify, please come up in the front of the room, take a chair opposite me so you can talk into the microphone, and then give us

your name and begin your testimony. Remember the court reporters are transcribing what you say, and so please don't talk so fast that they can't keep up with you.

I'm going to call 3 names at a time. The first name that I call will obviously be the next person to speak, and then the other 2, to use a baseball analogy, will be in the on-deck circle. And if those two would just sort of get your thoughts in order and perhaps even move a little closer to the front of the room, it will help us keep things flowing smoothly this afternoon.

During the last hour, the 3:00 hour, there was one gentleman who had preregistered to speak who was not able to get here on time. I'm advised that he is here now, and so with everybody's willingness and patience, I would like to call him first since he was supposed to actually speak about 50 minutes ago, and so at this time I will recognize Bob Gilespie. Mr. Gilespie will be followed by Bill Jones, and then Bob LaFramboise. I hope I'm pronouncing that correctly. Mr. Gilespie.

BOB GILESPIE: Thank you. Thank you for your indulgence as to my being late and the opportunity to talk. I live at 10032 Northeast 38th Court in Kirkland, 98033.

This is an enormous task for everybody, the FAA, everybody included. The FAA -- it has become part of the Washington process wherein we submit almost everything to this lengthy, protracted public debate and discussion either until it goes away or it gets to be so enormously expensive that it strains the limit of our public and private debt. We have about the most complex project related permitting environment in this country, and the Sea-Tac issue has become part of it.

There are a lot of small business representatives who cannot come before you today because of time constraints and the need to do other business. I'm one of the few that's fortunate enough to be able to sit down, and I assure you there are a lot of people in private discussions we have who feel the same way I do about the third runway and support it.

I can take some comfort in the fact that the decision will be made not on the number of yeses and nos and tallying that up, but on the facts, and the facts are that 1 in every 5 jobs in this area is dependent on international trade, and if for some reason that air cargo carrier decides it's too busy, too dangerous, too crowded here at Sea-Tac, they go elsewhere. There go the jobs. If an air traffic, if

an air passenger carrier decides that it is too busy or inclement weather, they cannot get in, they'll take the flights elsewhere. They may move the hub, and with that goes the tourism dollars, and the tourism dollars are the best type because the people come in, they land, they go see the sites, they leave their money, and then they leave, and we don't have to build sewers for them or schools or new housing.

If the problems become so bad we experience a major economic loss -- and your decision is based on the facts and you have to recommend an alternative, and I didn't review all 2,000 pages of the draft EIS. I took selected parts of it upon the recommendation of a friend of mine who did, and I think that no environmental impact in this project is so great that it cannot mitigated. In recovering the wetlands that will be lost, that will be filled, that can be done in like acreage or greater elsewhere.

In relocating a stream, that is not uncommon in this part of the northwest. We do that often, with generally better long-term salmon preservation benefits.

As to mitigating the dirt, the noise, the traffic, we did so successfully on Interstate 90 for 2 and a half years. It can be done here. Covering the trucks, restructuring the hours when they drive through, maybe some sound and noise mitigation, some temporary panels.

The draft says that long-term aircraft noise will decrease, quieter jets. There will be more flights, bu' . can handle that, too, through sound dampening measures.

And I hope that everybody can look past all the politically induced hyperbole and make a decision on the facts. It's a lengthy document. I would encourage that the chosen alternative be the 8500 foot runway and that when it comes out in October it speaks to that. And I would urge you, too, to consider carefully the cards and letters that come in from people like me who cannot come and attend. Thank you.

MR. GALT: Thank you Mr. Gilespie. Our next speaker will be Bill Jones, who will be followed by Bob LaFramboise, and then Minnie Brasher. Mr. Jones.

BILL JONES: Hello, John. My name is Bill Jones. I am the president of Local 1257 IAFF, which the the Sea-Tac firefighters at the airport. I'm also, or we are also members of the King County Labor Council.

I am here today, along with all the other business and labor leaders to demonstrate our total

support for the third runway. I represent 56 family wage jobs at the airport. I would like to thank the FAA for their comprehensive draft study they have done. We support it. The document is accurate, it is fair, and the bottom line is the major environmental impacts we can overcome.

I've been the president of the local for 15 years at the airport, so I've seen the growth in itself over the duration of time. I've seen it expand rapidly. I can see what the third runway would do for our cause.

We support at Sea-Tac 25,000 family wage jobs. Nearly 15,000 of them are at the airport. If we continue to do nothing, we're going to lose these potential jobs and future jobs. Again, as the gentleman talked before me, we will lose these services to the other surrounding airports, whether it's Portland, you got Denver that's just opened up, LAX, SFO, Vancouver which is right next door to us, Portland, and so forth.

We consider Sea-Tac not only a vital link not only to Seattle but to the entire Pacific Northwest region. Our region's economy is a factor that should not be taken lightly. In order to compete in today's market, we have to look beyond what is good for the few, but what is good for the many. We are rapidly approaching our capacity of 380,000 flights per year.

The two existing runways are close together. When they do use these runways -- runway during the bad weather, we personally experience that in the fact that we have to station CFR vehicles on the AOA during these conditions so we can have a rapid response if there is an incident. By providing that third runway, you're giving us that safety margin that we're looking for, which is safety for the flying public. I can say it in this fashion, and it's how many times have our loved ones traveled in and out of Sea-Tac. Their safety and that of the others, the traveling public, is our number one concern of the firefighters. A third runway would add that -- or would alleviate that risk factor that we're concerned about under our present condition of the two runways.

We're for the 8500 foot length. The impact of the other two is minimal. And generally I'd like to say thank you.

MR. GALT: Thank you, Mr. Jones. I was told during -- you can leave. Thank you, sir. We're going to wait just a minute.

Is there anybody here that has left a briefcase over in the corner?

A MAN: That's mine.

MR. GALT: Okay. Thank you. The next speaker will be Bob LaFramboise who will be followed by Minnie Brasher and then Elizabeth Springer.

BOB LaFRAMBOISE: Good afternoon. My name is Bob LaFramboise, and I'm responsible for sales and marketing for Heath Techna Aerospace, which is a subsidiary of a much larger company, Ciba Geigy, and located just over the hill here on East Valley Highway or Central Avenue in Kent, and Heath Techna is in the business of selling composite parts to the aerospace industry, and I'm here to express our support for the third runway based on a series of reasons.

First of all, Seattle was really kind of put on the map in terms of international trade with the APEC conference that occurred here a couple of years ago, and as a result of that, as we travel we see that Seattle is increasingly being seen as an entry port for the United States and a key port of access, and as traffic continues to increase, we believe that the third runway will be more and more critical.

Secondly, a major part of our business is international sales, and we spend a lot of time traveling in and out of the airport, and the need or ability to travel directly to major cities in Asia directly from Seattle is key, and again as the third runway comes on line, we feel that that will increase our ability to do that. Our analysis shows that Seattle is kind of in the unique position for entry into Europe and to Asia in terms of being about equidistance each way and timewise, and thus makes Sea-Tac a very good location to travel from.

Also, we find that in terms of recruitment of people to our company, as you know, Seattle is a highly sought area to live in, and in terms of recruiting high quality people, we feel the existence of the third runway would continue to make Seattle a competitive city in terms of recruiting people.

In terms of the actual impact statement, I have personally read the executive summary. I have not read the complete detailed document, but in terms of the executive summary, we would like to submit our support of the option for the longest option or the 8500 option. We feel that's the best payback for the money. Our analysis shows that while the impact statement may not be perfect, that substantial work has been done and it appears substantially to answer the questions involved, and we, therefore, throw our support to the impact statement as well.

So in summary, as a local supplier, located

in the Kent valley, a member of this area, and also in this industry in the aerospace industry, we support the third runway and also the environmental impact statement as it's been written. Thank you.

MR. GALT: Okay. Thank you, Mr. LaFramboise. Next speaker is Minnie Brasher, who will then be followed by Elizabeth Springer and Gary Tow.

MINNIE BRASHER: Thank you, John. Thank you for letting me speak at yet one more process on air transportation in the state of Washington.

An EIS is supposed to give the environmental impacts of a project. This DEIS does not. For 5 years we have attended all of the committee meetings and spoke on all of the previous EISes: the programmatic DEIS, the DEIS, and the final PSRCEIS for air transportation. At every meeting or hearing we spoke of the evasiveness of environmental impacts. At every hearing or meeting we were told, wait until the site specific EIS comes out, and all of your questions will be answered.

Well, this is supposed to be the site specific EIS, and it leaves even more questions unanswered. The master plan for the airport should have been produced first, and then the EIS would have answered the specific questions, but no, we in Seattle

R-1-11

have a first. We've always before been a first for everything, and so the EIS and the airport plans were done at the same time. The reason given? It saves money. I don't think so. It only gives more confusion about the total environmental impact.

R-1-11

Some of the problems in the EIS. Number one, the unbelievable folly of a 500 million dollar runway that will be used only in bad weather and only for landing. A third runway that shows only one arrival flight track and only two departure flight tracks, and shows no radials.

R-6-13

R-6-14

Number two, the Port of Seattle presently uses 600,000 gallons of water per day. The DEIS prediction is 4.3 million gallons of water a day in the year 2020. No clues as to where this extra water will come from.

R-13-14

Number three, air quality. For the year 2020 predictions on air pollution, Landrum & Brown used 50 departures per hour, worst case scenario. Flight plan and the FAA predict 141 operations per hour with a dependent third runway. If the real worst case scenario had been developed, it could easily double all emission rates modeled by Landrum & Brown. Using an average scenario, Sea-Tac is already over the CO and NO2 standards, and even though the EPA requested to

R-10-14

R-10-14

Landrum & Brown that all project impacts be evaluated together, this DEIS isolates each project on an individual impact basis.

A cost analysis put out by the Port of Seattle on this project is 1.5 billion dollars and counting. This DEIS is not a complete comprehensive study as has been stated. The information on projects is incomplete and source material is hard to come by. Personal phone calls listed as source material, while it may be a standard industry practice, on a project of this magnitude and environmental impacts, it cannot be tolerated. So go back to the drawing board.

Thank you.

MR. GALT: Thank you Ms. Brasher. The next speaker is Elizabeth Springer, who will be followed by Gary Tow, and then Rebecca Allmon. Ms. Springer.

ELIZABETH SPRINGER: Hi.

MR. GALT: Hi.

ELIZABETH SPRINGER: I guess I give that to you. I'm not quite sure what.

MR. GALT: Yes, you do. Thank you.

ELIZABETH SPRINGER: I'm Elizabeth Springer, and I don't recognize you from 1:30 in the morning, so I take it you're new to this presentation.

MR. GALT: I don't think we've met at 1:30 in the morning.

ELIZABETH SPRINGER: Well, we sat here until 1:30 in the morning one time when I was here to talk and discuss this third runway.

MR. GALT: I'm just the moderator for today's hearing.

ELIZABETH SPRINGER: Well, we'll give you an A-okay then.

R-18-2

We're back at the same old stand, however, Seeing the same people defending their homes against athe aggression of the airport. The worst part of this scenario is that these people defending their homes and well-being must pay heavy taxes to defend peace and quiet. Each and every year the Port of Seattle dips into the public purse for more than 30 million dollars. I think that last year it was up to 37 million. What does the Port do for this? Send a one-paragraph letter to the County council and request the levy for the year, and by statute the council adds their request to your tax bill, and that includes -- that's all of us.

How can this be reduced in amount or abolished? I was told in Olympia that it can't be abolished because the lobbyists for the Port are too strong. 74 to 76 Port districts in this state are

involved, engaged in buying land, investing, whatever. No taxes except ours are paid on this activity, just as there is no control over the building of the third runway. This DEIS is pretense, smoke and mirrors. It is to give the Port bigwigs fine salaries and trips to whatever exotic country they wish, and a yearly dip into the public purse.

R-18-2

The Port now holds a shareholders meeting yearly; at least they held one recently and assure us that they will be held yearly. What are the dividends? Jobs, said Commissioner Shell. You've heard of the shell game. Firing is what employees of one of the Port's warehouses received several years ago when they were reaching retirement age. They were competent, loyal employees. Port authorities hunted for someone to blame. Was that why the Dutchman quit? He got out and took lots of loot with him. It was all written in his contract.

Now they want us to believe that there is substance to this quasilegal document, the DEIS. It is nothing but another money grab by Port commissioners. They have set up so many groups that it is difficult to place blame. After promising the local citizenry that if a second runway would be built, another one would not be needed, what we're wondering today is where the fourth runway going to be.

This DEIS does not approach any real issue. The Port authority lies a lot and will do what it wants even though you repudiate this EIS statement, which you should do. Your dollars paid for it, and it is for you to decide. This airport is too small for this purpose, for its purpose. Always has been, and always will be. A third, fourth, fifth, or sixth runway will not solve capacity problems at this airport, but it will allow a few top dogs to retire in comfort and ease.

Should the people of King County be pleased that they can afford to pay lush pensions to top management? We tried to increase representation on the commission especially for those on the east side, only to find that Pat Davis was being paid to present an opposing view. She did say to me, "People listen to you." That's me. "I disagree with you, but they listen to you."

I say to her today that the reason I have a listening audience is that I am right. This third runway won't work, nor will any others. We must stop them now. There will be no third runway.

To the commissioners, you are driving us crazy, but we will stay and fight, and we will hope that we will win because we are right. No third

runway. Bury this DEIS now. Join with us in the next legislature to abolish the power of the ports, take back our government and access to our pocketbook. No third runway.

MR. GALT: Thank you Ms. Springer. Your statement will be entered in the record. Thank you. I was advised that Mr. Tow is unable to be here to testify this afternoon, so the last preregistered speaker during this hour would then be Rebecca Allmon. Ms. Allmon.

REBECCA ALLMON: Good afternoon.

MR. GALT: Good afternoon.

REBECCA ALLMON: My name is Rebecca Allmon, and I'm director of the corporate communications at Expediters International of Washington, Incorporated. Peter Rose, the chairman and CEO of Expediters can't be here today, so he wanted me to pass along his thoughts on the draft EIS to you this afternoon.

He wanted me to begin by giving you a snapshot view of our company so you'll understand why we're interested in this issue. Expediters International of Washington, Inc. is an international transportation company. We are kind of a travel agent for freight. We specialize in ocean and air freight forwarding, customs brokerage, and third party name, spell your last name and then your mailing address.

AMY YAMAMOTO sure.

MR. GALT: And remember, this is especially true for everybody, talk slow enough that the reporter can get what you're saying.

AMY YAMAMOTO: Thank you. I'll try to talk slowly. My name is Amy Yamamoto, and I'm at 7765 - 37th Avenue South, Seattle, and I'd like to speak or address this situation that affects, you know, just regular people, homeowners.

R-5-4

We have to put up with a lot of noise, and there will be a lot more noise if we have another runway, and there are alternative runways. I know they say they've looked at some of the alternatives, but they've dismissed them, and I think we could look at them a little more seriously instead of building another runway that is not -- it has not been proven to be more efficient or proven to do anything, and the studies that they have right now don't focus on the problems that they're causing for the people that -- it's not just the taxes but also the noise and the pollution and the problems they're causing for the people who live here.

I think that we should focus more on the

R-5-4

taxpayers and the burden that we already have and the problems that we already are subjected to without bringing it to a higher level, because it would make it more unlivable for us and also for the people in the hotels. You know, they would have a lot more noise, it would be maybe more unbearable to stay in where there's lots of jets taking off, and the water may be contaminated or have that runoff pollution like they have at Miller's Creek, and the water tasting not like it does now, and it's already getting worse. You can taste the water even now. In the past few years it's getting worse.

R-1-3

And I think that because of the environmental statement and the environmental reasons that have caused so much damage, not just for the wildlife but for the human beings here, the people who have to pay the taxes, I think we should look at it a second time. And I think we should have evening hours where people can come in after work instead of taking time off and have maybe a smaller or more pinpointed precise statement telling you exactly the real facts that are -- and make it available to everybody a few days in advance before the meeting so you can see both sides of the issues and make their mind up for themselves, make their own minds up.

And one last thing. I would like -- I would like this to be in the newspaper, have more newspaper coverage so that it could reach a larger audience and have it written 1,2,3, you know, in numerically and put it point by point, the pluses and minuses and the alternatives that are available. Thank you.

R-1-3

MR. GALT: Thank you, Ms. Yamamoto.

AMY YAMAMOTO: Thank you.

MR. GALT: Is there anybody else here at this time who would like to offer testimony regarding the draft EIS? The record -- are you coming to speak, sir? Yes, he is.

VERNON POMEROY: I don't know whether it would be the environmental impact statement or not.

MR. GALT: Have you got one of the salmon cards? This is Vernon Pomeroy, and he has his address on the card. Mr. Pomeroy.

VERNON POMEROY: I'm Vern Pomeroy, private citizen, live over here just west of Eighth Avenue, 124th Street.

We tried to put up with this airport noise and eat lunch outside today, and between 12:28 and one o'clock I took down the time each flight went off, and there was 14 flights in that time. Our taxes valuation of our property goes up, and I don't know why, because

R-5-4

we get more airport noise, I guess. More airport, more noise. I don't have -- I'm not familiar with the impact statement, but from comment I got from the paper, it doesn't address or tell us where they're going to get this water that they're going to use for the airport, not for the expansion time, but for the daily use of the water. Our water at home is so bad that it must come from the swamp. It comes from Seattle Water District, just the same as the other folks, and we have to buy water to drink.

R-5-4

R-13-15

Even the fill dirt that they're talking about hauling in is going to have a very devastating effect on the local streets and communities that way. A number of the schools in Highline District have already been closed, and many of those others, as the Mt. Rainer representative spoke are certainly very much impacted by this airport.

I think that's all I have now.

MR. GALT: Thank you, Mr. Pomeroy. Is there anybody else who would like to offer testimony this hour? The record will show there's not. Our next preregistered speakers are set to begin at four o'clock. We stand at recess until that time.

(Recess.)

MR. GALT: Good afternoon, ladies and

gentlemen, we'll reconvene today's hearing for the fourth hour. On behalf of the Federal Aviation Administration and the Port of Seattle, I welcome you to this public hearing regarding the draft EIS for the Seattle-Tacoma International Airport proposed master plan update.

I'm John Galt, the moderator for today's hearing. I've been retained by the Port and the FAA to moderate this hearing expressly because I don't work for the FAA, I don't work for the Port, I don't work for any of their consultants, and I have no role in the decision-making process for this project.

We are allocating members of the general public 3 minutes of testimony time each and representatives of groups and elected officials up to 5 minutes. The first half of each hour is by prereservation. The second half of the hour is by walk-in testimony. There is a signup sheet outside, and you can get salmon cards -- we had a pile of them here a few minutes ago -- that look like that. If you want to testify during the walk-in portion, you ideally want to pick up one of the salmon color cards.

When I call your name to testify, please come up in the front of the room, take a chair opposite me so you can talk into the microphone, and then give us

your name and begin your testimony. Remember the court reporters are transcribing what you say, and so please don't talk so fast that they can't keep up with you.

I'm going to call 3 names at a time. The first name that I call will obviously be the next person to speak, and then the other 2, to use a baseball analogy, will be in the on-deck circle. And if those two would just sort of get your thoughts in order and perhaps even move a little closer to the front of the room, it will help us keep things flowing smoothly this afternoon.

During the last hour, the 3:00 hour, there was one gentleman who had preregistered to speak who was not able to get here on time. I'm advised that he is here now, and so with everybody's willingness and patience, I would like to call him first since he was supposed to actually speak about 50 minutes ago, and so at this time I will recognize Bob Gilespie. Mr. Gilespie will be followed by Bill Jones, and then Bob LaFramboise. I hope I'm pronouncing that correctly. Mr. Gilespie.

BOB GILESPIE: Thank you. Thank you for your indulgence as to my being late and the opportunity to talk. I live at 10032 Northeast 38th Court in Kirkland, 98033.

This is an enormous task for everybody, the FAA, everybody included. The FAA -- it has become part of the Washington process wherein we submit almost everything to this lengthy, protracted public debate and discussion either until it goes away or it gets to be so enormously expensive that it strains the limit of our public and private debt. We have about the most complex project related permitting environment in this country, and the Sea-Tac issue has become part of it.

There are a lot of small business representatives who cannot come before you today because of time constraints and the need to do other business. I'm one of the few that's fortunate enough to be able to sit down, and I assure you there are a lot of people in private discussions we have who feel the same way I do about the third runway and support it.

I can take some comfort in the fact that the decision will be made not on the number of yeses and nos and tallying that up, but on the facts, and the facts are that 1 in every 5 jobs in this area is dependent on international trade, and if for some reason that air cargo carrier decides it's too busy, too dangerous, too crowded here at Sea-Tac, they go elsewhere. There go the jobs. If an air traffic, if

an air passenger carrier decides that it is too busy or inclement weather, they cannot get in, they'll take the flights elsewhere. They may move the hub, and with that goes the tourism dollars, and the tourism dollars are the best type because the people come in, they land, they go see the sites, they leave their money, and then they leave, and we don't have to build sewers for them or schools or new housing.

If the problems become so bad we experience a major economic loss -- and your decision is based on the facts and you have to recommend an alternative, and I didn't review all 2,000 pages of the draft EIS. I took selected parts of it upon the recommendation of a friend of mine who did, and I think that no environmental impact in this project is so great that it cannot mitigated. In recovering the wetlands that will be lost, that will be filled, that can be done in like acreage or greater elsewhere.

In relocating a stream, that is not uncommon in this part of the northwest. We do that often, with generally better long-term salmon preservation benefits.

As to mitigating the dirt, the noise, the traffic, we did so successfully on Interstate 90 for 2 and a half years. It can be done here. Covering the trucks, restructuring the hours when they drive through, maybe some sound and noise mitigation, some temporary panels.

The draft says that long-term aircraft noise will decrease, quieter jets. There will be more flights, but can handle that, too, through sound dampening measures.

And I hope that everybody can look past all the politically induced hyperbole and make a decision on the facts. It's a lengthy document. I would encourage that the chosen alternative be the 8500 foot runway and that when it comes out in October it speaks to that. And I would urge you, too, to consider carefully the cards and letters that come in from people like me who cannot come and attend. Thank you.

MR. GALT: Thank you Mr. Gilespie. Our next speaker will be Bill Jones, who will be followed by Bob LaFramboise, and then Minnie Brasher. Mr. Jones.

BILL JONES: Hello, John. My name is Bill Jones. I am the president of Local 1257 IAFF, which the the Sea-Tac firefighters at the airport. I'm also, or we are also members of the King County Labor Council.

I am here today, along with all the other business and labor leaders to demonstrate our total

support for the third runway. I represent 56 family wage jobs at the airport. I would like to thank the FAA for their comprehensive draft study they have done. We support it. The document is accurate, it is fair, and the bottom line is the major environmental impacts we can overcome.

I've been the president of the local for 15 years at the airport, so I've seen the growth in itself over the duration of time. I've seen it expand rapidly. I can see what the third runway would do for our cause.

We support at Sea-Tac 25,000 family wage jobs. Nearly 15,000 of them are at the airport. If we continue to do nothing, we're going to lose these potential jobs and future jobs. Again, as the gentleman talked before me, we will lose these services to the other surrounding airports, whether it's Portland, you got Denver that's just opened up, LAX, SFO, Vancouver which is right next door to us, Portland, and so forth.

We consider Sea-Tac not only a vital link not only to Seattle but to the entire Pacific Northwest region. Our region's economy is a factor that should not be taken lightly. In order to compete in today's market, we have to look beyond what is good for the few, but what is good for the many. We are rapidly approaching our capacity of 380,000 flights per year.

The two existing runways are close together. When they do use these runways -- runway during the bad weather, we personally experience that in the fact that we have to station CFR vehicles on the AOA during these conditions so we can have a rapid response if there is an incident. By providing that third runway, you're giving us that safety margin that we're looking for, which is safety for the flying public. I can say it in this fashion, and it's how many times have our loved ones traveled in and out of Sea-Tac. Their safety and that of the others, the traveling public, is our number one concern of the firefighters. A third runway would add that -- or would alleviate that risk factor that we're concerned about under our present condition of the two runways.

We're for the 8500 foot length. The impact of the other two is minimal. And generally I'd like to say thank you.

MR. GALT: Thank you, Mr. Jones. I was told during -- you can leave. Thank you, sir. We're going to wait just a minute.

Is there anybody here that has left a briefcase over in the corner?

A MAN: That's mine.

MR. GALT: Okay. Thank you. The next speaker will be Bob LaFramboise who will be followed by Minnie Brasher and then Elizabeth Springer.

BOB LaFRAMBOISE: Good afternoon. My name is Bob LaFramboise, and I'm responsible for sales and marketing for Heath Techna Aerospace, which is a subsidiary of a much larger company, Ciba Geigy, and located just over the hill here on East Valley Highway or Central Avenue in Kent, and Heath Techna is in the business of selling composite parts to the aerospace industry, and I'm here to express our support for the third runway based on a series of reasons.

First of all, Seattle was really kind of put on the map in terms of international trade with the APEC conference that occurred here a couple of years ago, and as a result of that, as we travel we see that Seattle is increasingly being seen as an entry port for the United States and a key port of access, and as traffic continues to increase, we believe that the third runway will be more and more critical.

Secondly, a major part of our business is international sales, and we spend a lot of time traveling in and out of the airport, and the need or ability to travel directly to major cities in Asia directly from Seattle is key, and again as the third runway comes on line, we feel that that will increase our ability to do that. Our analysis shows that Seattle is kind of in the unique position for entry into Europe and to Asia in terms of being about equidistance each way and timewise, and thus makes Sea-Tac a very good location to travel from.

Also, we find that in terms of recruitment of people to our company, as you know, Seattle is a highly sought area to live in, and in terms of recruiting high quality people, we feel the existence of the third runway would continue to make Seattle a competitive city in terms of recruiting people.

In terms of the actual impact statement, I have personally read the executive summary. I have not read the complete detailed document, but in terms of the executive summary, we would like to submit our support of the option for the longest option or the 8500 option. We feel that's the best payback for the money. Our analysis shows that while the impact statement may not be perfect, that substantial work has been done and it appears substantially to answer the questions involved, and we, therefore, throw our support to the impact statement as well.

So in summary, as a local supplier, located

in the Kent valley, a member of this area, and also in this industry in the aerospace industry, we support the third runway and also the environmental impact statement as it's been written. Thank you.

MR. GALT: Okay. Thank you, Mr. LaFramboise. Next speaker is Minnie Brasher, who will then be followed by Elizabeth Springer and Gary Tow.

MINNIE BRASHER: Thank you, John. Thank you for letting me speak at yet one more process on air transportation in the state of Washington.

An EIS is supposed to give the environmental impacts of a project. This DEIS does not. For 5 years we have attended all of the committee meetings and spoke on all of the previous EISes: the programmatic DEIS, the DEIS, and the final PSRCEIS for air transportation. At every meeting or hearing we spoke of the evasiveness of environmental impacts. At every hearing or meeting we were told, wait until the site specific EIS comes out, and all of your questions will be answered.

Well, this is supposed to be the site specific EIS, and it leaves even more questions unanswered. The master plan for the airport should have been produced first, and then the EIS would have answered the specific questions, but no, we in Seattle R-1-11 have a first. We've always before been a first for everything, and so the EIS and the airport plans were done at the same time. The reason given? It saves money. I don't think so. It only gives more confusion about the total environmental impact.

R-1-11

Some of the problems in the EIS. Number one, the unbelievable folly of a 500 million dollar runway that will be used only in bad weather and only for landing. A third runway that shows only one arrival flight track and only two departure flight tracks, and shows no radials.

R-6-13

R-6-14

Number two, the Port of Seattle presently uses 600,000 gallons of water per day. The DEIS prediction is 4.3 million gallons of water a day in the year 2020. No clues as to where this extra water will come from.

R-13-14

Number three, air quality. For the year 2020 predictions on air pollution, Landrum & Brown used 50 departures per hour, worst case scenario. Flight plan and the FAA predict 141 operations per hour with a dependent third runway. If the real worst case scenario had been developed, it could easily double all emission rates modeled by Landrum & Brown. Using an average scenario, Sea-Tac is already over the CO and NO2 standards, and even though the EPA requested to

R-10-14

Landrum & Brown that all project impacts be evaluated together, this DEIS isolates each project on an individual impact basis.

R-10-14

A cost analysis put out by the Port of Seattle on this project is 1.5 billion dollars and counting. This DEIS is not a complete comprehensive study as has been stated. The information on projects is incomplete and source material is hard to come by. Personal phone calls listed as source material, while it may be a standard industry practice, on a project of this magnitude and environmental impacts, it cannot be tolerated. So go back to the drawing board.

Thank you.

MR. GALT: Thank you Ms. Brasher. The next speaker is Elizabeth Springer, who will be followed by Gary Tow, and then Rebecca Allmon. Ms. Springer.

ELIZABETH SPRINGER: Hi.

MR. GALT: Hi.

ELIZABETH SPRINGER: I guess I give that to you. I'm not quite sure what.

MR. GALT: Yes, you do. Thank you.

ELIZABETH SPRINGER: I'm Elizabeth Springer, and I don't recognize you from 1:30 in the morning, so I take it you're new to this presentation.

MR. GALT: I don't think we've met at 1:30 in the morning.

ELIZABETH SPRINGER: Well, we sat here until 1:30 in the morning one time when I was here to talk and discuss this third runway.

MR. GALT: I'm just the moderator for today's hearing.

ELIZABETH SPRINGER: Well, we'll give you an A-okay then.

R-18-2

We're back at the same old stand, however, Seeing the same people defending their homes against athe aggression of the airport. The worst part of this scenario is that these people defending their homes and well-being must pay heavy taxes to defend peace and quiet. Each and every year the Port of Seattle dips into the public purse for more than 30 million dollars. I think that last year it was up to 37 million. What does the Port do for this? Send a one-paragraph letter to the County council and request the levy for the year, and by statute the council adds their request to your tax bill, and that includes -- that's all of us.

How can this be reduced in amount or abolished? I was told in Olympia that it can't be abolished because the lobbyists for the Port are too strong. 74 to 76 Port districts in this state are

involved, engaged in buying land, investing, whatever. No taxes except ours are paid on this activity, just as there is no control over the building of the third runway. This DEIS is pretense, smoke and mirrors. It is to give the Port bigwigs fine salaries and trips to whatever exotic country they wish, and a yearly dip into the public purse.

R-18-2

The Port now holds a shareholders meeting yearly; at least they held one recently and assure us that they will be held yearly. What are the dividends? Jobs, said Commissioner Shell. You've heard of the shell game. Firing is what employees of one of the Port's warehouses received several years ago when they were reaching retirement age. They were competent, loyal employees. Port authorities hunted for someone to blame. Was that why the Dutchman quit? He got out and took lots of loot with him. It was all written in his contract.

Now they want us to believe that there is substance to this quasilegal document, the DEIS. It is nothing but another money grab by Port commissioners. They have set up so many groups that it is difficult to place blame. After promising the local citizenry that if a second runway would be built, another one would not be needed, what we're wondering today is where the fourth runway going to be.

This DEIS does not approach any real issue. The Port authority lies a lot and will do what it wants even though you repudiate this EIS statement, which you should do. Your dollars paid for it, and it is for you to decide. This airport is too small for this purpose, for its purpose. Always has been, and always will be. A third, fourth, fifth, or sixth runway will not solve capacity problems at this airport, but it will allow a few top dogs to retire in comfort and ease.

Should the people of King County be pleased that they can afford to pay lush pensions to top management? We tried to increase representation on the commission especially for those on the east side, only to find that Pat Davis was being paid to present an opposing view. She did say to me, "People listen to you." That's me. "I disagree with you, but they ... listen to you."

I say to her today that the reason I have a listening audience is that I am right. This third runway won't work, nor will any others. We must stop them now. There will be no third runway.

To the commissioners, you are driving us crazy, but we will stay and fight, and we will hope that we will win because we are right. No third

runway. Bury this DEIS now. Join with us in the next legislature to abolish the power of the ports, take back our government and access to our pocketbook. No third runway.

MR. GALT: Thank you Ms. Springer. Your statement will be entered in the record. Thank you. I was advised that Mr. Tow is unable to be here to testify this afternoon, so the last preregistered speaker during this hour would then be Rebecca Allmon. Ms. Allmon.

REBECCA ALLMON: Good afternoon.

MR. GALT: Good afternoon.

REBECCA ALLMON: My name is Rebecca Allmon, and I'm director of the corporate communications at Expediters International of Washington, Incorporated. Peter Rose, the chairman and CEO of Expediters can't be here today, so he wanted me to pass along his thoughts on the draft EIS to you this afternoon.

He wanted me to begin by giving you a snapshot view of our company so you'll understand why we're interested in this issue. Expediters International of Washington, Inc. is an international transportation company. We are kind of a travel agent for freight. We specialize in ocean and air freight forwarding, customs brokerage, and third party logistics. Peter and some associates began the company about 15 years ago with 7 employees, and today the company operates 85 offices and 11 service centers on just about every continent, and employs over 2100 people worldwide. We're fortunate to say what began as a shoestring operation is now a publicly traded company with worldwide revenues last year of 450 million dollars.

We're actually neighbors with the Sea-Tac Airport. Our corporate office faces the runway, one of the runways, and because our Seattle branch moves a great deal of our client's freight by air, we're keenly interested in maintaining the economic health of Seattle by insuring adequate air lift or air capacity, as we say in our business. Sea-Tac International Airport is the state's key transportation link to the world. More than 28 billion dollars in air cargo including 17 billion dollars in international trade passes through Sea-Tac each year.

If Sea-Tac's air lift is impaired, opportunities across the state for trade and economic development will be at risk. Without adequate air capacity, the state will be unable to maintain existing international markets for trade or capture new ones.

Expediters supports the draft EIS. It's the

most comprehensive and detailed draft EIS ever completed on an airport expansion project. We think it's technically accurate, objective, and fair. The 8500 foot runway is the most sensible and cost effective option for the long-term development. There are no significant differences between the 3 action alternatives.

Thanks for your time. We at Expediters think that the proposal has been studied quite a bit, and we'd like to see some action.

MR. GALT: Thank you, Ms. Allmon. The first person on the walk-in speaker's list for this hour is Robert Nelson. Mr. Nelson.

ROBERT NELSON: My name is Robert Y. Nelson. I'm just a citizen. I'm a retired printer. I have a good deal of interest in the airport, all my life. I've lived here since I was a year old, and that's 78 years.

The SEATTLE TIMES article last night listed that it would take 16 hours a day of dump trucks to bring millions of cubic yards of fill into this. They would be working for 2 and a half years at this project. I have an alternative idea. I think that I happen to be an acquaintance of Homer Hadley, who designed the Lake Washington floating bridges. I think

R-4-11

that we could build a table out here instead of hauling in all that dirt from 16 different areas around the state from as far away as Port Gamble, I understand, from last night's article in THE TIMES.

I think that it could be very efficiently built out of reinforced concrete, on pilasters that are poured down into the ground to solid ground. I believe that they would -- if they can support the trucks that have 50 years been used across the floating bridges, I believe that it's an entirely feasible idea. I'm not an engineer. I think that if they hired an architectural engineering firm they should be capable of designing the efficient use of the space that's underneath it.

R-4-11

At the present time on weekends I drive cars for one of the rental agencies. The rental agencies have 180 stalls -- the one I work for has 180 stalls on the second floor of the existing parking garage. That agency pays $120 a month per stall, and they need more and more space. The space that would be made by making a table for the runway would make it so that it wouldn't have to be filled. The creek alongside on the north side and the south side wouldn't have to be presently disturbed. As time went on and the space under the roof of the table would be used, it could be

developed. It seems to me that it would be an easy way of going into a big project without a large capital outlay, as large as what we have.

A few months ago I read an article about the runway in the SEATTLE TIMES, and I called up the reporter that wrote the article, and his first reaction to me was, what's in it for you? Nothing is in it for me. I agree with the people that are working for labor that are here. I believe that we need this airport here. I don't think that it's feasible to go to Moses Lake or Paine Field or other places. We have the facilities here, and if we put some of it under the ground, like this table would allow us to do, it would eliminate traffic problems, many, many things, and I think it could be done a good deal cheaper than hauling fill material in from all over this part of the state.

Thank you for listening to me.

MR. GALT: Thank you, Mr. Nelson. The next speaker and the last one on the walk-in testimony list so far for this hour would be Eugene Hoglund. Mr. Hoglund.

EUGENE HOGLUND: Thank you. I just have a few words. I live at 257 South 197th at the south end of the runway and farther to the -- the third runway will impact my residence quite a bit. I'm very concerned about the air pollution, the increased air pollution, and the increased noise, actually noise pollution and how it disrupts those that live in the south end and the north ends of the runway and on both sides.

R-5-4

Section 1 on noise on the environmental impact statement describes that many departures will be 2.6 percent. That's what they predict. I don't know how they've got that, but that the runway would be mostly for landing, and I asked some of the counsel out there in the other room just how he got this figure, that it would only be 2.6 percent and how many flights that would be, because none of their noise contours show any airplanes taking off. It's like this runway will not be used for takeoffs and it will not impact those that live around it, and that is a very high noise on takeoff, and they don't feel that they have to make their noise contours reflect takeoffs, and I do not understand that if this is going to be a valid contour map, that they should reflect that airplanes are going to take off from there, and I think that should be addressed so that everybody will know that, or they should limit the takeoffs. If they say that it's only going to be 2.6, let's force it and make it a part of your EIS statement, that they're not going to

R-6-13

use this runway for takeoffs except 2.6 of the time, to impact the people.

Other than that, it looks like the die is cast, and there just should be -- there should be stipulations that they will not use this for takeoffs more than what they have said, 2.6 of the time. Thank you.

R-6-13

MR. GALT: Thank you, Mr. Hoglund.

We have nobody else presigned up to testify during this hour. Is there anyone in the room that has not signed up who would like the opportunity to testify? The record will show there is not. The next preregistered speaker is scheduled to begin at 5 minutes after the hour. We will reconvene at 5:00, and then I'll do the introductory comments again, and we'll continue on. We stand at recess until 5:00.

(Recess.)

MR. GALT: We'll reconvene for the 5th hour of today's public hearing. On behalf of the Federal Aviation Administration and the Port of Seattle, I welcome you to this public hearing regarding the draft EIS for the Seattle-Tacoma International Airport proposed master plan update. I'm John Galt, the moderator for today's hearing. I've been retained to moderate this hearing specifically because I don't work for the FAA, I don't work for the Port of Seattle, I don't work for any of the consultants that are involved in the project, and I have absolutely nothing to do with the decision-making process at all. I am just here to moderate the proceedings.

The published ground rules for today's proceeding advise you that we are allocating members of the general public three-minute testmony time slots, and representatives of groups and elected officials five minutes. We are not allowing any transference of testimony time, and individuals may not trade their speaking slots.

When I call you to testify, please come forward and take a seat in the chair opposite me so that you can talk into the microphone. We have a court reporter who is transcribing the hearing. Please help her by not speaking too fast. Some people this afternoon have had a tendency to try and cram as many words as they can into their three or five minutes, and when it gets too fast the reporter has to ask you to slow down, so if you would help us, we would appreciate that.

I am fairly strictly holding to the three-minute and five-minute time limits. I have a little card that if you get close to your time, I will

stand up in front of you that indicates you have about a half a minute to go, and if you're really running over, then I will hold up the red double zero which is your indication that your time is up.

If you don't speak today or if you have a lot of detailed or technical comments to offer regarding the draft EIS, or if three to five minutes is just simply too short of a time for you to offer all the comments you would like to, please realize that you can submit written comments as well. There are comment sheets available on the tables out in the lobby. You can turn them into me if you'd like to. There is a box out there that you can put them into, or you can mail them to the address that's on the bottom. If you mail comments, please be sure that they are mailed early enough to get to the FAA at the address that's on the form by August 3rd.

I'm going to call three names at a time. The first name in each group will obviously be the next person to speak, and the other two, to use a baseball analogy, will be in on the on-deck circle, and you can prepare your thoughts and perhaps if you're in the back even move a little closer to the front to help keep things moving smoothly this afternoon.

The first speaker for the 5:00 hour is T. J.

Woosley. Mr. Woosley will be followed by Arun Jhaveri and Kitty Milne. Mr. Woosley.

T. J. WOOSLEY: Hello, I'm T. J. Woosley, and I'm here representing the Greater Kirkland Chamber of Commerce. I came to speak to the findings of the EIS regarding the master plan and the second all-weather runway that's being proposed. As with any large, public infrastructure project, there are going to be impacts. There are going to be noise impacts, visual impacts, traffic impacts, wetlands impacts, and, for instance, we just recently got -- well, we're still constructing the West Point sewage treatment plant. It's got impacts along all those lines. However, the project is necessary, without question, it's regional in nature, similar to the master plan projects here.

There are impacts and, as with all the impacts that are being discussed in this EIS, they can be mitigated, and that's the most important point. Sea-Tac serves the whole region, and in this global economy where we're pretty much the center of the known world for aircraft manufacturing, we have to be able to compete. We have to be able to compete economically, and in order to do that we have to have an infrastructure that has the capacity that's necessary to compete.

We need to not only keep up but really we need to excel. Our economy is dependent on it, jobs throughout our entire regional economy -- "regional" being more than Puget Sound, "regional" being more than the state, "regional" being the northwest, is dependent upon the capacity of our area here to handle the air traffic that is demanded.

Kirkland is a player in this. I drove thirty-five minutes to get here. I don't come down here very often. I don't do local business down here very often, but the Kirkland Chamber of Commerce felt it was important to voice our position in support of the master plan because it's important to Kirkland's economy, and it's important to Mount Vernon's economy, and it's important to Federal Way's economy.

The impacts have to be weighed against the overall societal value. When that's done, the impacts can be mitigated. The conclusion is pretty obvious to get something built and let's move on. Thank you.

MR. GALT: Thank you, Mr. Woosley. Next speaker is Arun Jhaveri, who will be followed by Kitty Milne and then Don Newby. I hope I'm pronouncing your name correctly.

ARUN JHAVERI: Jhaveri.

MR. GALT: Jhaveri, thank you.

ARUN JHAVERI: Close. My name is Arun Jhaveri, a resident of Burien since 1967 and also the mayor of the city of Burien since incorporation in 1992. I'm here to provide both the general and specific comments on chapter 2 of the draft environmental impact statement titled "Purpose and Need."

R-1-7

General comments: It's absolutely critical that both the Federal Aviation Administration, FAA, and the Port of Seattle, POS, as the joint lead agencies for the draft environmental impact statement and the anticipated final environmental impact statement, clearly and categorically state in writing that they are both equally and fully responsible as well as legally accountable for the total contents of the EIS, no matter whether the documented adverse and unavoidable environmental impacts from the proposed master plan/airport expansion activities are of local, regional, statewide or national significance.

2, in no way a preparation of the draft EIS and final EIS by these two lead agencies constitute an approval or appeal of approval of the proposed master plan/airport expansion project. Irrespective of the multi-million dollar expended in preparing such a document. On the contrary, the DEIS and final EIS, as

R-1-7

required by the applicable state and national laws, must go through a detailed scrutiny as part of the public review and decision-making processes that can very well completely reject the proposed action as not in the public interest, cost prohibitive and/or creating ill-reversible damage to the human, natural and physical environments.

R-3-7

Specific comments: 1, the DEIS provides no support for its conclusive assumption that with or without airport development, airport activity is expected to increase as a consequence of regional population growth.

R-4-1

2, the DEIS defines the need to address poor weather airfield operating capability in such a way that it appears to preclude consideration of any alternative other than a third 7,000 to 8,500-foot runway.

R-3-9

3, there are glaring contradictions between the draft environmental impact statement and its direct relation to the flight plan final EIS. According to the flight plan final EIS, increasingly lengthy delays at the Sea-Tac International Airport, due to poor weather conditions, would result in airlines rescheduling and diverting aircraft to other airports and contribute to a decline in scheduling of new service.

Based on the above-documented discrepancy, the kind of growth and demand projected in the DEIS is not inevitable. The flight plan final EIS indicates that it would not occur.

The flight plan final EIS concludes that the third runway is needed to attract new capacity to Sea-Tac while the draft environmental impact statement asserts that a third runway is necessary to accommodate growth in demand that would inevitably occur. Therefore, the fundamental question remains, namely, what is the purpose and need for the proposed airport expansion? To foster an increase in demand or to accommodate an inevitable growth in demand?

R-3-9

In conclusion, the DEIS makes a gross error in judgment with its assumptions that defy common sense to think that the airlines and the flying public would countenance the kinds of delays the Port projects will occur as a result of an inevitable increase in demand. Thank you.

MR. GALT: Thank you, Mr. Jhaveri. The next speaker will be Kitty Milne who will be then followed by Don Newby and Pierre Mathews.

KITTY MILNE: Thank you very much. My name is Kitty Milne, I'm a council member with the City of Burien. My address is 415 Southwest 150th, Burien, Washington, 98166, and I would specifically like to

address construction impacts in chapter 4, section 23. The DEIS provides no information on the environmental impacts of the enormous mining operations that would be necessary both on and off site to extract the 13 to 17 million cubic yards of fill required for a third runway construction.

It fails to consider the Port's need to obtain a Department of Natural Resources mining permit and the required preparation of a suitable closure plan for extraction of this threshold level of fill material from on-site borrow areas. The DEIS also inaccurately describes the conditions under which it estimates transporting this fill. It fails to account for the late fall and early spring wet weather shutdown of its fill transportation activities. It does not address the peak hour traffic delays on major arterials, highways, freeways or interstates that currently occur.

R-12-5

The DEIS also fails to account for nighttime surface transportation noise curfews that would prevent the transportation of fill 16 hours a day, as they request. The DEIS also inadequately analyzes impacts on communities who are along the fill transportation routes, including the cost to them of resurfacing or even reconstructing the involved roadways. The cost

R-12-15

per mile to reconstruct a roadway of one lane in the City of Burien would be anywhere from 2 to 3 million dollars. The analysis of construction impacts focuses only on the affect of constructing the third runway and improperly does not consider the impacts of mining and transporting fill needed for the extra 600-foot extension of runway 16L/34R, nor for the construction of the south aviation support area. In view of these facts, we sincerely question whether the Port of Seattle has consulted with any of the cities involved on the transportation lines and informed them of the cost in dollars and impacts to their quality of life that will result from trucks on their streets and highways almost every minute of every day for two and a half years. Thank you, very much.

R-12-15

MR. GALT: Thank you, Ms. Milne. I've been asked to reverse the next two speakers, and so I will gladly do that. The next speaker would then be Pierre Mathews, who will be followed by Don Newby and Mike Heavey.

MR. GALT: Mr. Mathews.

PIERRE MATHEWS: My name is Pierre Mathews, and I live at 15929 Maplewild Avenue Southwest, Burien. My wife and I are south-end natives and have lived in this area nearly forty-five years. I'm

representing myself in this case. With all of the media coverage in the last couple of weeks regarding the 5th anniversary of VE Day, I was reminded of a similarity of our local situation and that of Poland in 1939 facing Germany and Italy. In this case substituting the FAA and the Port of Seattle. We are facing two powerful entities with great dictatorial powers poised to invade and destroy. Their storm trooper lobbyists in both Olympia and Washington, D.C. are using their guile and half-truths in an attempt to weaken politicians' opinions that are sympathetic to us, while the Port and FAA are plotting to bury us under millions and millions of cubic yards of dirt, destroying nearly 1,000 homes and businesses and imprison thousands of even more people in their homes that remain, not to mention the impairment to schools, hospital and churches.

The proposed master plan, that has a ring to it like mein kampf. The tyranny of the proposed master plan is indicative of a lack of ethics and morals in the perpetrators of this folly. To squander nearly a billion dollars of hard-earned taxpayers money -- 500 billion is a lie -- for an inadequate, dependent runway in the middle of 100,000 impacted people is inept planning to the extreme, or is it a scheme? Once the

R-18-2

third runway is in place, regardless of the length, Sea-Tac will become "the" regional airport, with nothing to stop the addition of the 4th, 5th, et cetera, runways.

Considering the fact that Sea-Tac Airport is the Port of Seattle's cash cow, that's the only part of the Port's operation that makes money, one can understand the greed and avarice behind the Port's drive to inflict us with this cancer. The Port has estimated in the EIS that their operations will increase to nearly 442,000 by the year 2020. A little arithmetic here: Divide 442,000 by 365 and you get 1,211 operations per day, every day of the year. Divide 1,211 by 24 and you get 50 operations every hour around the clock. Nearly one every minute. A constant, steady roar around the clock.

Think of the fees the Port could charge ... without opposition, a virtual monopoly aided and abetted by the FAA, a federal agency that is supposed to be against that sort of thing.

Blunder is the act of collecting spoils of war. Well, we refuse to be ghettoized and annihilated to sate your gluttony, and we will fight longer than it took to win World War 2, if necessary. Your 1,000 a year plan will not work. There is no mitigation

possible to soothe the harm of this project, and you will hear from me again.

MR. GALT: Thank you, Mr. Mathews. The next speaker will be Don Newby, who will then be followed by Mike Heavey. Mr. Newby.

DON NEWBY: Hi, I'm Don Newby with the Burien City Council, and I'd like to address a couple areas to you, primarily on surface transportation. Item 1 was by erroneously concluding that Sea-Tac would have the same number of operations whether or not the third runway were constructed, the environmental impact statement inaccurately minimizes the impact of greatly increased vehicular traffic on local streets and state highways, and from briefing the document, all state highways are going to be affected, whether it's state routes or interstate routes. The EIS conclusion that a third runway at Sea-Tac would not notably alter the ... surface transportation system is based partly on several already planned highway improvement projects, and those are the extension of 509, which is uncompleted yet, and the extension of the 28th and the 24th Avenue South arterial project, as to -- uncertain to warrant the consideration of their cumulative impacts on the local communities and, quite frankly, on the state.

R-3-7
R-9-21
R-5-3

I'd like to also address the fact that one of the key issues which you probably already heard is where we're going to get the 13 to 17 cubic million feet of dirt, and there appears to be 17 locations throughout the state. And it reminds me, quite frankly, of Winston Churchill when he said "it's by land, air and sea," that seems to be the method they tend to bring it in. Also I'd like you to at least be aware that we've had a tremendous reputation throughout the nation, Seattle, in the fact that we're the last discovered area. We've had a tremendous and good transportation system, but now Seattle in the nation is ranked fourth in the worst of traffic jams across the nation, and that's occurred only in the last five years.

By the impacts that this airport is going to bring and fill it in, we will probably be number one-- for the rest of the century and into the 21st century, as far as impacts on transportation. I'll let it go on the things that you've already heard on the costs of that affecting us. So I think in really conclusion, poor planning got us here. I think we have a milestone in the history of the northwest to get us back out again and really to conclude with the fact that everybody agrees that a major supplemental airport is

R-12-11

the key to the future for the Pacific northwest and the key to the 21st century, and I think the fact that we built an airport 40 years ago on a plateau, and now we've got to come and rebuild that mountain again and keep extending it, you cannot build airports on a postage stamp.

And, thus, we need to truly take a look at where land is available and it's lower cost, and it doesn't have impact on the citizens, in all categories, whether it's noise, traffic jams and the like, the health hazards that are being presented. So I'd just like to leave you with we have a -- truly a cornerstone, milestone to make here. We can live up for the next hundred years the reputation of Seattle by locating a new, major supplemental airport somewhere else besides here. Thank you.

R-4-4

MR. GALT: Thank you, Mr. Newby. The last-- preregistered speaker during this hour is Mike Heavey. Mr. Heavey.

MR. HEAVEY: Thank you. For the record, my name is Michael Heavey, state senator from the 34th legislative district, state of Washington. I'd first like to say that the whole process is, at best, a conflict, and at worst a farcical in the sense that the FAA and the Port of Seattle are supposed to be sitting

R-1-7

in objective judgment of this whole EIS process but yet they're the proponents of the project. I can't imagine their employees turning down this project.

R-1-7

There are unavoidable, immitigable, significant environmental impacts associated with the proposal. The areas I'd like to talk to, consider, are noise, quarries and wetlands.

Noise: Right now the Port has not mitigated even the soundproofing that they're supposed to be mitigating from the other runways. The DEIS treats areas that will have less than 65 LDN as if there is no impact. Well, there's going to be serious impacts to the human and built environment. The new flight tracks will create significant depreciation in property values among the houses that will be flown over. Mitigation must include the loss in property values caused by the new noise, whether it's because of new flight tracks--or because the new runway is 2,500 feet further west.

R-6-27

Quarries: 23 million cubic yards of fill. Used to be 16 million yards, but we know how the Port tends to exaggerate in their favor consistently. One expert told me that's not enough. There's not enough dirt available in the whole Puget Sound area to do the job. Result is they're going to deplete all the quarries that are available in the area. They use the

R-12-6

term "to borrow," and "borrowing areas" as if they're going to pay it back, it's almost a joke. But the borrowing areas are themselves quarries in their own right, some minor, some major, that should be required, each individually, to get their own EIS, let alone be involved in this process as a package. They should individually, the borrowers, be required to get their own EIS, go through the EIS process. How much is 23 million cubic yards? First of all, understand that the process involves excavation, loading, travel, dumping, grading, compaction, et cetera, et cetera, all this in rain, sleet, snow, darkness.

If you take 23 million cubic yards and you had one dump truck of ten yards every minute, twelve hours a day, six days a week, 52 weeks a year, it would take ten years and two months to deliver that dirt. That's how much dirt is involved in 23 million cubic--yards. But the Port says they can comfortably do it in two and a half years.

R-12-10

Wetlands: There are over 9 acres to be filled, and I'm sure you're aware that, if you did a full analysis -- and I hope the Corps of Engineers pays particular attention -- if you did a full analysis, made sure the class 3 wetlands are concerned, and you did the borrow areas in the analysis and you did the

R-14-4

R-14-4

potential new quarries that will have to be developed, the impacts to the wetlands and water quality would go into the hundreds of acres. New quarries will significantly degrade and destroy our water and wetlands far beyond what the third runway will do.

Legally -- Corps of Engineers, please listen, you know this -- when you approve a project or when this project goes through and you're filling this amount of wetlands, over 9 acres, you move from somewhat of a neutral position on the project to a presumption that there is an alternative to this project before a 404 permit can be granted to fill these wetlands. This is the mother of all wetland fills. This is 23 million cubic yards of fill. That's just going into the wetlands, let alone what it's doing to the westlands from where it's coming from.

R-4-7

And there is an alternative to this, and that is called demand -- I would say, first of all, demand management. We all know that the number of flights is spacious. The legislature conducted a committee that did studies on this, and the thing they found is that you cannot predict future flights. We know that when you fill up a 737 you don't add another 737, you add a 757. So although the passengers may increase, the flights don't necessarily increase. What's totally

R-4-22

left out is Boeing Field that I'm looking through as -- it's mentioned in one part but the analysis is not there. What is driving this is the commuters. If you take commuters and you put half of them into Boeing Field and move the civil aviation that fills Boeing Field up to Paine Field, which has capacity, you solve your problem, very simply.

Finally, the PSRC and the flight plan process have been corrupted at best. The chair of the flight plan that is given so much consideration in the flight plan process was flown to Europe twice by the Port of Seattle. Similar things have been done at the PSRC, corruption, conflict, bribery comes to mind in terms of what I'm thinking about. The most expensive runway ever built in the country for an increased capacity of 25 percent, maybe, and you know they always exaggerate. It's a farce. The project must be denied because there are adverse impacts to the wetlands and human environment, natural and built, that cannot be mitigated, and there are alternatives. I urge you to please deny the project.

MR. GALT: Thank you, Mr. Heavey. The first person in the walk-in testimony for this hour is Julia Patterson. Ms. Patterson.

JULIA PATTERSON: My name is Julia Patterson, I am a state representative for the 33rd legislative district; I represent 100,000 people who live around Sea-Tac International Airport. I have a prepared statement for you today. This DEIS appears to be attempting to justify, not evaluate, a project which at best offers marginal regional benefits and without question has tremendous local impacts, impacts which cannot be mitigated to our citizens' satisfaction. This DEIS asserts that airport activity levels will be identical, whether or not the project is built. And since that's the case in this DEIS, no further substantial mitigation is owed to our communities.

By ignoring or understating the effects of the proposed third runway, the DEIS also minimizes required mitigation of particular significance to this area which has now borne 50 years of unmitigated impacts already. The DEIS totally fails to address the cumulative impacts of a variety of related projects which must be taken together. It's ridiculous to imply that the community isn't suffering from this cumulative damage.

Arterial street projects, state route 509 extension and the federal detention center are several examples of the many directly-related projects which are brushed off in terms of their long-term cumulative

R-3-7

R-5-3

impact on the people that I represent here. These communities will be continuously and increasingly disrupted in countless ways. The construction impacts alone would, for years, horribly disrupt residents and their ability to move about with ease, to access and enjoy their parks and their open spaces, their schools and public facilities. Some of such impacts can be at least partially mitigated but most cannot be. Today I am requesting that the final EIS address this issue of construction impacts.

Over the long term, the communities will be inalterably changed for the worse. Property tax collections will be reduced, both from removing private property from the tax rolls and from the certain reduction of values due to adverse airport impacts. Today, I'm requesting that the final EIS address this issue of property tax reduction and the removal of private property from the tax rolls, as well as just the general subject of devaluation of all of our properties.

Community planning will be disrupted, uncertainty will increase, private investment will be reduced, the educational environment for our children will suffer and, over all, the level of the quality of the lives of our citizens will decrease. Again today,

R-5-3

R-8-1

I'm requesting that the final EIS address the aforementioned quality of life issues. Not only does the DEIS not thoroughly or genuinely evaluate real and reasonable alternatives to the proposal, it proposes unreasonable and disingenuous abatement and mitigation measures, when they are proposed at all.

R-18-29

For instance, the previous speaker alluded to this, no attempt has been made to mitigate wetland impacts within the same basin as the wetlands destroyed. Not only would we lose the present value of the wetlands, but some other community would realize any mitigation benefit. I would like to have an explanation as to why it is fair to this community that another community's wetlands are to be enhanced when our own wetlands are to be eliminated. There are numerous other real and troubling impacts associated with this proposal, none of which will contribute to better communities here. There is serious water quality and drainage concerns, and they exist regarding proposals to modify Des Moines and Miller Creeks. The noise associated with both aircraft and vehicles -- I'm almost out of time -- both during construction and the long term and the sources of 23 million cubic yards of fill dirt and the impacts of getting it to the site and on and on.

R-14-7

I am requesting today that the final EIS address these concerns. In closing, I am worried that no adequate means exists to thoroughly and acceptably mitigate all the potential impacts and make our communities whole if this project is constructed. However, for the project's proponents to so callously avoid any real obligation to do so is wrong. The DEIS has a long way to go to satisfy its legal requirements, let alone the general interests of our affected citizens.

MR. GALT: Thank you, Ms. Patterson. I have nobody else on the walk-in signup list. Let me ask if there is anybody who has not yet testified who would like to do so? If therein isn't, we'll recess, then, until the next hour and pick up again with those people who are preregistered for that time. We stand at recess, then. Our next speakers are scheduled for 6:10, so we will reconvene at 6:05, five minutes after six.

(Recess.)

MR. GALT: Good evening, ladies and gentlemen. Our hearing will come back to order, please. On behalf of the Federal Aviation Administration and the Port of Seattle I welcome you to the sixth hour of the public hearing regarding the draft EIS for the Seattle-Tacoma International Airport proposed master plan update. I'm John Galt, the moderator for today's hearing. I've been retained to be the moderator specifically because I don't work for the FAA, I don't work for the Port of Seattle, I don't work for any of its consultants, and I have absolutely nothing to do with any of the decision making on this project. My job is just to run today's hearing.

As you have undoubtedly read in the little handout on the hearing ground rules, we are allocating 3 minutes of time to our general citizens to speak and 5 minutes to representatives of groups and elected officials. The first half of each hour is devoted to preregistered speakers, and then the second half of the hour to folks who have come in today and just signed up at the door.

We are transcribing the hearing. The court-reporters need to have you use the microphone and talk relatively slowly so that they can keep up with you. The transcript that they prepare will be given to the FAA and the Port staffers, who will use it in the preparation of the final EIS. When I call your name to testify, please come forward and have a seat in the chair opposite me so that you'll be comfortable with the microphone, and then begin your testimony. I have

a little sign that reminds you if you're running close to the end of your time, and if you really stretch things and go a fair amount beyond -- I'm trying to stay polite but somewhat flexible. If you go beyond your time, you'll see the double zeroes go up in red, and that means that you really do need to bring your comments to a close.

If you don't speak tonight or if you have complex, technical matters that you want to present to the study team, or if simply 3 to 5 minutes is not enough time for you to get across the point that you would like to get across, please realize that you can also submit written testimony. There are comment sheets available on the tables out in the lobby. You may use the comment sheet to submit written material. You can turn these in to me, you can put them in the cardboard box that's outside on the table that says -- "comment sheets," or you can mail them to the address that's written on the bottom. If you mail comments in, if you write a letter and mail it or use one of these forms and mail it, please make sure that it goes to the address on the sheet and that it gets there by August 3rd.

I'm going to call witnesses three at a time. The first one will be the person who is next to speak, and the other two, to use a baseball analogy, will be in the on deck circle, and so that will give you a little bit of time to get your thoughts organized, and if you're near the back of the room, you might consider moving forward somewhat to help things move along a little more quickly.

The first preregistered speaker for the 6:00 hour tonight is Arlene Brown. She will be followed by Randy Tate and then Janett Burrage. Arlene Brown.

ARLENE BROWN: Am I correct, there's no FAA here right now? We're just transcribing?

MR. GALT: Yes, that is correct.

ARLENE BROWN: Considering I've spent the last 17 years in the aerospace industry as a materials engineer, the health of the airlines, not just surrounding communities, is important. The data says it will be a mistake if we continue to try to put a huge square peg into a tiny round hole or, in this case, build up a tiny thin valley that's about 2 stories below the existing runways.

R-16-9

The report's conclusions are not supported by the data. For example, the report assumes there is no depreciation in property values, which then leads to a reduction in real estate tax revenues. Just considering the 50 homes in the building project beside

Marvista School, homes have already been devalued by 33 to 50 percent over the last few years. The calculations I brought use 33 percent and led to a projected loss in revenue of 13.8 million over the next 15 years for a tiny X on a map that is outside the generalized study area. Imagine the billions it must be when you consider that most of Normandy Park and Burien are impacted.

R-6-8

Noise: Although it contains pages of data that says noise above 45 db's is a problem, it then contradicts itself by only considering noise that makes you go defense. Then there is the whole issue of noise contour maps and measuring systems. Within one hour you could have 5 motorbikes for 30 seconds each and 5 lawnmowers for 1 minute each, and it could still be considered zero noise using the DNL, LDN system. I don't think a jury would embrace the DNL noise measuring system as enthusiastically as the Port does, do you? Especially looking at the devalued property values which you can get by going to the King County Courthouse and just reading them.

R-15-1

The report is missing vital data. For example, bald eagles are living and breeding by the airport. I wasn't going to bother bringing them up, but as I drove home from the library after studying the report, there was a bald eagle under an airplane that was taking off to the north. So I figured I was obligated to mention it.

— R-15-1 —

Then of course there are the landslide and earthquake fault high hazard areas where the 8 Kingdomes worth of fill is being dumped that the report failed to mention. In my report, I am giving them the references so they can go find the data. They also couldn't find the erosion hazard data either.

— R-11-1 —

It is fitting that I spent Memorial Day preparing for this. I know that most people in the area feel that the government here is by the Port and for the Port, but I know the third runway won't meet the airlines' needs, so it's not worth destroying anyone's home, man or beast, or, for that matter, subjecting us to carbon monoxide and air toxins that are already above established safety standards and, according to this draft report, will be increased as a result of the third runway. The third runway only increases capacity by 12 percent going one direction and 2.6 percent the other, but it's going to cost over an order of magnitude more than a standard runway, and I've got all these numbers and they're all -- I have it all detailed in our report so you'll know exactly what runway I'm comparing it against.

The third runway is an extravagance Washington can't afford. The only real questions are, are we going to have to go to court to stop it? How big a scandal is the EIS going to cause if it isn't revised to address comments such as those you've heard today? When we are we going to put together a plan that really meets the airlines' long-term needs. This is just a band-aid that's going to fall off, perhaps even before it's finished. After all, you have to wait for the 8 Kingdomes worth of dirt to settle, or else you'll have the construction problems and repair issues and costs that the Denver airport is going through right now, because they didn't wait long enough when they used their fill dirt.

As I said, I will include a very detailed report with references and calculations that any engineer can go through, if they can find one.

(Applause.)

MR. GALT: Thank you, Ms. Brown. The next speaker is Randy Tate, who will be followed by Janett Burrage. Mr. Tate.

RANDY TATE: Thank you. First of all, thank you for allowing me the opportunity to testify this evening. I would like to begin, first of all, by thanking the Federal Aviation Administration for holding this hearing and for extending the public comment period on the draft environmental impact statement from 60 to 90 days.

The FAA should also be recognized and given credit for agreeing to hold a second public hearing on this issue that is critical to the future of western Washington. Allowing every organization and every individual the opportunity to participate in this process and offer their opinions is by far the most critical element in developing a community consensus that we should or should not move forward with this project. All interested parties must have the chance to present their views and discuss this issue.

R-2-5

In this regard, I would like to commend the efforts of the Puget Sound Regional Council for having the flexibility and fairness to appoint an expert arbitration panel on noise and demand system management. I urge the FAA to consider the expert panel's recommendations as part of its review of the Port of Seattle's proposed revised master plan.

Tonight has been set aside for public comment on the DEIS. Our area's debate is about more than just whether a justifiable need exists for a proposed third runway at Sea-Tac airport, it's about whether the proposed expansion of Sea-Tac fits a comprehensive

transportation plan that will serve western Washington's needs now nor the next generation. We must avoid the temptation to avoid short-term parochial policies in response to long-term statewide needs.

Congress has set the goal to balance or federal budget by the year 2002, and one of the most important long-term strategies for balancing the budget is to maximize the return on the taxpayers' dollars, to spend only on efficient programs. Transportation planning in western Washington and indeed the whole state must be guided by that same principal. Finding cost effective, long-term solutions for our transportation needs, and in an environment of fewer federal dollars, sound solutions must be found by state and local officials with the support of the impacted public.

R-12-11
R-12-15

My constituents have brought to my attention their concerns over various parts of the DEIS. It's logical that those matters be properly addressed. Things to be considered include noise and impact on neighborhoods, parks and schools. The effect of airport expansion on existing and planned state and local road projects and other local public works projects must be taken into account. We must fully and honestly examine the impact on surface and subsurface water quality, wetlands, and floodplains. Many suburban King and Pierce County residents want the adverse impacts of this project to be known before the quality of life they currently enjoy is lost.

R-12-11
R-12-15

All of these concerns demand thorough analysis before any new construction begins. As far as our region's long-term planning is concerned, we need a thorough, detailed vision. All methods of transportation capacity improvement must be given full and fair consideration, including high speed and commuter rail, commuter and larger airplanes and airport demand strategies. We cannot fail to plan for how our region will move people and freight in the next century. Integrating all these systems, airports, railroads, highways and ports is critical to responsibly planning for our state's economic growth.

R-4-7
R-4-9

Western Washington is growing explosively for a reason. It is a tremendous place to raise a family and to find high-paying jobs. Working together we can device a plan that will satisfy Washington's transportation needs for years to come while preserving our quality of life. I look forward to working with the FAA on these issues, and again thank you for giving me the opportunity to talk with you tonight. Thank you.

MR. GALT: Thank you, Mr. Tate. Our next speaker will be Janett Burrage, who will then be followed by Leslie Thomson and Joseph McGeehan. Ms. Burrage.

JANETT BURRAGE: Thank you. My name is Janett Burrage, and I'm a member of the Des Moines City Council. I've been known in the Des Moines area and also throughout the state as a property rights advocate for individuals, and I stand by that, but I don't think that individuals have the right to use their property when they damage their neighbors, and in this case the Port of Seattle is going to be damaging their neighbors with water quality problems, among other things. They're going to pollute and expect others to clean it up.

R-3-11

There was a waste water permit that was applied for recently with the Department of Ecology, and it was granted, and then there was an appeal on that permit, and one of the things that's not accounted for is the evidence that was found during the investigation for that appeal. They found that there was sludge in the lagoons that are not protected from leaking into the ground water and might affect wells in the area, and another thing they found was that the industrial waste system often overflows and has excessive flows currently.

Also, the industrial waste system cross-connects with the storm drainage, so they're mixing dirty water and clean water, and so what they come out with in the storm drainage is contaminated with industrial waste. This goes down to the creeks and into Puget Sound. The industrial waste includes fuel spills, deicing chemicals and paints from repair hangars. I think that it was found in the EIS that they will have the same number of aircraft operations whether or not the third runway is constructed. This seems a little odd of why they even want to build it then, but even if there are the same number of operations, they will be adding new facilities, which will add to an already strained system of surface water and industrial waste, without coming up with a way to fix the problem that exists today. I'd like to request that this deficit in the current waste water be addressed in the final environmental impact statement. Thank you.

R-13-11

R-3-7

MR. GALT: Thank you, Ms. Burrage. Our next speaker will be Leslie Thompson, who will be followed by Joseph McGeehan. Ms. Thomson.

LESLIE THOMSON: Thank you for the opportunity to comment. I'm speaking as the mother of

3 young children. We live in the Highline area. We live in a wonderful area, Three Tree Point in Normandy Park. We love where we live.

Although the noise from the Port often rattles our windows, we've been told by the Port that this is insignficant, that the noise isn't an issue in the area where we live. I'd like someone from the Port to tell me that at 4:00 in the morning when those jets start to rev and my 3 year old wakes up, but, you know, I'm really not worried about the noise because I know that really won't kill us, but I'm concerned about the pollution. It will. I'm very concerned about the level of pollutants that are in the Highline area air. In the DEIS on section 9 where it talks about air quality, there is a graph that talks about the pollution emissions around the Sea-Tac area and compares it to the King County area in general. For carbon monoxide volatile organic compounds and nitrous oxide, the Highline area has half the amount of the total King County area at large. This is scary to me.

R-5-4

Data has been shown by physicians in the Highline area that there's increased brain tumors in the area. I personally have 3 friends who have all suffered from the same type of brain tumor, two of them have lived in McMicken Heights, and one of them worked

R-10-37
R-10-65

R-10-37
R-10-65

at McMicken Heights School. Additionally, we know that asthma has increased in the Highline area. You can talk to any of the pediatricians. Considering these pollutants, we have a number of schools that are right in the flight path. I'm scared to have my children attend these schools.

R-16-8

The final thing I'd like to address is the property value. As a young family, our primary fiscal -- I'm sorry, I've lost -- fiscal value is wrapped up in our home. And as one of the earlier speakers talked, I've been told by a real estate agent that if the third runway were to go in, I could expect my property value to be decreased by 20 percent, and I suspect it may be even more.

I'm very concerned about these issues: the noise, although I've been told it's not an issue, according to the Port, the pollution and the effect -- this will have on the school children who do play outside year-round in the Seattle area, even though many places in the DEIS state that this is a cold-air area, and we really shouldn't be concerned about the noise and pollution because we spend so much time inside. Anyone in Seattle knows that Seattleites don't spend time inside. And, lastly, the property values. None of these things were truly addressed in the

environmental impact statement draft, and I ask that the FAA reconsider these statements. Thank you.

MR. GALT: Thank you, Ms. Thompson. Our last preregistered speaker during this portion of the hearing is Joseph McGeehan. Mr. McGeehan.

JOSEPH McGEEHAN: Good evening. I want to thank you for the opportunity to speak before you tonight. I am Joseph R. McGeehan, superintendent of the Highline School District.

R-7-9

The building of a third runway at the Seattle-Tacoma International Airport will have an impact on the schools, the community which we serve and the quality of life in this area. As superintendent of schools, I have the opportunity to listen to many points of view about this subject. Tonight I wish to speak to several issues related to this matter, and one of our board members will address this panel again on -- June 14.

First, I want to address the allegation that the school district will not cooperate with the Port of Seattle concerning sound attenuation issues. The board of directors believes they have a responsibility to keep open the opportunity to challenge and to seek assistance and financial relief from any future airport developments which adversely affect noise levels around schools. The proposals which have been offered by the report request that the board renounce any future claims if we accept sound attenuation monies. The board is paying careful attention to the EIS study. The board, in conjunction with its legal counsel, is seeking to create appropriate language which protects its future rights and responsibilities and establishes some standards to which both parties can agree so that a sound attenuation program can move forward.

We also are considering the need for the affected schools to be air conditioned. It is a source of frustration that we are expected to resolve this issue and other related matters from the school district's budget, particularly when other citizens and travelers benefit from the airport without providing any financial assistance to those of us who will bear the burden of the third runway.

We do not wish to demonize this issue, but we believe fairness and community responsibility are being ignored by some. We also received criticism for having schools in the flight path. We have received no offer to move schools out of the flight path. The impact of such a decision has profound economic and social consequences for the communities in which these schools are located. The transporting of students away from

R-7-9

their neighborhoods is always an additional source of legitimate concern.

I have been the superintendent of the Highline School District since July 1, 1994, and I am pleased to say that my communication with several Port officials has been forthright and cordial. To the best of our ability, all of us need to work at being good neighbors towards one another. Your assessment of the impact of the third runway on children and their parents can be beneficial. We want learning environments in which the noise level and the air quality meet safe standards for students, employees and the community. We are concerned about issues related to the loss of concentration and the inability to hear one another. We are involved in a research study to assess the impacts of the airport on students.

We also are working with the airport committee's coalition on impact issues. We will send you more information about these matters during the next several months, and attached to this statement are several significant previous research studies about the impact of airports on public schools throughout the world. They are provided for your review and consideration. Thank you for your time.

MR. GALT: Thank you, Mr. McGeehan. Do you

R-7-9

have the documents you want to turn in now?

While he's doing that, I'll indicate that we have two people on the walk-in list for this hour. The first will be Derek Brown, who will then be followed by Rich Feldman. Mr. Brown. Thank you, sir. Just bend it a little bit, and it will come down.

DEREK BROWN: There will be close to about 1 million dollars to make the third runway. Most runways cost about 50 million dollars. The third runway will not be able to carry fully-loaded cargo planes, It will only be able to carry -- it will only increase by 2 percent of the takeoffs and it will only be able to increase by 12 percent the landings, plus it will also annoy the people, animals -- like dogs, cats, and most importantly bald eagles.

When I am at school, I hear airplanes every -- very often. Probably other schools do, too.

R-5-4

The grass-filled part of the box is the woods and grass. The empty part of the box is the concrete walls, new buildings and runways. The ball will substitute the noise of the airplanes. See how the ball will make more noise on the concrete walls, buildings and runways than it will the woods and grass.

(Demonstration.)

Thank you for your time.

(Applause.)

MR. GALT: Thank you, Mr. Brown. For purposes of the record, Mr. Brown's demonstration was done with about a 7-by-12 box, and he had some like Easter egg grass in one end and a plain open end on the other and a hard rubber ball which he dropped in two different ends of the box. Thank you. We'll put your statement into the record.

Next would be Rich Feldman.

RICH FELDMAN: Good evening. My name is Rich Feldman. I'm here representing the King County Labor Council, AFL/CIO. We strongly support the third runway, and we support the methodology and technical analysis done for the draft EIS.

I'd first like to talk about the jobs impact of this proposed third runway, and its of critical importance for maintaining air capacity in our region. The air transportation sector is a highway sector. Our county is not producing very many high-wage jobs today. With Boeing layoffs and other layoffs in industrial sectors, high-wage employers are few and far between. The air transportation sector pays well above the King County average wage, and Sea-Tac supports close to 25,000 jobs, nearly 15,000 of them directly at the airport. Thousands of future jobs and billions of future dollars rest on the decision to go ahead with the third runway. Take, for example, the decisions of international airlines to locate oversea routes out of Sea-Tac. Northwest Airlines just made a major commitment to Seattle by opening up a route to Osaka.

This has major implications for international trade, which many jobs in our area depend upon, and for jobs. This route alone created hundreds of good-paying jobs. A third runway assures our ability of continuing to bring in these job-creating routes. We're presently giving tax breaks, incentives, other things that bring in manufacturers and others into this area, and it makes no sense to shut down a critical high-wage employer at this time.

Our economy depends on solid air transportation, and Sea-Tac, as many know, is the fifth fastest growing airport in the world. Its capacity for increasing and bringing in future jobs is limited by not having the third runway.

On the environmental side: We feel that this EIS is comprehensive and detailed and -- fairly comprehensive and detailed for this airport expansion project. We believe it's technically accurate, objective and fair. Further, we feel that the

8500-foot runway is the most sensible and cost-effective option for the long term. We see no significant differences between the 3 action alternatives.

We feel that because of the Port of Seattle's existing noise reduction programs and the federal mandate to phase out noisier stage 2 aircraft currently in use, that long-term noise will decrease, and that, therefore, no additional noise mitigation is required. We are pleased to learn that the EIS comes to this conclusion.

We recognize that there are structures in the flight path that must be insulated because of overflights and increasing overflights resulting from the additional runway. The impacts of the runway on wetlands and streams we feel could be mitigated by replacement of wetlands in other parts of the county, and specifically the Green River Valley.

Aircraft operating at Sea-Tac contributes less than 1 percent of carbon monoxide emissions for all mobile sources within Puget Sound. By far the bulk of pollutant emissions in this region are emitted by motor vehicles. This is not expected to change significantly by the third runway. So I'd like to conclude by thanking you for your time and emphasize the importance of this project for our economic health in this region and its ability to generate high-wage jobs. Thank you.

MR. GALT: Thank you, Mr. Feldman.

I have one more person on the walk-in signup list. That would be Robert Ellison. Mr. Ellison.

ROBERT ELLISON: Thank you, Mr. Chairman. I am appearing as a private person and a pilot and would like to just simply make some comments and ask some questions which I haven't seen addressed in the EIS statement, which I read at the library, and I simply wanted to question some of the basic underlying statements made which cause the whole issue to be raised about the construction of a third runway.

R-4-0

One of the major assumptions requiring the third runway is that poor weather conditions will produce significant delays, and on that statement everything else flows. So I looked into the EIS statement to look for the subject of GPS, differential global position satellite system, which has now been demonstrated to significantly increase capability of aircraft to land in poor weather on a hands-off basis, and the cost of implementing and constructing differential GPS systems at this airport and other airports would be significantly less expensive than

building a third runway. So essentially the whole question of what GPS can do and what its capabilities are appears to have been omitted from the EIS statements, and my question is why. And I'll beg off on that.

MR. GALT: Thank you, Mr. Ellison. I have nobody else on a sign-in sheet for this hour of the hearing, but as I have in each of the preceding hours, I will ask if there is anybody here at this time who has not testified who is not signed up to do so later and who would like to take this opportunity to testify on the adequacy of the draft EIS. Since we don't have you as a signed in person --

ANN BONNEY: I'll sign it, I'll fill one of these out when I'm finished. Is that all right?

MR. GALT: What I was going to ask you to do was simply give us your name, spell your last name, and then if you could give your address to the clerk.

ANN BONNEY: My name is Ann Bonney, and I think we have solved the problem of the third runway.

R-18-2

If the contour of the third runway goes on the books of the general purpose government, President Clinton will release funding through ASNA to remove the 10 jurisdictions of 65 LDN, but the only thing that he would require is federal 80 funding, state 20 percent funding, and the State of Washington would have to agree to put the band of the noise around the books of the general purpose government rather than the 10 jurisdictions governed by the Port of Seattle, and so the federal government's got 80 percent funding to remove the citizens of Des Moines, Normandy Park, Federal Way, Kent, Tukwila, Sea-Tac, Burien, Seattle, and two unincorporated King County jurisdictions, but the only way we can get into the funding of ASNA is through the books of the general purpose governments.

R-18-2

MR. GALT: Thank you. If you'd be sure to give your address to the clerk, please.

Is there anyone else who is not signed up but who would like to testify during this hour? The record will show there is not. It's 6:41. Our next scheduled speaker is for 7:03. We'll reconvene at 7:00. We are at recess until 7:00. We are at recess until that time.

(Recess.)

MR. GALT: Good evening, ladies and gentlemen. We'll reconvene our hearing at this time. On behalf of the Federal Aviation Administration and the Port of Seattle, I welcome you to the seventh hour of this public hearing regarding the draft EIS for the Seattle-Tacoma International Airport proposed master

plan update. I'm John Galt, the moderator for today's hearing. I've been retained to moderate the hearing specifically because I don't work for the FAA, I don't work for the Port of Seattle, I don't work for any of their consultants, and I have absolutely nothing to do with the decision-making process, so I'm here just to run the meeting for today.

As you have, I hope, noticed from the little brochure on the hearing rules, we're allocating three minutes of time to members of the general public and five minutes to persons representing groups and to elected officials. The first half of each hour is devoted to testimony by persons who have preregistered to speak during that time period, and then the second half of the hour is for what we're calling walk-in testimony, people who have shown up tonight without preregistering and indicated the desire to speak. We are not allowing any transferance of testimony time, and individuals may not trade their speaking slots.

When I call your name to testify, please come forward and take a seat in the chair opposite me so that you can speak into the microphone that's provided. Tonight's hearing is being transcribed by the court reporters to my left. They need to be able to hear you and actually it helps them if they can watch you talk, so that's why we have you face me, so that they can do that. The written record that they produce will be given to the FAA and to the Port of Seattle for their use in the preparation of the final EIS.

If you do not speak tonight, or if you have a lot of detailed or technical comments that you want to offer, or if the three or five-minute time period is just simply not long enough for you to say what you want to say, then I want to remind you you can also submit written comments. Written comments are just as valuable as the spoken word is here tonight. There are comment forms on the tables outside that you can use, they may be either left with me, left in the cardboard box that's on the table or mailed to the address that's listed on the bottom of the form. You may also write letters, send them to the same address that's on that form. It is very important if you want your written comments considered that they be received at that address not later than August 3rd of this year.

I'll be calling names three at a time. The first name will be the person who is to speak immediately, and the next two names will, to use a baseball analogy, be in the on-deck circle. And if you're near the back of the room you might start moving

forward or getting your thoughts organized. That's sort of a warning that it's coming real close to your time to speak.

The first person that we have to hear from during our seven o'clock hour is Bill Turnbull, who will be followed by Carol Hetzel and Jan Mehloff. Bill Turnbull? Is Mr. Turnbull here? We'll pass on by and come back and see if he has come in later. Carol Hetzel? Good. Carol Hetzel and then Jan Mehloff and John Rants.

SPEAKER: Hi, I'm Carol Hetzel from Mercer Island, and I requested to speak tonight on behalf of ANAC, so if you have me down for three minutes, it's supposed to be five, but I'll probably end up with less. The airport master plan environmental impact statement should include a broader area of Puget Sound, and it should include indicators of changes that are... taking place now, that are currently underway and in the planning stages and future changes that will be due to the third runway.

Specifically to be included should be anticipated flight track changes, and these should be clearly documented in the final version for the larger region not just for the current 60 DNL study area. The draft environmental impact statement currently includes

R-6-14
R-6-15

R-6-14
R-6-15

a checklist that the FAA has drawn up to use for making such changes in flight tracks. The inclusion of this into the EIS indicates that perhaps the FAA does want and plan changes in flight tracks.

R-6-23

Many boxes in the step-through process for this checklist have already been checked off. What does this mean? I would like to have an answer to that. Mercer Island and other east side communities have had a steady increase in aircraft noise and overflights since 1972 when the east turn was initiated. Previous to that time we had no overflights, we were a residential community without impact from air noise.

R-6-14

In 1982, the LA flights were added to this turn, and even previous to that in -- previous to that were the beginning of the SUMA turns, and then the addition of the LA turns in 1986. And currently there has been a tightening process of the turn procedure, which causes a U-turn affect with Mercer Island being the vortex of three-sided noise that lasts for a lengthy period of time as the planes fly north and then east and then turn and go south around us. The third runway will just be a further addition of noise and flights to the area. Thank you.

MR. GALT: Thank you, Ms. Hetzel. Next will

be Jan Mehloff, followed by John Rants and Clark Dodge. Jan Mehloff? I'm not doing real well here in this hour, am I? Let's try John Rants. Mr. Rants is here, and then Clark Dodge and Claes Hagstrom. Mayor Rants.

MR. RANTS: Thank you. John Rants, mayor of the City of Tukwila. The analysis contained in the draft EIS is seriously flawed in at least three ways.

R-4-1

The draft EIS inaccurately defines the problem or need at the airport in the way that almost assures that a third runway will be the chosen solution. The master plan draft EIS defines the problem as poor weather airfield operating capability in a way that appears to preclude consideration of any alternative other than the third runway.

R-3-9

This contradicts the description of purpose and need contained in the prior flight plan EIS, which indicated a third runway is needed to attract new capacity to Sea-Tac. If the real purpose is to provide new capacity, there are numerous alternative ways to accomplish this that have yet to be evaluated. The draft EIS dismisses other potentially viable alternative ways of accommodating growth and demand for air travel without adequate analysis or justification, again leading to the unsupported conclusion that the third runway is the only solution.

The draft EIS provides only a summary of its conclusions that other alternatives will not address air needs, relying on prior analysis that alternatives contained in the flight plan EIS and PSRC's major supplemental airport study. This significant shortcoming is not cured by deferring to PSRC's major supplemental airport study. The MSA process was terminated prematurely, not on the basis of technical feasibility or alternative airport sites, but due to the tremendous political pressure brought to bear by the communities in the vicinity of the alternative sites.

R-4-1

The draft EIS grossly underestimates the environmental and social impacts of building a third runway by incorrectly assuming that air traffic at Sea-Tac will grow by the same rate regardless of ... whether a third runway is built or not. The draft EIS incredibly assumes that the number of operations at Sea-Tac will increase by more than 100 thousand per year whether or not a third runway is built. This defies logic and common sense and directly contradicts the findings of the prior flight plan EIS.

Clearly -- in conclusion, clearly define the Port's objectives in adding a third runway in a manner

R-3-7

that allows for a meaningful and objective analysis of alternatives. Provide the kind of detailed analysis of alternatives and their impacts as promised by the flight plan EIS and provide realistic projections of future air traffic operation with and without a third runway to allow a meaningful comparison of impacts on the environment and on our communities.

Thank you.

MR. GALT: Thank you, Mr. Rants. The next speaker is Clark Dodge to be followed by Mr. Hagstrom. Mr. Dodge.

CLARK DODGE: Thank you. My name is Clark Dodge. I'm a member of the city council of Normandy Park. I'd like to thank this board for listening to everyone, but I would also like to voice a real concern for the lack of total information in the EIS. There are many issues that aren't being covered here and ... haven't been covered.

Some of those issues are environmental issues, the Miller Creek basin, for instance, the fish habitat, the restoration of the stream. We are looking here at moving an awful lot of dirt. This dirt is going to go on the highways, it's also going to end up on the street, it's also going to end up in the ditches and in the streams, and right now we're battling the

R-13-17

R-12-17

R-18-29

R-8-1

problem of silting and contamination of those streams.

It appears to me, looking at the documents, that not enough of this has been looked at nor the total impact that it's going to have on the environment, and these go along with the construction impacts. What affects are the construction impacts going to have on the surface water and what are they going to have on the groundwater? We're working very hard in the area to increase the number or the amount of water that's returned to the ground so that we get clean water to drink for many years to come.

The second thing is the environmental impact on the communities and the quality of life. I have lived in this area for almost 20 years, so I've seen the growth of the airport, I've understood it, have seen the changes from the types of aircraft, the number of flights, have seen many changes in the flight patterns. I am very active with the suburban cities association, talk to an awful lot of elected officials in other cities who also comment on the impacts that their cities are feeling from the number of flights from the airport. They feel that as the impact or the flights increase, that impact will also increase, and I just would like to close with the importance of these issues on the community and make sure that they are

R-18-29

R-8-1

addressed, because the present DEIS, I don't think, totally covers those issues. Thank you.

MR. GALT: Thank you, Mr. Dodge. Our next speaker is going to be Claes Hagstrom. I hope I'm pronouncing that correctly.

CLAES HAGSTROM: That's accurate enough.

MR. GALT: Okay. Thank you, sir. Mr. Hagstrom.

CLAES HAGSTROM: Well, I'd like to first say I represent the Seattle RCA, and these comments today are extremely preliminary because we haven't managed to swim through this amount of paperwork that you have given us, but we do expect to provide a written response by August 3rd, and also we feel pretty unenthused and frustrated by this whole EIS process, because as we can see here today, we don't have too many decision-makers that are listening to us, and we don't see any Port commissioners here today, and we also understand that when the final decision is made on this issue, the so-called record of decision, that FAA will issue that decision by itself. And since the FAA is the author of the report, we find it very curious and not a very independent review of this entire matter, and comparing that to a major development by even a large company as Boeing, I mean, we do have an independent review process and permits for those kinds of major developments that seems to be lacking in this instance.

We did see an attempt to a dialogue in the beginning of last year when the Port of Seattle had a Sea-Tac university. In the first session we were allowed to ask some open-ended questions, but unfortunately what happened after that session was that these questions were not answered or they were answered in writing or they were referred to the present process, EIS, and so far I haven't found answers to many of the key questions. So we strongly advise both the Port and FAA to start a more open-ended dialogue about this issue and hopefully that could be answering direct questions either in writing or orally.

Further, we encourage that the public can vote on this issue. In the City of Seattle we were ... even allowed to vote on such a so-called minor issue as the Pine Street opening, and I think this issue is far beyond that in importance and scope for the entire area. We further encourage the Port of Seattle to let the process continue, or start maybe, that the state should be involved in making this decision, which is the case in many other states in this country. And we also encourage the Port to let the federal government

have their say without overhanded and heavy lobbying in Washington, D.C. when the key decision will be made there.

Further, and maybe the most eminent right now, we strongly encourage the Port to stop using strong-arm tactics, as we call them, in trying to steer the decisions of the expert arbitration panel that could make a killing decision on this entire third runway. We think that the expert arbitration panel was appointed by the State of Washington as an independent and binding panel, and as the Port has already tried to overrule them once, we are very leery that the Port could do that again.

As far as the noise condition is concerned, in Resolution A9303, if the panel rules that that condition hadn't been met, essentially we are asking the Port very strongly to take their hands off this ... project for good and forever. And as far as the capacity-on-demand factors that the panel will rule about, high speed rail, the congestion pricing and technology improvements that clearly are all alternative to this major disasterous project, we would ask if their ruling come in from the panel for the Port to take their hands off and not make this into a tremendous breach of the public trust. And our area

R-3-5

has reputation as being one of the foremost highest quality of life areas and environmentally educated public, so I think we want to keep that reputation on a national and also international level. I don't know how much longer I have to speak.

MR. GALT: About 10 seconds.

CLAES HAGSTROM: Okay. I just want to say there are some major issues there is no need for this runway in the first place because the delay figures are extremely inflated by the Port and further the demand forecasts, If you look at the variation of those forecasts from time to time, you can call them nothing else but customized forecasts. And according to our figures, which we hope the panel will agree with us, the expert arbitration panel, that is, that there is a tremendous increase in the enplanements (phonetic) per flight that will take care of our demand in 20/20. Thank you very much.

R-3-16

MR. GALT: Thank you, Mr. Hagstrom. Now, let me go back to the two names that I had to pass over because they weren't here and see if they have come in in the meantime. Is Bill Turnbull here? Mr. Turnbull? No. And how about Jan Mehloff? Mr. Or Ms., I'm not sure which, Jan Mehloff? We will pass them by. I have some walk-in people signed up, the first of

which would be Chris Clifford, who will be followed by Erhard Wichert, is that close enough? Okay. Mr. Clifford.

CHRIS CLIFFORD: My name is Chris Clifford, 2721 Talbott Road South, Renton, Washington. I work with a number of citizens groups in the Green River Valley and also, on more regional basis, on transportation issues. Looking at -- and I have had extensive work with EIS and through the SEPA process and also at the FEIS with the Federal Clean Air Water Act and the NEPA process.

One of the things is that this is ridiculous. If you look at your documents that you have, you have three volumes that are about the size of a telephone book and you're expecting people to come here tonight and to testify coherently about the information in them. We have had numbers of requests from a number of people to please expand the time that we could allow people to look at these documents so that they can come and speak about them and have analyzed them in a fashion that makes their comments worthwhile. Right now, almost every speaker I've heard today has come in here and said the same thing. We have not had enough time to process the over 2,200 pages.

R-1-5

R-1-2

The other thing is this is very unfair to the average citizen. The cost of obtaining these documents is excessive and the fact is if you go to your libraries right now, they are not accessible, they're not there half the time, and I've been to a number of the libraries. I would say that this process seems to be geared to not letting people have access to these documents and seems to be geared to producing a document that is so thick and so onerous that no one can come and speak about it or even coherently testify about what's in it or challenge what's in it because you've just produced so much volume. I guess, you know, quantity does not necessarily mean quality, but it certainly does slow down everybody's ability to find where the problems may lie.

R-1-3

I would ask on behalf of those groups that you extend the comment period, that you hold a public ... hearing where people speak at the end of the comment period not here at the beginning. The other thing is that for years we have been promised by the airport that this was only a runway for foul weather conditions. Now all of the sudden you go in there and you look at the boards and there's going to be a 25 percent increase in air traffic. When they first came out and talked about the third runway, they never

talked about increasing a net increase, they only talked about the ability to facilitate air traffic that

R-6-13

could not get in in foul weather conditions. If you guys were being honest with people, you would say to the public, fine, during fair weather conditions we will only operate two runways, but people out here know that that is not what you're going to promise, that you're going to work those three runways and that you're going to increase this -- I'd say 30 percent but fine, I'll let your reader board of 25 percent increase speak for itself. I mean, do the math, you have two runways, you add an extra one, how much more capacity do you have? It's about 50 percent. But, you know, if you run it at half the time, that's a 25 percent increase. That is exactly contradictary to the promises and what was being said to people about this third runway. ...

R-14-1

The other problem is with the environment. You were talking about filling in 10 acres of wetlands in there. These are 10 acres of highly rated wetlands, this is not low-quality wetlands, we're not talking about pallestrine (phonetic) wetlands that were once like a cow field that now because of the building of freeways have now been retaining water. We're talking about water systems, we are talking about very valuable systems. We're looking at moving, moving. I mean, just listen to the words you use in your own documents and reader boards. Moving 3,700 feet of Miller Creek, moving 2,200 feet of Des Moines Creek. If you've lived in the northwest, I don't need to be a civil engineer to tell you that when you move creeks and when you move streams, guess what? They move you away. Look at the Cedar River, look at any of the rivers where we've moved; if you move 1 foot of it, I promise you, it will move back 10 feet. Nature does not go for that.

R-13-27

You're look at filling 10 acres of wetlands and burying it with a 150 foot wall of dirt. That is not acceptable. I do not know of any mitigation plan in this state, and I have been promoting and worked with the people at the Auburn race track where we had the largest wetland fill in state history of 17 acres, that was 17 acres of low-grade pallestrine (phonetic)... wetlands. This is 10 acres of prime wetland area, grade 1, class 1 wetland. You would be looking at having to -- if you were to follow the same criteria, you would be looking at having to fill in 50 -- creating 50 acres of high-grade wetland. The

R-14-1

transportation, 135 trucks per hour, I would encourage to you look at alternatives, such as the transportation method being used by the Department of Energy in Idaho,

R-12-22

in Boise Idaho, as a way to possibly we should build another airport in another area where the impacts aren't as great, where the costs of building it are lower and then have a high-speed or a light rail system that would bring people to the civic centers. I would ask you to expand the comment period. This is inherently unfair and you -- I mean, this will end up in litigation if you continue this way. Thank you.

MR. GALT: Thank you, Mr. Clifford. Would you be kind enough to leave the salmon card for the card for the clerk, please.

(Applause.)

MR. GALT: Next would be Erhard Wichert.

ERHARD WICHERT: Good evening.

MR. GALT: Good evening.

ERHARD WICHERT: As the gentleman indicated, there is not quite enough time to put together a ... statement and to peruse the 2,200 pages contained in those three volumes. I made a feeble attempt yesterday and I scribbled down a few notes.

R-1-5

First, I'm deeply disturbed by the imprecision that strikes me in looking over this document. You say you have about 23 borrow sites. I went home and looked up the dictionary, and it says you borrow -- "borrowing is receiving something with the understanding or the promise that it will be

R-11-3

R-11-3

returned." Do you have any intention of returning the dirt to those sites where you will dig it up?

(Laughter.)

If not, why don't you come out and be honest about it. If this single instance of imprecision is an indication of the other imprecisions contained in the document, I am further deeply disturbed.

R-7-33

Noise. Everybody is talking about noise insulation. I have yet to hear a proposal to insulate my ears. My wife and myself have the habit of sleeping by open windows, sitting on the patio. How are you going to address this problem? Stuffing a little bit of stuff in the walls or providing me with money to buy double-paned windows isn't going to do the job. I believe that other people will have that same opinion.

This document treats what can at best be called hypotheses as if they were tested and substantiated theories, totally unacceptable. I realize that this is a draft environmental impact statement; is that correct? Those draft EIS's have the habit of becoming the final thing. I hope when the final EIS is going to be published it will be a little more precise than this sorry exexcuse for a document.

In some of the documents attached, the FAA and the Port have confirmed that the new airport will

not satisfy the needs addressed by the EIS, probably by the definition of the Port or the FAA; I don't think this is much of a proof. I believe most of what I would say is what probably will be said more eloquently by people who have studied the draft EIS in more detail, so I wouldn't have that much to add. There's another element that disturbs me a little bit. I don't see Channel 4 here today, but at the last hearing about the noise in front of of the noise panel in this hotel, between 70 and 80 people spoke against the runway, not one spoke for the runway.

When I came home I turned on TV, Channel 4, they showed three people speaking, two that spoke about 10 feet away from me, because I was there, and one who wasn't. I believe the people of the Seattle area that will be impacted by this third runway, by this whole issue, deserve better than this shoddy excuse for journalism, which pretends to be professional journalism. It makes you wonder whether or not Channel 4's operating budget is partly supplied by the Port of Seattle or by Air Washington.

When it comes to the impact of the transportation of the dirt to the dump sites, I feel sorry for those people that live near those approach routes, but that document is just -- it's too imprecise when it comes to that. I believe the Port has no clue what those routes are going to be, they have just possibilities. Again, I feel sorry for those people, but litigation is probably the next step. Thank you.

MR. GALT: Thank you, Mr. Whichert. Let me try again, Bill Turnbowl? Jan Mehloff? Still neither one. Okay. Is there anybody else who is here who has not spoken during our hearing and who's not signed up to speak in the next session who would like to offer testimony now? Anybody at all? Yes, sir. I'd ask that when you start, please give us your name, spell your last name.

DON DOCHERTY: I was in here this afternoon so I had a chance to listen to some.

MR. GALT: You learned what the routine was. This is Mr. Docherty.

DON DOCHERTY: Docherty.

MR. GALT: Docherty.

DON DOCHERTY: Yes. I've lived in the neighborhood here for forty years, I've watched the airport grow from practically a very quiet place to now something that is noisy and not only noisy but the air quality, I'm sure, has deteriorated quite a bit in my time. This afternoon I was in here and I heard a young lady by the name of Laurie Wordian speak about air

R-10-65

quality, and it brought to mind so many of my friends who have died from cancer. In the northwest sector, about a square mile just northwest of the airport, I don't know what the number is now, but the last I heard it was 35, and the 35 -- these individuals were in about a one-square mile area. And the young lady that did this research found out that that was equivalent to a normal area of 10 square areas, so there's a concentration caused by something, and the only thing I can nail it down to would be the air quality.

R-5-4

The noise, as far as noise is concerned, I think we have to live with it. My house has been insulated and it only has had a moderate affect, but at least the present noise -- but if we expand it -- it seems to me that if we're going to add another runway, we're going to increase the airline pollution. I don't think there's any way around that one, and then a couple of the things, one was the put in the fill to take care of that third runway, I believe is probably in the vicinity of about 50 percent of what is going to actually be required. Now, I have quite a bit of experience, I've been an architect for forty years, and I have had a lot of experience with environmental impact statements, and one of the things I found out about them is you -- like the old song goes, you accentuate the positive and eliminate the negative, or at least reduce it so that it doesn't look so bad.

I looked at the air quality comment out here on one of the boards and it said that it may cause cancer. Well, I'm positive that it does, because I've lost lots and lots of friends. This young lady that made the survey lost her mother, her dad, her grandmother and an aunt. And that's about all I've got to say, in my last 30 seconds. Thank you.

MR. GALT: Thank you, Mr. Docherty. Is there anybody else who would like to testify? ? Yes, ma'am. Would you be kind enough to start with your name and address for the clerk, please.

JEANNE MOELLER: My name is Jeanne Moeller, I reside at 21215 Fourth Place South in the City of Des Moines.

MR. GALT: Thank you.

JEANNE MOELLER: I finally found out exactly who wrote the environmental impact statement, it was Lewis Carroll, because this reads exactly like "Alice in Wonderland."

(Laughter.)

There are so many problems in it that it's very difficult to zero in on all of them, but I would like to point out the idiocies that I have seen in it.

I would begin with the tightly packed dirt that is to mitigate a seismic hazard that is -- that the runway is to be built on. I would point out the lunacy of taking nine and a half acres of wetlands and moving it to Puyallup or Auburn. Do we put up signs for the ducks and the herons pointing "wetlands this way" (indicating)?

R-44

R-54

This is our community. We live in a community that once was quiet, no longer is. We don't gripe too hard about the noise and the pollution and the rest of the down sides of the airport. In fact, a study was done by the ACC, by Dr. Sanford Fidel, that shows that we are far more tolerant of noise than anybody else they've ever run in to. We'll tolerate approximately 6 decibels more than most other people will. The problem we have here is that this is a self-serving document. It is a document that has been drawn up to prove, A, the necessity for a third runway, B, that you can fill in one of the greatest holes that they could possibly find out here, that you can rechannel all of the streams, that you can do whatever you want to destroy the environment, and then to top it off to try to tell the citizens out here that you've cut the noise in half and we can have 100,000 more flights and it won't be as noisy? Every single plane that takes off or lands at Sea-Tac Airport gobbles up the minutes of our days with the noise. It isn't the level of the noise, it's the length of it. My quiet bucket has already sprung a lot of leaks, and it's getting worse all the time. Thank you.

MR. GALT: Thank you, Ms. Moeller.

(Applause.)

MR. GALT: Is there anybody else who has not spoken who would like to do so during this hour? Yes, sir. You must have come in a little bit late. If you would take a seat in the chair there, please. This is Carl--

CARL MEALY: Mealy.

MR. GALT: Mr. Mealy, you have three minutes.

CARL MEALY: Won't take near that long. My basic piece tonight is that I have attended a number of public hearings regarding the airport, its noise, mitigating efforts and so forth. My questions are, and what I've read from the paper -- and I confess I have not read the entire EIS statement -- is twofold. One, is addressing how this effort, both for the construction of the airport will be mitigated for the neighboring communities, as well as what happens once it's all done. I mean, we've already experienced what

R-18-8

R-8-1

took place with the second runway within the communities and the downfall of that in terms of losing the number of residents, businesses and viability of land around the airport. It's not clear now when we talk about a third runway if those same things are going to be repeated and at what point in time do we ever say we call it quits and realize that we need to go on to a better solution? We're not recognizing the total impact that the airport has on its community in existing as well as what it takes in the future.

R-8-22

The second part of it is, what the airport has done to mitigate the noise is also having a profound affect upon the communities, and I don't think we're addressing that. What I mean here is that we're buying out homes, we're moving people away from communities, we're making land worth less that's there, we're changing essentially the structure and land use around the airport. Now the communities are having to react to the airport as opposed to the other way around. That's the first part.

R-13-4

The second part was reading in the newspaper about the airport about the number in volume of water that was going to be required by the airport after the year 2,000. As a water commissioner in a local water district, I'm concerned about the volume. We're essentially talking about a four-fold increase in water consumption by a nearby community, and where it's going to come from I do not know, but the potential and its impact on our local aquifers, which are essentially drawing at near capacity now, is of great concern. Thank you.

MR. GALT: Thank you, Mr. Mealy. Is there anybody else who has not testified who would like to do so during this hour? Thank you. Our next witness will be John Rozdilsky.

JOHN ROZDILSKY: Yes, very good. Just let me get a chance to gather my thoughts. I just came in here after talking to folks out at the EIS display. And one of the things I'm concerned about is after talking about the EIS studies is that there are concentrations · fuel, unburnt jet fuel, that is in the air at certain times of the year. I've smelled it at Angle Lake over at First Avenue South. The testing that was done in the studies was done in the months of October, November and December. The other studies that concern looking at hydrocarbon levels were models. After talking to the person concerned with the study, he admitted that the type of things that I was concerned about, like unburnt jet fuel, weren't taken into consideration in their models.

R-10-8

I would like to see on-the-spot testing done. It seems that benzene, which is in jet fuel and is a known carcinogen, can't be very good for our community. I like to fish at Angle Lake. I don't want to know that the fish are affected and my human neighbors are also affected. The other thing I have a concern about is something that is exempted in terms of noise, and that is the runups. Runups are probably the worst noise that I experience at my residence. Why are runups exempted? The decibels are enough to cause my house to resinate. It took me quite a few years to figure out what the source of the noise was. I was simply sent footprints of airplane takeoff noise, but it was only recently that I found out that runup noise is what was causing my discomfort.

Lastly, I would like to address the problem of bringing all this fill in from distant places to ... create the third runway, and, conveniently, the 509 connection is not completed. They were vague about where the 509 would lead. It would lead, obviously, to the First Avenue bridge and then you would go to Route 99 or the connector -- Michigan Street connector to I-5. Both of these are urban arterials. I can imagine that the impact on these areas would be quite severe. I think this is a convenient omission in the EIS, and

R-10-8

R-6-17

R-12-7

also I think that the addressing of high concentrations of unburnt jet fuel and runup noise are other convenient omissions from the EIS, and would I would urge these to be taken into consideration. Thank you, very much.

MR. GALT: Thank you, Mr. Rozdilsky. Is there anybody else who has not signed up but who would like to offer comment on the draft EIS during this hour of the hearing? Record will show there is not. Our next preregistered speakers are scheduled to begin shortly after eight, so we will stand at recess until eight o'clock.

(Recess.)

MR. GALT: We'll reconvene our hearing at this time. Good evening, ladies and gentlemen. On behalf of the Federal Aviation Administration and the Port of Seattle I welcome you to the eighth hour of the public hearing regarding the draft EIS for the Seattle-Tacoma International Airport proposed master plan update. I'm John Galt. I'm will hearing moderator for this evening. I've been retained to moderate the hearing in large part because I don't work for the FAA, I don't work for the Port of Seattle, I don't work for any of their consultants, and I will have absolutely no role in the decision-making

process. My job is just to run the hearing this evening.

As you have read in the little brochure on the ground rules for tonight's hearing, we're allocating members of the public 3 minutes each for testimony, and persons representing groups and persons who are elected officials 5 minutes each. The first half of each hour is set aside for prereserved testimony, and then the second half of the hour is for folks who are just walking in and who decide as they come in the room that they would like to speak.

When I call your name to come forward to testify, please come up and take a seat in the chair opposite me so that you can talk into the microphone. The microphone is both the public address system here and also an aid for the court reporter. The testimony that you give this evening is being recorded by a pair of court reporters. It will be transcribed into written form and then provided to the FAA and Port of Seattle study members for their use in preparing the final environmental impact statement.

I will be relatively strictly enforcing the time limit. I have a little sign that I hold up as you get close to the end of your allotted time, and then the big deadly double zero on the other side for when you're running over. And if I do hold up the double zero, and for those of you who have been here for a couple hours, you realize that I'm fairly liberal in not holding this up precisely on the minute, but within reason. If I do hold this up, I would ask that you conclude your comments as promptly as you can. If you don't speak tonight, if you have a lot of detailed or technical comments that you think would be difficult to do orally, or if the 3 or 5-minute time period that you're allotted is just simply not enough time for you to make the point that you wish to make, please remember that you can submit written comments.

There are comment sheets on the tables outside in the lobby that you may use. You can turn these in to me before you leave if you'd like to. There's a cardboard box on the table outside. You can just stuff them in the box. Or you can mail them to -- the address that's provided on the bottom of the form. You can also, of course, type a letter, handwrite a letter, whatever, and mail that in to the address that's on the form. It's very important if you're mailing a comment to make sure that it gets to the address that's listed there by August 3rd. That's the cut-off date for the receipt of comments on the draft EIS, August 3rd of this year.

I'll be calling 3 names at a time. The first name that I call will be for the person who is next up to speak, and then the next two will be, to use a baseball analogy, which I've now used 8 times today, in the on-deck circle. Those will be the next two speakers in order, and I would ask that they sort of get their thoughts in order and perhaps if you're in the very back, you might even want to start moving forward to help keep the hearing moving along.

Our first speaker during the 8:00 session is Kathleen Vermeier, who will be followed by Rose Clark and then Matt Rosenberg. Is Ms. Vermeier here?

KATHLEEN VERMEIER: I guess for the record I'll introduce myself, Kathleen Vermeier, former mayor of Normandy Park, presently council member of Normandy Park. I'm here tonight to protest adamantly against a third runway. I've attended several public hearings, and I am not in favor of the runway, and I'm here tonight to say the same thing. I've got grave concerns over this so-called "master plan" here. Chapter 3, "Affected Environment," doesn't even list my city, and yet the maps show that Miller and Walker Creek flow right through my city. That definitely is affecting my city. It also includes -- on your maps within this master plan, it lists schools and other facilities, and

R-5-2

R-5-2

yet when it comes to listing homes, it doesn't even show Normandy Park as having any homes, any commercial property whatsoever, but yet your maps show Miller and Walker Creek flowing through it. Like in the generalized existing land use, single-family residence, according to this map, Normandy Park doesn't have any. Multifamily residence, Normandy Park doesn't have any, and yet Miller and Walker Creek flow right through it.

R-7-5

I also have a concern that our land use -- parts of our land use element plan that we have adopted or in the process of adopting, definitely any expansion at the City of Sea-Tac, will greatly violate some of those land use elements, and you need to be aware of that.

R-6-34

Also, according to your maps here, the noise contours have decreased, and yet I have a survey here that was conducted April 18, 1995, and the results are this: A large majority of the survey respondents and neighbors both near and distant from the airport have not noticed any reduction in aircraft noise in recent years. Most respondents have noticed an increase in aircraft noise in recent years. Among those respondents many describe the increase as substantial. And yet your noise contour map says the LDN -- 65 LDN is decreasing. I think you need to pay real close attention to the survey and also adjust your maps

accordingly.

R-18-4

I'm also concerned on page 7, you listed runway safety areas, which will affect runway 16L/34R, and it says here that the FAA previously issued a funding grant to the Port, and in order for the -- I assume from this statement the funding grant has already been given to the Port, those dollars have already been given to the Port, but yet this master plan, which is an EIS statement, is still in draft form. How can they accept funding grants from FAA when a draft form of a master plan depicting the increase in those particular runways hasn't even been completed.

R-2-5

I believe seriously that the state needs to be involved in making any kind of decision, especially when it comes to expansion at the City of Seatac, and my advice to whoever drafted this master plan update draft EIS had better pay very close attention to the expert panel, especially when they have drawn conclusions when the Port is not even satisfying reducing the noise level within this area. Thank you.

MR. GALT: Thank you, Ms. Vermeier. Our next speaker will be Rose Clark, who will be followed by Matt Rosenberg and Trina Gould. Ms. Clark.

ROSE CLARK: Thank you. I am Rose Clark. The DEIS assessment of air pollution is totally inadequate. For several years I have been involved in a study of health impacts, specifically cancer. I can tell you that within one mile all around the airport we have documented a couple of hundred cancer deaths. No big deal, right? People everywhere die of cancer? 12 of these deaths are from a brain tumor called glioblastomas. Statistically there should be one in 25,000, not 12 in 60,000. Two deaths are a husband and wife. It silently acts like the fingers of my hand; like tentacles it encloses the brain.

It closes and squeezes the brain, perhaps causing a stroke. Your bloated body, with no muscle control, dies a very painful death. By not implementing regular air quality studies, the FAA has some responsibility for these deaths. By not adequately addressing it in the DEIS, the FAA sets the stage for more deaths in the future. I respectfully... request that the FAA relieve itself of air monitoring responsibilities and seek to assign it to the Environmental Protection Agency. The DEIS inadequately addresses the wetlands. I live right next to the class 1 wetlands immediately west of the airport. It is a very -- it is part of Miller Creek, a very important drainage basin in south King County. Destroying it with fill will be a great loss to the whole community.

R-18-29
R-10-37
R-10-65

It helps our community not one bit to enhance a wetland somewhere else. It's like a blood donation, totally draining my body so someone in another county can live longer. My profit is not readily noticeable to me.

How much attention has been paid to safety? With the exception of the Texas plane crash yesterday, all crashes in the past 12 months have taken place in clear zones in excess of 3 miles from the end of the runway. Since we have no such clear zone, a few years ago a cargo door landed on an elementary school at the north end. Thank goodness it wasn't recess time. This same area under the north flight path was overflown by a burning jet a few years ago. This year a large piece of an airplane body fell onto a tennis court at Mt. Rainier High School, landing one foot from students. Why does not the DEIS address a large clear zone to mitigate this problem? Is it cheaper to bury people... than relocate them? The fill is a problem in a known severe seismic area. This will liquify when an earthquake occurs. Where does the EIS address these seismic problems?

I demand that the final EIS fully address the issues of health, wetlands and safety, as well as the issues of education, fill and the related truck traffic, as well as daily traffic, which are also

R-18-29
R-16-15
R-11-1

woefully, inadequately addressed in this DEIS. Thank you.

MR. GALT: Thank you, Ms. Clark. The next speaker is Matt Rosenberg, who will be followed by Trina Gould. Mr. Rosenberg.

MATT ROSENBERG: Good evening. Good evening. Thank you, sir. My name is Matt Rosenberg. I am here on behalf of the regional commission on airport affairs, an organization, so I'll be taking 5 minutes. It's been nice to see some of my old friends from Chicago from the consulting firm of Landrum & Brown who are here helping to do the draft EIS that justifies the new runway, or attempts to justify the new runway at Sea-Tac. These very nice, very friendly, professional people are some of the same people who have been working very hard for two years to try and add 2 new runways at O'Hare airport in Chicago. This -- is related to an important, overarching point behind the supposed need for the new runway here in Seattle.

R-3-7

In the DEIS it is stated that because of an inevitable increase in regional population of 1 to 2 million people in the next 20 or 30 years, it is therefore also inevitable that there will be another 90 to 100,000 flights per year at Sea-Tac. The Puget Sound Regional Council, a nonelected body, made up of

R-3-15

elected officials from other jurisdictions, has decided in its vision 2020 metropolitan transportation plan that indeed we want to facilitate growth. We want to build more highways, we want to maybe consider a new runway at Sea-Tac, we want to do things, this nonelected body says, to handle the inevitable growth. We want to make Seattle Chicago. We want to make Seattle Los Angeles. This is what the nonelected body that is overseeing the third runway study is really saying.

I would submit there's a fundamental problem here. The people of the region do not want Seattle to become another Chicago. Speaking as someone who has lived in Chicago for many years, I think it would be a terrible shame if Seattle became Chicago or Los Angeles, but by laying out the welcome mat for the supposedly inevitable population increase of 1 or 2 -- million people, we do that. So I think this is a fundamental flaw. The draft EIS also discusses the

R-3-16

need for the project in other terms, saying that because the added flights will come, bad delays will come if the new runway is not built. A couple of points here. No. 1, the delays at Sea-Tac, which are used as a primary justification for the new runway in the draft EIS, are actually very low. According to the

U.S. Department of Transportation, official airport delay statistics at Sea-Tac in the last 2 years, the percentage of flights that were early or on time was 85 percent. 85 percent in 1993, 84 percent in 1994.

Nearly 9 out of every 10 flights are either early or on time. There was also a breakdown of flights early versus flights late. In every case, in every month, the number or the percentage of flights that were early were twice as many as the percentage of flights that were late. So there are some very big distortions occurring with respect to the delay issue. Then there is the issue of load factors. According to the Port of Seattle's master plan, which is the thing that this DEIS is done upon, the larger airplanes flying into Sea-Tac, or flying out of Sea-Tac rather, are 43 percent empty. The smaller planes are 55 percent empty. When one gets into the numbers, as I'm about to do, there's also the "my eyes glaze over" risk factor, but I'm going to go ahead anyway.

The year 2020 demand projection that is in the master plan update, the selected mid-level demand projection is for 19.1 million departing passengers. We have almost that many departing seats right now. There are about 17 million departing seats per year now based on the 1994 level of operations. If simply

R-3-16

R-3-10

another 20 or 25,000 flights were added, which I'm saying we could stand, I'll go out on a limb here -- that would give you another 4 million or so passengers, using just the larger planes, and the year 2020 average seating capacity of 204 seats -- again this is from the master plan update -- that additional 4 million seats added to the current 17 million departing seats would give you 21 million departing seats, 2 million more than the actual demand for the year 2020. There's a heretical notion contained in this. There should be higher load factors. There's a heretical notion that at some point the convenience of the traveler and the elbow room of the traveler and the time of day that the traveler travels has to give way somewhat to the social costs that are borne by the communities.

That leads us to other areas of the draft EIS. It says more flights will equal less noise. In fact, that is not true. There are some other very important points that are glossed over in the draft EIS. There's been tremendous pollution. There were homes that were bulldozed for noise mitigation in the '70s. They've buried them now and the rubble is leaking high level contaminants. That's in here. Finally, please know that this EIS process is a sham. What's most important is that the governor of the state

R-3-10

R-6-1B

can block the new runways under federal law, it's admitted in the EIS. He has to sign off on the air and water pollution. Also know that the draft EIS states that the Seatac City Council must grant the necessary zoning, and they have not yet. The draft EIS also makes it very clear the King County Council has to grant approvals, also. So, you know, the casserole has barely gone in the oven, and when it comes out, it's going to be burnt to a crisp. Thank you.

MR. GALT: Thank you, Mr. Rosenberg. The last preregistered speaker for this evening is Trina Gauld. Ms. Gauld.

TRINA GAULD: Good evening. My name is Trina Gauld, and I'm executive director of Air Washington. We're a statewide coalition of labor, business and concerned citizens in support of adequate air capacity. Thank you very much for the opportunity to testify before you tonight on this important issue to our state. Without question there is a need for expanded airport capacity in the Puget Sound region. Study after study, including flight plan, has confirmed the need for expanded airport capacity in the Puget Sound to accommodate rapid population growth.

For the record, the draft environmental impact does not address off-site alternatives to the

third runway such as a major supplemental airport or expanded air strips elsewhere in the region. After exhaustive study and analysis by the elected officials representing the Puget Sound area communities who make up the Puget Sound Regional Council, that council determined that it was not feasible to site a major supplemental airport in the Puget Sound area. The most sensible cost effective solution for the forseeable future is a new all-weather runway at Sea-Tac. The future for the third runway is clear. Sea-Tac is rapidly approaching its capacity of 380,000 flights per year. The two existing runways are too close together to be used simultaneously for landing during cloudy or bad weather, which occurs 44 percent of the time, and in that weather Sea-Tac's ability to handle flight operations is effectively cut in half. As the number of operations increase over time, delays due bad weather increase exponentially. Aircraft delays and bad weather will more than quadruple over the next two decades. These delays translate into wasted dollars, increased pollution. The additional aircraft operating costs resulting from these delays is estimated to reach about 245 million per year in the next 20 years.

The future of Washington state's economy -- I know this is a regional issue, the third runway, not just a local issue. The future of our economy and quality of life depends on how accessible we are to the world, and that means an air transportation system that operates efficiently and without delay.

The draft environmental impact statement is one of the most comprehensive and detailed ever completed on an airport expansion project. It is technically accurate, objective, and fair. It concludes that there are no major environmental impacts which cannot be mitigated. That is not to say that there are not major impacts, but again the bottom line is they can be mitigated.

Air Washington, we further believe that the 8500-foot runway is the most sensible and cost effective runway length for the long term.

Turning to the issue of noise, noise will actually decrease with or without a third runway because of the success of the Port of Seattle's existing noise reduction programs and the phase-out of noisier stage 2 aircraft. Although no additional noise mitigation is required, the EIS identifies structures which should be insulated because of overflights resulting from the additional runway, we would agree with that, and there are some homes that may need to be purchased at the end of both of the runways.

Turning to the issue of probably one of the greatest environmental impacts that the EIS identifies lies in relocating streams, replacing the 9 to 10 acres of wetland and hauling dirt for use as fill. These are all big impacts. This is a big project, yet again these can be mitigated. Wetlands, for example, can be replaced elsewhere in the lower Green River Valley. Wetland mitigation should not occur near the third runway, because you don't want waterfowl birds or anything like that flying into -- in the close proximity to an active runway.

We've been hearing a lot today and this evening about air quality. I'd like to point out that aircraft operating at Sea-Tac contribute less than about 1 percent of the carbon monoxide emissions within the Puget Sound region. Airport-related emissions are not expected to change significantly with any of the 3 alternatives, the action alternatives.

I want to thank you very much for your time this evening. I want to emphasize again that the region will not have a healthy economy without adequate air capacity. The options have been studied long enough. The EIS indicates there are no major impacts which can't be mitigated. It's now time to move ahead with expansion at Sea-Tac. Thank you.

MR. GALT: Thank us, Ms. Gauld. The first speaker on the walk-in list for this part of the hearing is Lewis Thompson. He will be followed by John Thompson. He will be followed by John Thompson.

LEWIS THOMPSON: Thank you. I'm speaking here based on my own personal interest. I am -- I live with my family of 3 children and wife in the Three Tree Point/Normandy Park area.

The reason I'm here is because of my heartfelt concern for my community. With everything that I've read in the environmental impact statement, the amount of disruption to the community, as I see it, would be enormous. To begin with, the schools that are affected right now by the airport would continue to be affected in a lot more extreme manner. Quality of education is of high importance to us, and -- anyhow, so that's one area.

R-18-29
R-7-9

The other area is in terms of how it affects the actual business district and operating area of this region. With the excessive amount of traffic and construction that would be going on in the area, it would disrupt and halt a lot of the business in the area and have a negative effect for years to come. From a noise point of view, one concern I have is that all the studies I hear are about which houses would

have to be replaced and what not are just -- the noise issue seems to be related only to the houses just under the north and south parts of the airport as opposed to the EIS and west. Where we live, as the airplanes turn around and fire up their reverse thrusters and whatnot, we get a lot of noise coming to the west, and it's my understanding that the value of our property would continue to be jeopardized and compromised by this third runway and increased noise associated with it. In all the publications and what I've seen, there is no consideration given for financial reimbursement for housing except for within a very small zone.

R-18-29
~~R-16-9~~

And then the last part of what I wanted to talk about is in the environmental impact statement on the section on health. They talk about physical and psychological and emotional health, and it has the audacity to go in there and actually try to argue whether or not sleep deprivation is an issue or not. It is an issue. It causes stress, and it even has the audacity to go in there and debate whether or not stress has a detriment on health of the people. These are all very real and important factors that need to be considered, and -- so anyhow, that's where I'm coming from. So in summary, the effects on the community relative to the health of the people, the schools and

R-16-29

just a local issue. The future of our economy and quality of life depends on how accessible we are to the world, and that means an air transportation system that operates efficiently and without delay.

The draft environmental impact statement is one of the most comprehensive and detailed ever completed on an airport expansion project. It is technically accurate, objective, and fair. It concludes that there are no major environmental impacts which cannot be mitigated. That is not to say that there are not major impacts, but again the bottom line is they can be mitigated.

Air Washington, we further believe that the 8500-foot runway is the most sensible and cost effective runway length for the long term.

Turning to the issue of noise, noise will actually decrease with or without a third runway because of the success of the Port of Seattle's existing noise reduction programs and the phase-out of noisier stage 2 aircraft. Although no additional noise mitigation is required, the EIS identifies structures which should be insulated because of overflights resulting from the additional runway, we would agree with that, and there are some homes that may need to be purchased at the end of both of the runways.

Turning to the issue of probably one of the greatest environmental impacts that the EIS identifies lies in relocating streams, replacing the 9 to 10 acres of wetland and hauling dirt for use as fill. These are all big impacts. This is a big project, yet again these can be mitigated. Wetlands, for example, can be replaced elsewhere in the lower Green River Valley. Wetland mitigation should not occur near the third runway, because you don't want waterfowl birds or anything like that flying into -- in the close proximity to an active runway.

We've been hearing a lot today and this evening about air quality. I'd like to point out that aircraft operating at Sea-Tac contribute less than about 1 percent of the carbon monoxide emissions within the Puget Sound region. Airport-related emissions are not expected to change significantly with any of the 3 alternatives, the action alternatives.

I want to thank you very much for your time this evening. I want to emphasize again that the region will not have a healthy economy without adequate air capacity. The options have been studied long enough. The EIS indicates there are no major impacts which can't be mitigated. It's now time to move ahead with expansion at Sea-Tac. Thank you.

MR. GALT: Thank us, Ms. Gauld. The first speaker on the walk-in list for this part of the hearing is Lewis Thompson. He will be followed by John Thompson. He will be followed by John Thompson.

LEWIS THOMPSON: Thank you. I'm speaking here based on my own personal interest. I am -- I live with my family of 3 children and wife in the Three Tree Point/Normandy Park area.

R-18-29
R-7-9

The reason I'm here is because of my heartfelt concern for my community. With everything that I've read in the environmental impact statement, the amount of disruption to the community, as I see it, would be enormous. To begin with, the schools that are affected right now by the airport would continue to be affected in a lot more extreme manner. Quality of education is of high importance to us, and -- anyhow, so that's one area.

The other area is in terms of how it affects the actual business district and operating area of this region. With the excessive amount of traffic and construction that would be going on in the area, it would disrupt and halt a lot of the business in the area and have a negative effect for years to come. From a noise point of view, one concern I have is that all the studies I hear are about which houses would

have to be replaced and what not are just -- the noise issue seems to be related only to the houses just under the north and south parts of the airport as opposed to the EIS and west. Where we live, as the airplanes turn around and fire up their reverse thrusters and whatnot, we get a lot of noise coming to the west, and it's my understanding that the value of our property would continue to be jeopardized and compromised by this third runway and increased noise associated with it. In all the publications and what I've seen, there is no consideration given for financial reimbursement for housing except for within a very small zone.

R-18-29
~~R-16-9~~

And then the last part of what I wanted to talk about is in the environmental impact statement on the section on health. They talk about physical and psychological and emotional health, and it has the audacity to go in there and actually try to argue whether or not sleep deprivation is an issue or not. It is an issue. It causes stress, and it even has the audacity to go in there and debate whether or not stress has a detriment on health of the people. These are all very real and important factors that need to be considered, and -- so anyhow, that's where I'm coming from. So in summary, the effects on the community relative to the health of the people, the schools and

R-16-29

what the schools are trying to do, the business environment and property values all need to be considered. Thank you.

MR. GALT: Thank you, Mr. Thompson. Our next speaker is the other Mr. Thompson, Mr. John Thompson. You might want to pull that Mike a little closer to you if you don't mind, son. Just take ahold of it and yank it over to you. There you go. Go ahead.

JOHN THOMPSON: Well, the thing that I just wanted to -- well, actually, when, you know, when school's going?

MR. GALT: Uh-huh.

R-5-4

JOHN THOMPSON: And the third runway is going, the two things kind of -- if the school's kind of in the north or the west, then you think the kids are learning?

And also, in my church, well, at least about every 5 minutes we hear an airplane really nice and clear. And if this third runway is built, then it will be like -- the noise at my church will be like-- the noise will be increased big time. It will be like -- it will be like an airplane noise about like a lot louder and about every half a minute or so. And all the pollution.

Because all that pollution from the airplanes

could be bad or decreased (sic) from the airplanes could be kind of disastrous, because it like rains down on the air and rains down into the water and goes down into the grass and stuff, so it actually isn't very healthy. And also the noise. The thing that I don't like about the noise is because the thing about my church and the thing about the school and you know when you're going to sleep? The noise could keep you awake, so that's why I vote for no.

MR. GALT: Thank you Mr. Thompson.

(Applause.)

For the record, I will just indicate since age doesn't appear in the transcript, I would guess that the second Mr. Thompson is probably what, 8 or 10?

JOHN THOMPSON: 7.

MR. GALT: 7. Thank you. A young man of 7.

I have nobody else on the walk-in -- yes, I do. Excuse me. I have one more. James Carpenter. Mr. Carpenter? Okay. You're Mr. Carpenter. Then we'll take you next, sir.

MR. CARPENTER: My name is James Carpenter. I live at 16463-6th Avenue Southwest in Burien, which is due west of here about a mile. We lived in the area about 20 years. The second runway was here when we arrived. We realized there was noise. We've been waiting I'd say for the diminishment of the noise to become apparent to us. We like to be out on the yard on beautiful days like this, and frankly I haven't really noticed it. It's still very disturbing, and so I view with some skepticism the idea that this noise it magically going to go away because of improved aircraft engines and less noisy aircraft. It hasn't really worked that way for us.

R-6-1B

I also have some skepticism as to whether more airplanes will make less noise, which is what we've been told, and also I think it's fairly obvious if the airport moves closer to us, we have more of a problem. So I am offering that. I'm a structural engineer, so I don't claim to be an expert on aircraft noise, but I do like to have logic in my presentations that are given to me. ...

I guess the point that I've made is that I live in the area and I'm familiar with how it affects me and my family, and I agree with the other testimony that I think it affects the community at large.

I also as an engineer and a citizen take exception to statements by some organizations in favor of the third runway that say that anybody that's not for it is against a healthy economy for the region. I

think this is one of our biggest mistakes, that people, the powers that be, have decided they're going to go for this third runway. They're leaving the alternative airport to become even more difficult to locate. There's no question it's going to be -- if it's difficult now it's going to be more difficult in 30 years, so I realize it's not on the agenda, but I certainly feel that we're going in the wrong direction both from a business standpoint as well as a health of the community standpoint. Thank you.

MR. GALT: Thank you, Mr. Carpenter. This is Stewart Creighton. Mr. Creighton.

STUART CREIGHTON: Thank you very much. I'm the president of the Regional Commission on Airport Affairs, and I would appreciate the 5-minute window.

MR. GALT: You have it.

STUART CREIGHTON: Thank you very much. I... have some concerns about the DEIS, as most people do that have testified I believe here tonight. My concerns center around what is not in there. I realize it's a comprehensive 2300 page document, but it does not address the issues that are of most importance to the people of my organization, the people of my community, and the greater neighborhood of the Sea-Tac communities. I think that what I would like to do is just identify what I believe are the major points that are not adequately addressed and see where we go from there. The document itself, being as large as it is, I would categorize it as amazing. It's huge. But as each issue or problem is identified, it is immediately converted to a condition that can be mitigated, no matter what comes up, be it water quality, air quality, construction issues, millions upon millions of cubic yards of dirt, noise, creek destruction, wetland destruction, homes, schools, churches, destruction of neighborhoods.

Nothing can stay the Port of the Seattle and the FAA from their appointed rounds. Everything can be fixed. That's one of the issues that makes me a little nervous. There is nothing in this DEIS that recognizes the fact that the people that are living in this greater Seattle, south Seattle, Seatac community are in fact people. They are things to be mitigated. I can bulldoze your house and give you some money and you can go away. I can put your stream in a pipe and send it some place else and you don't have to worry about it. We have in one part of the DEIS it says that because of previous fuel spills Des Moines Creek is almost completely devoid of life at the moment, therefore what we do now doesn't matter, seems to be kind of a

dichotomy there.

We've destroyed your stream; therefore, putting it into a worse condition is not something that matters. If such single-minded determination to fix the problem at Sea-Tac, which is a peak hour, peak day, demand problem, if such single-minded determination were applied to trying to find a method to manage that problem, there wouldn't be a construction DEIS on the table tonight.

It appears to me that this document, the Port of Seattle and the FAA are of a like mind, that if they were Department of Transportation, they would be recommending 12-lane freeways in each direction to fix peak hour, peak demand traffic. That's not what the solutions are called for today, but that's the solution they are offering to a peak hour airliner demand problem.

R-4-7

Also missing is the ability to use any demand or system management tools. Sea-Tac must be one of the most unique airports in the United States, if not the world, because the DEIS indicates that no demand system or congestion pricing techniques or tools would work at Sea-Tac Airport. If there is a congestion pricing technique that works in Boston or New York or Chicago or Atlanta, why wouldn't it work here? Apparently other airports have had the ability to make demand system management tools work.

Slot controls work in high density airport conditions. Seattle, between Boeing Field, Renton field, and Sea-Tac has a higher or equal number of flights to O'Hare Midway, National Dulles, or JFK. Why don't we have a recognition of that density by the FAA? Orange County Airport has recognition that there are a certain number of flight operations that are allowed annually at that airport. Why can't we have that here?

FAA at San Francisco has a test condition going on called managed arrival. They are getting approximately a 10 percent increase in flights and have been since January of this year. There is no recognition or comment in our DEIS that a technique such as this might work. It is not even mentioned in the DEIS.

R-4-7

The last thing I guess I would make a comment on is the DEIS asks me to believe that 90,000 planes a year addition additionally flying over my head will make less noise. There is a complete illogic to that particular comment. Thank you.

R-4-1B

MR. GALT: Thank you, Mr. Creighton. Is there anybody present this evening who has not

previously spoken or signed up who would like to offer testimony at this time? I see a hand up back over here. We'll take this gentleman. Did you have your hand up? You'll follow him then, sir. And then we'll take the lady over there as the third. When those 3 are done, I'll ask if there's anybody else. For you 3, if you would begin -- if you don't have one of those salmon cards with you, if you'd begin by giving us your name, help us spell your last name and then your address, please.

BEN STARK: My name is Ben Stark, my address is 1310 South 230th Street, Des Moines, Washington. I believe that aircraft noise that affects the people of this community and the overflights are an invasion of our private property rights and our liberties as citizens of this country.

R-5-4

Soundproofing our homes, as the EIS claims, is not mitigation, it's trying to rectify damage that the Port has done to these homes already. Requiring people to sign a navigation easement to offset the damage done by the Port is a further deprivation of the private property rights of the owners of the homes. This simply does not mitigate the damage that's being done. There is no way that they can mitigate moving people from their homes, destroying the homes in this

R-4-7

community, destroying the schools and the damage that this thing is doing, but some mitigation could be done if they eliminated all night flights at Sea-Tac Airport. It's been done in other airports, and it could be done here.

Also, steps could be taken to eliminate all cargo flights at Sea-Tac Airport. If it's so important to serve the passengers, instead of asking the people of this community to sacrifice, they can move the cargo flights somewhere else. That's just a couple of comments. I could go on all night. I could tell you about how when my son came to visit us, he insisted on sleeping under the table because of noise. He was afraid in our house.

MR. GALT: Thank you, Mr. Stark. You're next, sir.

AL FURNEY: Good evening.

MR. GALT: Good evening.

AL FURNEY: Thank you. My name is Al Furney. I reside at 24718 Marine View Drive South in the city of Des Moines. I won't spend a lot of time here. There have obviously been a lot of comments already issued by many members of the concerned public here.

A couple points that I just recorded during

the few minutes that I've been here this evening. Ms. Trina Gauld from Air Washington testifies that labor, business, and concerned citizens have brought forth this proposed expansion of Sea-Tac Airport. I have been following this issue for probably 2 years fairly closely, and to my knowledge I'm not aware of a single citizen that's come forth in support of this project and testified at a public hearing. Now, that may very well have occurred, but I would be hard-pressed to find one that I couldn't directly correlate to a party that's directly financed by the Port of Seattle or a lobbying interest.

I'd note for the record that Air Washington is a paid lobbying group, having been paid by the Port of Seattle, one of the two proponents of two proponents along with the FAA in this project. The impartiality that is needed to conduct a comprehensive land use planning decision of this magnitude certainly needs a degree of impartiality, and after reviewing the public disclosure filings of various political lobbying interests that have been involved in this effort causes me great concern about the impartial amount of the parties that are pushing this project.

R-3-11

Population increases in this area which the PSRC project up to 1 and a half million newcomers to

R-3-11

the northwest region don't fit in line with the Growth Management Act and the requirements that are being imposed by local zoning ordinances regarding growth and community development, including the Growth Management Act, and cause me to have serious concerns about the projected increase in passenger traffic into Sea-Tac Airport.

I guess one of my main concerns -- I have many -- and this one hasn't been brought up, and that is what is being proposed here. When we had the initial scoping comments for this project, the FAA regional manager, Eric Edward Tatum and William Brower, described this proposed action as, one, updating a master plan for Seattle-Tacoma International Airport, possibly to include a new parallel runway, or as developing a new runway at Sea-Tac International Airport, or 3, addressing the bad weather capacity ... problem at Sea-Tac Airport, or meeting the long-term regional air travel needs, or as a new parallel runway and improvements to the passenger terminal, or other airport developments.

I think there is serious confusion in the minds of all parties, including the public, which are probably the party that needs to be most influential this this process as to what is the proposed project

R-4-2

and what are the alternatives. There's been discussion of bad weather delays. I think further scrutiny into the EIS needs to occur on that issue.

The future of our economy does not require an additional runway. I would concur with the previous speaker that there are probably additional economic benefits to the commercial and residential areas located in the vicinity of Sea-Tac Airport without an additional runway.

R-6-8

I do not believe that the noise will decrease given increased flights. A professional engineer recently discovered that the Port's hay-weighted (phonetic) noise metric only reported about 7 percent of the noise that was being produced at a local church located in south King County where noise measurements from aircraft were being taken. We believe the Port's noise contours are shrinking faster than the Port's ... credibility. That's about all I have. I'll be submitting a number of lenthy comments, technical comments, in response to this request for input. Thank you.

MR. GALT: Thank you, Mr. Furney. The lady back over here?

KATHY PARKER: Hi. Kathy Parker, Seahurst. Excuse me. Having followed this issue since 1988, I would typically have prepared a statement tonight backed up by lots of facts and data, but whenever I've been at a hearing which has been hosted by the Port or the FAA or anyone affiliated with them, I've never really been listened to, so I did not take the time or the trouble to do that this evening. However, I do have 3 comments.

I think it's appalling if the Port and the FAA okay a billion dollar band-aid solution when Paine Field sits empty, able to take a hundred thousand more jet aircraft a year, stated by the FAA. That's an appalling statement. That's an appalling fact that we taxpayers find irreprehensible.

R-4-4

The second comment is, I don't know how the FAA or the Port of Seattle could condone 2500 trucks on I-5 and 405 carrying dirt for over 2 and a half years, 16 hours a day, 6 days a week when we are absolutely... deadlocked every day on those roads. That is just incredible decision making, and as a taxpayer and a native of this King County, I'm appalled at that part of this whole mess, too.

R-12-11

My third comment is how they can even consider impacting seriously environmentally healthwise, socialwise over a hundred thousand people directly under their flight paths is also something

that is absolutely unbelievable to me, and I think this is the reason why citizens today, citizens like myself, mainstream America, are absolutely sick of government decisions, they're sick of government spending, that's why they voted in 601, and that's why they are absolutely fed up. If this charade is allowed to continue, it's just one more example of government mess. Thank you.

(Applause.)

MR. GALT: Thank you, Ms. Parker. Could you leave the salmon card, please? Thank you.

Is there anybody else who has not testified today who would like to do so? Yes, ma'am. I didn't fill out a card because I wasn't going to do this, but my name is Marilyn Ayres, and I live at 728 South 231st Street in Des Moines, Washington.

I've spent the last several hours going back and forth between this room and the video room across the hall trying to piece things together. I haven't had an opportunity to read the full document. However, I did get some information from there that I would like to bring to your attention.

The assumptions of the level of service based on the charts over there for the year 2020 show the RTA being in place, 509 finished, and the south access to

R-9-3

R-9-23

R-9-15

the airport being open. They also told me as of today, the representatives in the room next door very kindly were telling me, that 509 has not been funded. We failed the RTA when it came up to the voters recently.

The assumptions must be made for studies; however, what I didn't find over there in information and could only be referred to appendices to the draft EIS is what happens between the year 2000 when supposedly the construction is under way and 2020 with those supposed improvements of 509 being finished, the RTA being in place and the south access to the airport being open to the traffic circulation around the airport, based on the number of truck trips to bring the fill dirt in, based on the number of increased passengers of -- how much is it, another 80,000 or 82 percent more passengers coming to and from the airport?

With levels of service for at least 4 or 5 of the major intersections serving the airport being at level D or E now, meaning they need to be relieved. Up until the completion, how much of this construction will add to the traffic to and from the airport now? I looked at several intersections that I thought I would like to bring to your attention, if I can quickly find them for you. South 170th and Highway 99 is at a level

R-9-12

D now. It's predicted to be at a level F in 2020. What happens during construction? How are all these people it who are grid locked on I-5 now, 405, Highway 99, Highway 509, which is impacted by the improvements to the First Avenue South Bridge, supposed to get to and from the airport. How is the fill dirt going to be brought up from the Duwamish waterway to the airport, from the fill dirt that is being proposed to be brought over from Maury Island, I think it's Lone Star pit? I was told there's a proposal to put in a rail spur from the Duwamish to the airport to bring this fill dirt in. Well, that would mean more construction, and indeed more traffic on our streets.

This doesn't go at all into the problems of what additional air quality that these impacted intersections would have with additional idling of traffic along our freeways and our access roads to the airport.

That's all I had time really to get into with looking at the charts over there. I hope to be able to read further and maybe make more comment if I think of anything else I'd like to bring to your attention, but I felt that it wasn't addressing the interim time at all in the report except for appendices O and I if anybody in the room or who reads this wants to look up what might happen in the years intervening between existing and the 2020 as shown. Thank you.

MR. GALT: Thank you, Ms. Ayres. Is there anybody else who has not testified who would like to do so? The record will show there is not. We are committed to be here until 10:00 because the hearing was advertised to extend to that hour tonight, and we do not have anybody signed up as a preregistered speaker for the 9:00 hour, and so what I am going to do is recess the hearing on-call.

I and the court reporters will basically, to put it colloquially, hang around, and if people show up who would like to testify, I'll call the hearing back to order, and we'll take that person or person's testimony. So we will be here until 10. At about 5 minutes of 10 I'll reconvene the hearing for one last time, and then we'll close at 10. Thank you very much for your participation. We are at recess on-call.

(Recess.)

MR. GALT: We're reconvening our hearing at 9:38. We have a gentleman who has come in and would like to offer testimony. If you'd begin by giving your name, spell your last name to help the clerk and then give your address, please.

SPEAKER: My name is Carey Tinker, I live at

15829 9th Avenue South, and I've lived here -- lived at the airport pretty much all my life, and I've seen the construction they've done in the past -- for the last 30 years I've seen the construction, and I believe that they already have pretty much the dirt that they need already, and I think that what could be done is-- I've been told that they want to buy out further north than what the runway is already on the west side, and they want to buy out that bigger slope area. The landfill area could be filled into the hole down there by 12th Avenue, and then the other parts, other pieces of land, like over by the farm and that area could be brought in -- dirt from there could be brought in as well as from the other places that have been proposed that they've had ideas for, and what they could do is take -- they need to do it step by step instead of making one big project.

R-11-2

They could take all the land they have right now from Des Moines Way to the fenceline they have and flatten that area out, just make it straight across, not at any kind of hill, little slope hill or anything but just straight across to the -- as far as they can and push it into the ground or push it into the hillside to the width area and make it at a steep 45-degree, angle and then after they've got all that area, then see where they are, instead of just thinking that they need that much dirt.

They should put in -- they should straighten out -- flatten out below and make that -- leave that environmental area, just leave it alone, just don't do nothing with it, leave it for the wildlife and the birds and everything to let it grow back like they've let 12th Avenue grow back already, let it just keep on growing back and whatever is still living down there, leave Miller's Creek alone, they don't need to bother with that, they just need to push everything up into the area-- up towards 12th Avenue and then see where they need to put more dirt, because I feel what they're doing right now is they're trying to get too big of a -- they're thinking too far ahead.

They need to take it, put it in there and then see how much dirt they need, and if it's still too much dirt, they could -- and the 45-degree angle is not good enough, just like they have on the northeast side, they could do the same thing on the northwest side with that big, huge wall. It might be larger and everything, but if they keep on filling in as close as they can, they won't have to have 150 feet or whatever high wall, they'll just have the excess of whatever they need left to make that wall.

R-11-2

And when you've got a wall blocking -- when you've got a wall blocking straight up, it blocks the noise from all the planes taking off than it would from that slope. The slope that comes down, the noise comes off those planes and just slopes down into -- down below. But if you have a wall, it will block all that noise down below for those apartments on the other side of Des Moines Way. And as you're cramping that area, you just got to do it step by step, just put it all up in there and then see where you're at. And then if you need it, if you need it, you can either bring a little bit more in -- and you probably won't be needing 23 million cubic yards, you'll probably just need half that, if not a third of that, to finish off the rest of it. Because you just need to do the step of filling in -- first from where you got the high spots, fill it into the low spots, straightening out from, say, Des... Moines Way in towards -- as close as you can towards 12th Avenue and then making that 45-degree slant going straight up. And then to make it as level as you can -- to make it level with the rest of the runways. And then if you need some more, then see where you're at and get more dirt because I think you're just trying to get too much dirt and you don't really know where you're at.

MR. GALT: Thank you, Mr. Tinker. We will again stand at recess on-call pending somebody's desire to testify.

(Recess.)

MR. GALT: Give us your name, spell your last name and give us your address and then we'll give you three or four minutes of comment time. We'll reconvene. Officially at this time we have another person who would like to offer some testimony.

JANE TINKER: Jane Tinker, and I have a very nice house -- 15829 - Ninth South, and I hope to retire in the next year, and I have a very nice house on Miller's Creek, and I'm -- from looking at the way things are, I'm afraid that you would not be able to find me a comparable place to retire.

MR. GALT: Okay.

JANE TINKER: I think there's very few, very nice houses on creeks anywhere.

MR. GALT: Thank you. What community is that?

JANE TINKER: Sunnydale.

MR. GALT: I was just thinking for them on the mailing address.

JANE TINKER: Actually it's Seatac.

MR. GALT: Seatac? Okay. Thank you very

much, Mrs. Tinker. We will again stand at recess on-call.

(Recess.)

MR. GALT: It is now 10:05 p.m., we have had no persons come in since Mrs. Tinker desiring to testify. It is past the time that we had committed to remain here this evening and therefore I officially close the hearing for Thursday, June 1, 1995.

(Hearing adjourned at 10:05 p.m.)

CERTIFICATE

I, KAREN L. LARSEN, RPR, do hereby certify that the foregoing proceedings were stenographically reported by me and that this transcript was prepared by me and is a true, complete, and accurate transcription of same to the best of my ability.

Signed this 2ND day of June 1995

Karen L Larsen

Notary Public in and for the
State of Washington, residing
at Seattle. Commission expires
January 21, 1998. CSR LARSEKL637B7

I, TONI L. CHRISTY, RPR, do hereby certify that the foregoing proceedings were stenographically reported by me and that this transcript was prepared by me and is a true, complete, and accurate transcription of same to the best of my ability.

Signed this 2nd day of June 1995.

Toni L. Christy

Notary Public in and for the
State of Washington, residing
at Seattle. Commission expires
January 21, 1996. CSR CHRISTL408NM.

COPY

FEDERAL AVIATION ADMINISTRATION
and
PORT OF SEATTLE

PUBLIC HEARING ON

DRAFT ENVIRONMENTAL IMPACT STATEMENT
FOR PROPOSED MASTER PLAN UPDATE
SEATTLE-TACOMA INTERNATIONAL AIRPORT

Volume 2, Pages 216 - 272

Moderator: JOHN GALT

Hearing at: Calvary Lutheran Church
320th Street
Federal Way, Washington

Date: June 14, 1995

Reported by: Karen L. Larsen, RPR CSR# LARSEKL637B7
Toni L. Christy, RPR CSR #CHRISTL408NM.

MR. GALT: Good evening. Our hearing will come to order at this time. It's now 6 p.m. On behalf of the Federal Aviation Administration and the Port of Seattle, I welcome you to the June 14th public hearing regarding the draft EIS for the Seattle-Tacoma International Airport proposed master plan update.

I'm John Galt, the moderator for tonight's hearing. I've been retained to moderate this hearing expressly because I don't work for the FAA, the Port, or any of their consultants, and I have no role in the decision-making process for this project. We want to thank Calvary Lutheran Church in Federal Way for offering its facility for our use for this hearing tonight, and we want to emphasize to you and for the record that the church obviously has no position in this matter whatsoever. They're just allowing us to use the facility so that you can come and speak on this subject.

If you would like to testify during the hearing and have not signed up to do so, please be sure to sign up on the sheet at the entrance to the hearing room and pick up one of the yellow witness cards.

Mary Vigilante of the study team would like to open our proceedings with a few brief comments tonight. Mary.

MARY VIGILANTE: Thank you, John.

I'd like to thank those attending tonight for coming to the seccnd public hearing on the draft environmental impact statement for the master plan Sea-Tac Airport. As the project manager for the team preparing the draft EIS, we scheduled this second hearing in response to Congressman Tate, who requested that we hold a hearing in his district to provide the residents with an opportunity to testify in regards to the draft environmental impact statement.

Tonight's hearing has been structured slightly different from the June 1st hearing, where we are just enabling a resident to come in and provide testimony. We do have a few display boards in the lobby of the church where people can see the types of material that we had available at the June 1st hearing. At the June 1st hearing, I did submit copies of the display boards and so they are already on record in the hearing transcript. Thank you.

MR. GALT: Thank you, Mary. The first half of this hour will be for those who have preregistered to testify, the second half will be for those who are walking in tonight and signing up to speak. The printed instructions which are available on the table outside the hearing room explain that members of the public will be allocated three minutes each and persons representing groups or elected officials will be allocated five minutes each.

Transferance of testimony time is not allowed, individuals generally speaking are not allowed to trade speaking slots; however, if somebody is not here and the next speaker is, then I will take them out of order for the convenience of those who are here. When I call your name, please come to the front of the room and be seated in the chair that's opposite me so it will be easy for you to speak into the microphone.

The court reporters to my right are transcribing the proceedings tonight. It is their written transcript which will be available to the study team and used in the preparation of the final EIS. Please help the court reporters by speaking clearly and not too speedily.

Part of my job is to ensure that as many of you as possible have the opportunity to present oral comments on the draft EIS. I will be fairly strictly following the time guidelines that the Port and the FAA have issued for this proceeding.

I have a little sign that if you're getting close to the end of your allotted time I'll hold up so you can see it. This reminds you you've got about a

half a minute to go, and then if for some unforeseen reason you actually run over, I have the big red zeros that I will hold up to let you know your time is up. If I do show you the red zeros, please wrap up your comments as promptly as you can.

If you don't speak tonight, if you have a lot of detailed or technical comments, or if three to five minutes is just simply too short a period of time in which for you to make the points that you want to bring out, please be assured that written comments are just as valuable as oral testimony.

Comment sheets are available outside in the narthex area that you can use. You obviously can also just simply write letters if you would rather do that. The address to mail the comments to is printed on the bottom of the form as well as the deadline date of August 3rd. Please be sure that if you send any written comments, that they are mailed far enough in advance to get to the FAA by August 3rd.

If you would like to, you may leave written comments with me; for example, if you have a written prepared statement that you're going to be reading from or reading excerpts from tonight, please feel free to leave that with us and we will make it part of the record. If you have comment sheets there is a big cardboard box out there on one of the tables that says "comment sheets," you can drop the comments in there as well.

I'm going to call three names at a time to speed the process along. The first name I call will be obviously for the next speaker, and then I will call two names after that, and using a baseball analogy, those people will be on the on-deck circle and can prepare their thoughts and be ready to come forward when I call their name.

The first of the preregistered speakers this evening is Jack Dolvey, who will then be followed by Hope Elder and Joe Millsaps. Mr. Dolvey.

JACK DOLVEY: Thank you. My name is Jack Dolvey, and I reside at 917 South 294th Place, Federal Way, and I'm on the Federal Way City Council.

As I've been reviewing this information on the third runway project, I've been conducting a calling program in the City of Federal Way. I call people regularly and ask them what their views are on this project, and as I've been calling them I've been finding that the constituents in Federal Way are running between 60 and 70 percent against this project. And as a representative I have to then come forward and express my concern and opposition to this.

R-5-2

What I'm finding is that people are concerned that the studies that have been done on noise and the amount of planes that are flying over seem to not cover the whole city of Federal Way. People are concerned that the amount of aircraft that would be coming from this third runway will impact Federal Way greatly, that the quality of life which will many people have moved to Federal Way for because it is a nice suburban area to live will be affected and, therefore, with the amount of noise and congestion that the property values will go down, therefore, making it not a place that they want to live.

R-12-11

There's concerns about the amount of materials that are going to be transported. We look and see that there's, depending on who you talk to, 700 to 2300 hundred trips a day of materials being moved. There's a lot of concern about what that's going to to do infrastructure and the congestion. Right now in our city we're improving Highway 99 and 348th, and it's a major bottle neck. People are concerned that this will continue and impact Federal Way when these trucks start to move and bring materials.

And as a representative of the city of Federal Way, and from the impact or input that I'm getting from my constituents, I need to go on record that I'll do what I can as an elected official to make sure that we stop this project. I think that the Port and the FAA needs to make sure that they do more studies, check and see what the impact will be with my constituents from south of 304th and be prepared to have a lot of opposition. And I want to make sure I go on record that I'll do all I can in my elected position to fight this project. Thank you.

MR. GALT: Thank you, Mr. Dolvey. The next speaker is Hope Elder, who will then be followed by Joe Millsaps and Chris Vance. Ms. Elder.

HOPE ELDER: Good evening. I'm Hope Elder. I live at 30105 Second Place Southwest, Federal Way. I am a member of the city council of Federal Way. We appreciate the efforts of Congressman Randy Tate and the extension of the comment period of the EIS for this project and extend our thanks.

R-5-4

The addition a new runway will result in devastating results to Federal Way. Federal Way's proximity to the Seattle-Tacoma International Airport introduces many problems in relation to the health, welfare and economy of our residents. The noise, disruption of community planning and reducing property values are just a few of our concerns.

Aircraft noise has become increasingly worse

R-5-4

due to the increased number of flights and the shifting of the four-post plan. Another runway would make a bad situation nearly intolerable. Aircraft noise not only disrupts area residents' sleep, it also affects mental health, disrupts learning and interrupts enjoyment of our outdoor environments associated with homes, businesses and public facilities. The sunrise service on Easter Sunday is also a good example. We wait many times while the airplanes are going over. Increased aircraft noise will make our area less desirable for economic growth. When a desirable, livable environment is destroyed, economic growth also disappears.

Federal Way is proud of our quality schools, affordable housing and competitive commercial property. We urge careful consideration of our values. On April 2nd, 1992, our council passed a resolution in opposition to the third runway, and certainly there has not been significant investigations

R-5-2

to alter this decision. The EIS is conspicuous in its absence in the lack of meaningful evaluation of impacts beyond the immediate airport area. Federal Way is directly impacted but has not been duly considered.

According to our information, it will take 13 Kingdomes of fill dirt to complete this project. The amount of traffic involved, the amount of trucks, the noise and the pollution is just not considerable.

MR. GALT: Thank you, Ms. Elder. Try and ignore the PA system out in the hall. We think we're picking up somebody using a portable microphone in a restaurant or store or something down the block, because every so often they come on and tell you there are a few more minutes left for the half price sale, so it is not coming from here and not from the church.

Our next speaker is going to be Joe Millsaps, who will then be follow by Chris Vance and Gary Towe, I believe it would be. Mr. Millsaps.

JOE MILLSAPS: Thank you. My name is Joe Millsaps. I live at 3815 Monterey Place Northeast in Renton.

I work with John Graham Associates, an architectural engineering firm in Seattle. We were established in 1900 so we've been in the Seattle area for 95 years through a lot of the time. We're active with Air Washington, a state-wide coalition in support of expanded airport capacity. Obviously I'm here in support of the third runway, and I'm here, as my firm is, in the feeling that the environmental impact study, from our understanding, seems valid and, from our experience, standard in its coverage. Seattle's economy is based by and large on transportation, be it

goods in and out of the city or people in and through the city. Last year traffic at the airport increased 12 percent over previous years. This year it's already increased 13 percent.

I feel that there's not many people that would disagree with the fact that something does need to happen to account for the expanded usage of the airport. It becomes a situation where you fix something now or do you wait until it's broken and spend a lot more to fix it?

A lot of talk has been going on about the inconvenience that's going to be brought about by this action and there will be. A person would be crazy not to admit there will be inconveniences in a project of this size. I guess the question is, that weighed against the good that it will do in the long run for Seattle and all the communities, Federal Way included, around it with the added revenues and income that a project like this would bring.

The state's major industries rely heavily on the export and import of parts and supplies, and this project alone would add approximately 2.8 billion in annual personal income, 17 billion in business revenue, and over 400 million a year in state and local taxes for over the next 25-year period, which is a rather hefty, I guess, for lack of a better word, hefty chunk of change for the area.

One in five jobs in the area are tied to international trade. With "Fortune" magazine's article recently in November '92 stating Seattle is the number one city for businesses, one of the big reasons is what makes an international city, the ability to leave it fast, in and out of the airport. In my travels with the architectural firm I'm with, even though it is a small microcosm, we do find ouselves channelling our flights to chose one or two airports over another one due to the ease of getting in and getting out, how long do we have to wait, stuff like that.

With the environmental impact study, one of the major problems that I've heard people voice would be the noise problem. Again, relying on the belief that the study is valid, and we feel it is, there would be a small increase in noise over a do-nothing approach at this time, but in the long run, which you combine the Port of Seattle's noise abatement programs with the phasing out of stage 2 aircraft, which are the older, much noisier, there would be a, from what I've seen, a worse case even noise problem when you look at it down the road.

The aircraft operating out of Sea-Tac,

another problem I've heard is the pollution. They contribute roughly 1 percent to the total pollution involved in the area, and as with the noise getting less on the newer aircraft, so goes, in most cases, the engines now are putting out less pollution than they were before. And these things, again, just keep getting better because no one is denying the fact that if you throw 12 aircraft into where you had 6 before there's going to be more of whatever they produce. That's why it brings ahead the issues of what can we do to cut down on the pollution, because it's a given we do need these other aircraft.

I would say in conclusion that all things said and done, there are valid points I feel on both sides of the argument. We stand behind the environmental impact statement 100 percent and feel that this has been going on for quite a long time. The longer we wait, the closer we're going to get to the point where the airport is not approaching its maximum capabilities, it will be there, and at that point it's almost too late, then you're playing catch-up from then on. We feel it's time to look at it realistically in the long run and get things started and go ahead with the project. Thank you.

MR. GALT: Thank you, Mr. Millsaps. The next speaker will be Chris Vance, who will then be followed by Gary Towe and Elizabeth Springer. Mr. Vance.

CHRIS VANCE: Thank you. My name is Chris Vance, Metropolitan King County Council member representing District 13. Would you like my home address?

MR. GALT: No, you're preregistered. That's not necessary. Thank you.

CHRIS VANCE: I want to thank you on the opportunity to comment on the draft environmental impact statement proposed master plan update for the Seattle-Tacoma Airport. As the elected member of the King County Council representing many of the communities surrounding Settle-Tacoma Airport, I know the devastating impact a third runway at Sea-Tac would have upon the lives of those citizens I represent.

These are real people. They have real concerns about what a third runway at Seattle-Tacoma Airport would mean to the future of their families and the future of their communities. And they have very legitimate concerns and complaints about the process in general and this DEIS in particular.

As such, I urge you to take your comments and my comments and others in this community seriously and recommend you address our concerns and work diligently

to correct this document's many flaws. For example, the DEIS ignores the fact that the Port and the FAA have articulated unduly narrow purpose and need for the proposed airport expansion. The study erroneously assumes the "do-nothing, no-build alternative" would have many of the same major environmental affects as the "with project alternatives." And most important, the conclusions completely ignore the potential impact of work being done by the expert arbitration panel on noise and demands its management issues and how it may affect the Port's authority to proceed with the expansion project.

R-4-1

R-3-7

R-2-5

However, as a member of the Puget Sound Regional Council's executive board, I want to focus my testimony primarily on the DEIS inadequate analysis of potential alternatives of building a third runway. And as the chairman of the County Council's growth management committee, one of my responsibilities is looking at environmental impact statements, and I know that they have to focus on possible alternatives to projects. So in short, it is improper for the DEIS to simply dismiss all other potential alternatives to solving the Puget Sound region's air transportation needs and focus solely on a 7,000 to 8,500-foot third runway as the solution.

R-4-1

The fact is other options such as building a second major airport, instituting reduced set ratio requirements or diverting commuter and general aviation flights to other areas are not only available, they can potentially be better solutions for both the short and long term. As such, all should have been studied by the DEIS. State and federal law, as I know only too well, requires a "reasonably detailed analysis of a reasonable number and range of on-site and off-site alternatives."

R-4-4

Along these lines, the key point I want to make is the PSRC itself identified a number of adequate sites for a second major airport in the western Washington area in their major supplemental airport study. In fact, those recommendations were endorsed both by the consultant that the Puget Sound Regional Council hired for his expertise in this area and by a vote at the Puget Sound Regional Council's growth management and transportation policy boards on Septembeer 8th, 1994, and I've included for the record the recommendation from those policy boards to the executive board and a lot of the history on the study which I'd like to be part of the official record.

However, the study was then abruptly terminated by the PSRC executive board, of which I am a

member, for absolutely no other reason than pure political NIMBYism and a lack of political will to continue with the study and not for any objective empirical factors relating to those sites. Those sites should have continued to be studied, and I think the law would require that as a local governmental entity the PSRC identify them as potential alternatives to the third runway. I don't see how the EIS cannot look at those as possible alternatives to this project.

R-4-1

It should be the job of the DEIS to examine with impartiality all of the alternatives to addressing the alleged needs of the region's increased air capacity, not just simply dismissing them and concentrating solely on the third runway alternatives. Thank you. I'll turn this in.

MR. GALT: Thank you, Mr. Vance. The next speaker is going to be Gary Towe, who will be followed by Elizabeth Springer and then Roy Wiberg. Mr. Towe.

GARY TOWE: Gary Towe.

MR. GALT: I'm sorry.

GARY TOWE: That's all right, I'm used to it. Council member of the city of Des Moines.

R-5-3

I think that the DEIS fails to adequately address and acknowledge and incorporate the cumulative environmental impacts of the several other major projects that are either approved or planned for the same region. The federal detention center, the south access road, airport hotel, Des Moines Creek biotechnology campus and 509 are all projects that are reasonably foreseeable in this same geographic region, yet they're all being treated as separate, independent projects.

The fact is each of these projects has incremental and significant impacts to the environment and to the area in terms of traffic, noise, surface water management issues, and they should all be taken in in cumulative fashion and taken a look at what the long-term cumulative environmental impacts of all of these projects are. The third runway is the latest in a series of developments and should adequately build on the other impacts that will be foreseen as a result of these other projects.

R-5-3

I also think the draft EIS falls short of adequately analyzing the on-site and off-site options, they too quickly dismiss the "do-nothing" alternative. The major supplemental airport studies that have been mentioned was cut short not for any technical reasons but for political reasons and is still worth further study. They failed to adequately study demand and system management and they've simply locked on to

R-4-1

R-4-4

R-4-7

degrees of airport expansion, which I think fall short of what the real value of the environmental impact statement is, and that is to take a look at what alternatives might be available and have an objective analysis and discussion, debate, as to what the best option really is and adequately address what can really be expected for the total environmental impacts, not only of this project but taken in conjunction with the other development in this area as well. Thank you.

MR. GALT: Thank you, Mr. Towe. The next speaker is Elizabeth Springer, who will then be followed by Roy Wiberg. Is Ms. Springer here? Ms. Springer is not here. Is Mr. Wiberg here? So you mind speaking early?

ROY WIBERG: No, not at all. I didn't know if I was going to even get a chance to speak, the way the thing was set up.

MR. GALT: Wait until you come on up here and get seated.

ROY WIBERG: You're not timing this three-minutes, are you?

MR. GALT: That's why I want you to have a seat.

ROY WIBERT: You mean you got an eject?

MR. GALT: Mr. Wiberg.

MR. WIBERG: No, I'm not going to bring anything new before the group, but the thing that's always concerned me, one of the major things, has been from the very start when Temple Johnson initiated -- the FAA initiated the four-post plan over the city of Federal Way, and even before the paper -- or even before anybody was able to take any measurements. And I know the airport doesn't take measurements down in Federal Way, but the next day's paper, Temple Johnson was claiming a tremendous success with the four-post plan, that there was no impact -- or no change in the impact on the city of Federal Way.

R-5-4

And actually I've been measuring it for 20-some years, but especially in the last five years, and the impact on Federal Way at that time was like three noisy planes of low elevation, or 5 a month. When they initiated the four-post plan, it was up to over ten a day, which was almost -- almost 300 times as much noise. That would be a 30,000 percent increase in noise. And then he said there was no significant impact, and I would even think that 100 percent increase would be significant, but that's worried me the whole time.

R-6-11

The other has been this sound information bulletin that comes out every week saying that things

R-6-11

are getting better and they're going more stage 3 instead of stage 2, and we haven't found any difference in the noise between the stage 2 and stage 3 in Federal Way, and the situation has gotten worse.

R-6-1A

And also -- this is just on takeoff noise, but also the return to Sea-Tac noise has gotten much worse because instead of flying down the I-5 corridor it flies all over Federal Way, so that noise has gotten -- and I'm just concerned about the measurement of noise by the group that's doing it. I have worked on water pollution, air pollution, noise pollution for large companies, and we were able to solve their problems.

R-6-21

I got two other points that I wanted to really hit on again tonight, and one was there's so many things they left out on the environmental part of the impact. Sea-Tac impacts us a great deal, Boeing a little bit less. Tacoma's airport over there where the people fly from Tacoma to Bellevue to go to work impacts Federal Way, and then also McChord impacts. All of these are disconnected, even though they're federal, state or city contributions to the overall problem, but this isn't handled that way as far as the environmental impact by the Port's measurements.

The other thing is the one that I think

Councilman Doug spoke on was -- no, it was this other fellow that talked so fast. He said that decisions or alternatives were chosen that were viable, and I think that same way. I believe that the money has been spent at Paine Field, the landing field is there, and they could use that right-of-way instead of waiting five years to get this other thing built and everything and come up with a more economical system, because everything the City of Seattle does, or the Port, they think the federal government's got endless money to sink into anything, and I think they're just giving them a poorly designed or projected project in the expansion at Sea-Tac.

R-4-4

MR. GALT: Thank you, Mr. Wiberg. The next speaker is Jerry Graham. Is Mr. Graham here?

MR. GRAHAM: Yes. Thank you. My name is Jerry Graham and I would like to emphasize that I'm here on behalf of a resident in the Federal Way area. I wear several hats, and I want to be sure that I'm not represented as being -- representing my company, the company I work for and/or the positions or boards that I might sit on or be involved in.

I've lived in the area for 26 years, built my house out here, built it in Federal Way to get some rural benefits, at the same time have some urban access

to services and shopping and likewise, the airport, et cetera, those types of things. I've been pleased with it, I've been happy with it. I live in a pattern that is east of I-5 where the four-post flies over.

I enjoy working in the garden, and I think that over all as I read the summary of the EIS, one of the things it does address is the noise issue. I have heard quieter planes, I work many hours out in the garden when I have the time and there are quieter planes and I appreciate that. Four-post is I think something that should separately be addressed, continued to be looked at by the FAA. But with reference to the EIS, I think there is one area that is missing there and that is the affect of any business when they're restricted to be competitive.

That is to say, that the airport is not able to be competitive because they don't -- the other airports have advantages where they don't, and that potential loss of business and affect on the economy in the area isn't addressed. I don't know whether it's something because it isn't measurable or exactly what, but, as any business, if you're not competitive and you have a competitor that has an advantage over you, you stand to lose business.

R-8-21

I know there are about 1,900 people working at the airport that live in the Federal Way area, and those are jobs that are direct jobs, not indirect, and I'm sure there are a lot of other support jobs. I would be concerned about the economic loss to the community if the airport were not continued to be able to be competitive by adding a third runway, by enlarging the terminals, et cetera.

R-4-21

I enjoy Federal Way. I have to stop when the planes -- when some of the planes fly over, other quieter ones not as much, when I'm outside talking, but I'm here for a reason and I look to the country and enjoy the country but I also prefer to live in Federal Way, and so I expect that there are freeway noises that have grown over the years, there are the airport noisest that have grown over the years. Someday maybe I'll move, but I don't think so. So again, I think the only area the EIS as lacking in is the affect of the "do-nothing" affect and the economic impact, the negative economic impact that could occur if there was a "do-nothing" affect. Thank you.

R-5-4

MR. GALT: Thank you, Mr. Graham. Let me go back and ask again if Ms. Springer is here, Elizabeth Springer? She has not arrived. Okay. The next preregistered person is going to testify at seven o'clock, or thereabouts. I don't have other names that

have been handed to me of any of you who would like to speak, but I sort of have a custom at these somewhat awkward times of asking if there is anybody in the audience who didn't sign up when you came in but who has since decided that maybe they would like to take a three minute, or if you're representing a group a five-minute, opportunity to offer comment regarding the draft EIS. So I ask at this time if there is anybody who would like to take me up on that. Yes, sir.

For those of you who have not signed one of the cards, if you would begin by giving your name, if it's an unusual last name please spell it for the clerk, and then your address, please.

FRANK ALLEN: That's easy. My name is Frank Allen, I live at 32232 2nd Avenue Southwest in Federal Way. One of the things that I think we should address is how we could avert a third runway and construction. One of the things that is available to airlines is intermodal containers. Containers that can go by air, by sea and by truck. And just because an airplane lands at Sea-Tac with an intermodal container doesn't mean that it has to fly out of Sea-Tac.

With an intermodal container it can be trucked to another airport, it can be trucked to a distant area. Another thing that I think we need to do

R-4-7

is to look very carefully at the impact that this will have on the people who surround the airport as far as living. It's been my experience that there is virtual gridlock in the area around the airport from the hours of 3 to 6:30 p.m., particularly in Des Moines and on Des Moines Way.

I think the constructionw would have an adverse affect on the people living in this area who now are in gridlock. I don't know what they would experience otherwise. It seems to me that the impact on the people living there during the construction is something that needs to be looked at very carefully. Another thing that I think should be looked at is load factor of the airplanes going and coming to Sea-Tac Airport. If an airplane has a break-even load factor of, say, 55 percent and it's operating with a 20 percent load, then I think there should be a regulation that says the airplane doesn't fly unless it meets its break-even point as far as price is concerned. And I think this could be done because there are frequent trips from the airport on various airlines and it wouldn't be a great problem to reschecule on a different airline if an airplane has, say, a load factor of less than 50 percent. Thank you for your kind attention.

R-12-11

R-4-7

MR. GALT: Thank you, Mr. Allen. Is there anybody else who has not spoken yet this evening who would like to take the opportunity and do so now? The record will show there is not. We will therefore stand at recess until seven o'clock.

(Recess.)

MR. GALT: Good evening. We'll reconvene our hearing again. It's seven p.m. On behalf of the Federal Aviation Administration and the Port of Seattle, I welcome you to the continuance of the June 14, 1995 public hearing regarding the draft EIS for the Seattle-Tacoma International Airport master plan update. I'm John Galt, I'll be your moderator for this evening. I've been retained to be the moderator specifically because I don't work for the FAA, I don't work for The Port, I don't work for any of their consultants, and I have nothing to do with the decision-making process of this project at all. I'm simply here to moderate the proceedings and to keep things moving along smoothly this evening.

If you would like to testify and have not signed up, there is still plenty of time to do that. Some of you who were here for the first hour know that you don't even have to do that, I'll ask you if you just want to testify off the cuff, as it were. The hearing this evening, as was the hearing on the 1st of June, is being run in a combination of preregistered testimony times and then open testimony times.

The printed instructions that are available and have been passed out indicate that the members of the general public will be allowed three minutes each, elected officials, persons representing groups and organizations will be allowed five minutes each.

I am trying to keep people fairly strictly to those time limits out of fairness to other people so that one person or one or two people don't monopolize the testimony time. If you don't speak tonight, if you have a lot of written, technical materials that you would like to present to the study people regarding the draft EIS or, frankly, if the three or five-minute time limit just simply isn't enough time to get the points across that you would like to make, I would like to emphasize on behalf of the study team the value of written comments. Written comments are just as important to them, just as helpful to them as are oral testimony comments that you make here at the hearing.

They have some little prepared sheets that you could use for relatively short comments, you can write letters to them if you have longer comments. The address in which to mail these comments is listed at

the bottom of the comment sheet. So even if you're going to write a letter, I would urge you to take one of the sheets so that you can get the address. All written comments have to be received at the address that's provided by August 3rd in order for them to be considered in the final preparation of the final EIS. You can also leave comments with me tonight if you'd like to. There's a cardboard box out in the hall, and you can put your comments in there as well.

When I call your name, I would ask you to come forward and take a seat in the chair that's opposite me so that you will be able to speak conveniently in the microphone and then begin your testimony. If you are a preregistered speaker, I will call your name and you don't have to then give us your name and address because that's already in the record. If you are a walk-in speaker, we would appreciate it if you would give your name and address before you start.

I usually call three names in a row, with the first one being the next speaker and the other two sort of in the on-deck circle waiting to come up. I don't have three names to call this half hour, so I can't do that. For those of you who have been sitting through more than one hour of this, I wanted to let you know why I'm not doing that for this particular part of the evening. Our preregistered speaker for the seven o'clock hour is Debbie Desmarais. I hope I'm pronouncing that right, or close enought anyway. Okay. Ms. Desmarais.

DEBBIE DESMARAIS: The DEIS proposes to expand the airport and add another runway. If anyone were to believe the air pollution methodology, this is completely unnecessary. The air pollution inventory is based upon 43.9 peak departures in an hour. Most of those who live in the flight path or who have ever been involved with the runway groups know that peak departures are much higher than 43.9 in an hour. The FAA's own documents say Sea-Tac's normal capacity is at least 60 in an hour. The 1991 Department of Ecology report showed 72 flights in an hour fromt he operations log taken directly from the airport records from August of 1989.

R-10-14

But if 43.9 is peak and 50.67 is peak operations for the year 2020 and 60 can happen now, it doesn't make any sense that a third runway is needed. Either the whole air pollution inventory is too low or the third runway is unnecessary. If you think that's weird, think about this: What does a 1.67 DC-10 look like? I know what the one whole plane is, but what is the .67? This is typical of the numbers used for the

peak hour departure figure. I for one living in the flight path do not ever want to seet he .67 part. Originally I thought it was interesting that fractional numbers of aircraft were taking off in a given hour, but then I realized that this isn't exact numbers of airplanes, it's the peak, month, day, year annualized. I don't know what peak month was used, if it was June, what day in June, what hour, what year. I don't know what day or part of the day, I don't know what hours within that day.

R-10-14

This is the kind of beginning data someone must adapt to to try to understand how the inventories were derived. Only a maniac can figure this out. Anyone who is reasonable and has a logical mind is going to be boggled the riddles. When one page says "peak hour takeoffs," it takes a computer to understand what that means, or someone who is good at descrambling Rubex cubes. All the pertinent information must be read and sorted. Some information is in one section, the most important information is at the back in an appendices or it is footnoted and in the FAA office in Renton, you must go there and get it. Sometimes you might have to pay for it; other times it may not be available.

R-1-6

There is no agency that should be in charge which is in charge. This document doesn't have any oversight. It needs the EPA, the DOE and Puget Sound Air Pollution Control Agency oversight. The placard outside says that the basic air pollution problems in the area are for cars, trucks, buses and taxis. I would add that we also have an off-road mobile source of lawn mowers, maybe snowblowers could be thrown in.

R-10-5

How many kilograms a minute do you think a snowblower could put out? I know what an airplane puts out, I know what the EDMS model from 1991 said. I know that it's somewhere in the range of 218.3 kilograms an hour for a 2.2 minute takeoff and climbout of just nitrogen oxides. Thats just one element of hundreds of compounds that are in the aircraft exhaust. The placard outside says that the aircraft contribution regionally is only 1 percent. It's been estimated at 5 percent for carbon monoxide in the past and 8 percent of nitrogen oxides.

R-3-7

The placard says that pollutants will increase with or without the project. This another real big dilemma in the DEIS, that we have more aircraft operations, we have more vehicle traffic, we have a lot of other contributing projects going on through the whole scenario all through the years up to 2020, but interestingly enough, in the year 2020 we

have less pollution and we have less noise. We have less impacts, although we have increases in everything meant to cause impacts.

R-10-5

The DEIS shows that all the air pollution inventory is below the standards. Again, if all that's based on the faulty aircraft number, everything will be much lower than what it actually is in a real life situation with higher aircraft takeoff numbers which happens on the average of once per day greater than 43.9 aircraft operations. The DEIS is also not below the standards, there are many criteria pollutants that are breaking the standards.

MR. GALT: Thank you very much. As I indicated, I have nobody else signed up to speak during this first half hour, and I have been given no names on the walk-in register for this hour either. Is there anybody in the audience at this time who has not spoken previouley who would like the opportunity to comment regarding the adequacy of the draft environmental impact statement? The record will show that there is not. Under the circumstances then probably the best thing for us to do is recess again; however, I'll hope that some folks might come in during the next 15 or 20 minutes or so. I'm going to recess until 7:30 and we'll reconvene at that time and see if anybody has arrived who wishes to offer testimony. We'll be in recess until 7:30.

(Recess.)

MR. GALT: We'll reconvene the hearing. It's 7:31. Let me ask again if there's anybody who has arrived this evening who hasn't signed up to speak yet or who hasn't spoken yet this evening and who would like to do so? Is there anybody who would like to offer testimony? There is not. The record will show that we stand at recess again and we'll try again at eight o'clock.

(Recess.)

MR. GALT: Good evening, ladies and gentlemen. We'll reconvene the hearing at this time. It's eight o'clock, and on behalf of the Federal Aviation Administration and the Port of Seattle, I welcome you to the eight o'clock portion of the June 14, 1995 public hearing regarding the draft EIS for the Seattle-Tacoma International Airport master plan update.

I'm John Galt, the moderator for this evening's hearing. I've been selected as the moderator because I don't work for the FAA, I don't work for the Port, I don't work for any of its consultants, and I have nothing to do with any of the decision-making on

this project. My role is simply to chair tonight's proceedings.

We'd like to thank Calvary Lutheran Church here in Federal Way for allowing us to use this facility here tonight for this meeting. I do want to emphasize to you the church, as you would I hope obviously assume, has no position on this subject one way or the other. They're just being good citizens and letting us use the facility here tonight.

When I call your name, have a seat in the chair opposite me so that you'll be able to speak easily into the microphone. The court reporters to my right are transcribing this evening's proceedings. Please help them by speaking into the microphone and by not speaking too fast. The transcript that they produce will be given to the study team for use in the preparation of the final EIS.

If you don't choose to speak tonight, or if you have a lot of detailed or technical comments to offer, or if the three to five-minute time limit that we have for you this evening is just simply not enough for you to get across all the points that you wish to make, I want to assure you that written comments are just as valuable as the spoken word is.

There are some comment sheets available on the tables outside in the narthex or lobby area. Please feel free to put your comments on there and then you can either bring the comment sheet to me or you can put it in the cardboard box that's on one of the tables out there or you can mail it to the address that's listed on the bottom of the sheet. If you mail the sheet or a letter, please be sure that you get it to the FAA by August 3rd. If they don't receive it at that address by August 3rd, they will not be able to consider it in the preparation of the final EIS.

I'm going to call three names here at one time, the first name will be the first person who will be speaking, the next two, to use a baseball analogy, will be in the on-deck circle, so the next two people should be prepared to come forward and offer testimony. The first witness during the eight o'clock session tonight will be Joe Feuerstein, who will be followed by Bob Vonesh and Kris Webb. Mr. Feuerstein.

A WOMAN: He's out in the lobby talking to somebody.

MR. GALT: He needs to be here if he wants to speak. I think somebody is going to try and retrieve him. Mr. Feuerstein?

JOE FEUERSTEIN: Well, that's pretty close.

MR. GALT: That's close? Okay. It's your

turn, sir.

JOE FEUERSTEIN: Well, okay. Such a crowd, too.

MR. GALT: Please have a seat there so that you can talk into the microphone.

JOE FEUERSTEIN: Okay.

MR. GALT: Go ahead. Since I'm not pronouncing your name correctly, why don't you start by pronouncing it and go on from there.

JOE FEUERSTEIN: That's not uncommon. My name is Joe Feuerstein. I'm in Seattle, Sea-Tac, if you will.

The thing I wanted to talk about was the environmental impact statement and the current action before the governor to consideration to appropriate $500,000 for the budget for a number of cities to study objectively and nonpolitically the environmental impact statement, and to solicit, I hope, more people in the audience, folks in the audience to call the governor on 1-360-753-6780, to tell him if you agree, that you support that he should approve the $500,000 grant that has been authorized by the legislature to permit the communities to objectively study the huge environmental impact statement that's been prepared over quite an extended period of time.

And I want to repeat again, call the governor, telephone number 1-360-753-6780 to request him to approve that $500,000. He's getting lobbied heavy by people not to sign it, airport interests, Air Washington and the director of the Department of Transportation.

I think it will help us all to get a nonpolitical but objective view of this. The governor and the head of the transportation department in the "Highline Times" quotes that it shouldn't be approved because the cities would using it for propoganda. That is illegal under the bill, and the City of Burien, I know, who has the lead on it has said they would not. So, again, try to call the governor, 360-753-6780. Thank you.

MR. GALT: Thank you, Mr. Feuerstein. Bob Vonesh? Mr. Vonesh.

BOB VONESH: Thank you. My name is Bob Vonesh and I live in northeast Tacoma, and I want to make one point during my presentation.

I didn't have a whole lot of time to look at the draft environmental impact study, but I did spend some time at the library and took a look at it, and I wanted to see exactly how this -- if this was weighted toward environmental issues or what, and I suppose it

was. I didn't have a chance to study it in detail. But it seemed to me it did go over a lot of material that had been covered in previous studies, including the Puget Sound Air Transportation Committee's flight plan project.

R44

And I wanted to see in particular what they had to say about the Paine Field option since in the Puget Sound Air Transportation Committee, they studied about 30 alternatives and found that Paine Field would meet all of the demand that is expected to be met by this third runway and, of course, Paine Field already exists.

So I was somewhat -- then in looking at the draft EIS I did not see anything in there about Paine Field other than a few statements to the effect that Paine Field apparently was not analyzed very much because, quoting their document here, "reflecting widespread opposition from county residents, the Snohomish County Council voted in 1994 to oppose use of Paine Field as a supplemental airport."

It seemed that vote stopped all further analysis, and since Paine Field, according to their flight plan project, does meet the needs, I would like to know why there was no analysis of this option in the draft EIS. There is a reference to appendix B where all of the supplemental airport options were considered, but Paine Field does not appear to be among them. Apparently there were two existing airports studied in some detail, McChord and Arlington, and ten new sites were studied, but Paine Field, again, was not listed among them in appendix B.

So I find this rather disturbing, to say the least, since aircraft noise is just wonderful and fine for the folks of southwest King County but it's absolutely unacceptable for people in Snohomish County. Thanks.

MR. GALT: Thank you, Mr. Vonesh. The third speaker during this hour is Kris Webb. Ms. Webb.

KRIS WEBB: I was a little short of time to prepare anything so I'm just going to read this. I do better just reading a statement.

MR. GALT: That's fine.

KRIS WEBB: My name is Kris Webb, and I'm at 13511 Second Street East, Sumner, Washington 98390, and I have a few points to bring up regarding the proposed runway at Sea-Tac.

Number 1, the length of the runway, on page 6, chapter 2, item B of the Sea-Tac Airport master plan update draft EIS, you cite that a B747-200B fully loaded aircraft requires a 12,500-foot runway to fly

R-4-4

R-3-26

nonstop to Hong Kong or Shanghai at 76 degrees Fahrenheit. Currently the existing runways are 9,425 feet and 11,900 feet at Sea-Tac.

These runways now will not accommodate this takeoff, and I want to know if the deviation from this requirement will be allowed by the FAA to ensure takeoff for the 747 fully loaded, as described before, on the third runway, which is only going to be an additional 8,500 feet. Sea-Tac, it appears, does not intend to provide the airlines that serve these two important destinations in the east with a runway that is capable of this takeoff; however, there are two runways that are currently available, one at Moses Lake and one also at Paine Field.

Number 2, I have a little bit of experience in earth, as far as the fill requirements for the proposed third runway site. I question a number of the estimates on fill requirements that will make a hill out of a valley for the proposed runway. The Port estimates are approximately $3.56 per cubic yard with an estimate of 23 million cubic yards of fill required for a total of approximately 81 million dollars for fill material costs alone.

A fully loaded dump truck with trailer weighs 105,000 pounds, carries 23 yards of fill material.

R-3-26

R-4-4

R-12-6

Therefore, the Port must be estimating that one million loads of fill will be carried from the state certified pits in the area to the site. Can the Port identify these certified pits at the present time? If 1,000 trucks are used making two trips per day it will take 500 days or approximately two years to complete just hauling the fill, not including compacting or grading.

R-12-10

Given that the fill comes from pits that are located in a 30-mile radius from Sea-Tac, does the Port intend to run more than a thousand trucks or possibly run dump trucks and trailers 24 hours per day five to seven days per week nonstop? Should the pit sites that comply be located farther than 30 miles from Sea-Tac, which I think may be the case, the number of trips per day, per truck, will be reduced, thereby increasing the number of trucks hauling the fill or extending the period of time required to fill the site.

R-12-15

Since the Port wants to use its own sites and "off-site borrow sources" which they refer to in chapter 4, subtitle 19, "Earth," paragraph 3, please identify the location of these sites, and are they approved by the Corp of Engineers? This information should have been gathered and made public long ago. It does affect the environment, the roads and the true cost of the third runway construction.

R-12-9

I have one little aside on this, too. I don't think a lot of people who -- particularly Snohomish County -- are aware of where these pit sites are, and they may think twice about, oh, throw the third runway in down at Sea-Tac when they find they've got a thousand trucks a day 105,000 pounds coming out of places like Maltby and other secluded places where there's just no nasty runways. To comply with the FAA requirement of runway spacing, I believe it's a 4300 foot separation between runways, the amount of fill would be greater, because the area required would be greater.

R-12-11

This would bring the requirement closer to 50 million cubic yards and a more realistic price of $7 per cubic yard or 350 million dollars for the cost of just the fill material.

MR. GALT: Your time is nearly up. So if you have another whole page to read I'm afraid you won't be able to get through it.

KRIS WEBB: I've got one more thing about environment. I'll leave all my nasty stuff out.

MR. GALT: You can submit the written statement or you can put it in writing and leave the nasty stuff out if you want.

KRIS WEBB: Thank you very much. I did want to bring that up because I don't think they've looked into the fill requirements or if they have, they're not telling the public. Thank you.

MR. GALT: Thank you. We have a speaker who had preregistered to speak at 8:24, and we're darn close to 8:24. I wonder if Mr. Townsend has joined us yet. Mr. Townsend? I think we're going to check and see. I'm afraid I wouldn't know Mr. Townsend if I saw him. No, he's not here. We will, then -- let's see, I've got 8:16 on my watch. Let's recess until 8:25 and see if Mr. Townsend is here then. We'll stand at recess until 8:25.

(Recess.)

MR. GALT: We'll reconvene our hearing. It's 8:25 and I said we'd get back together at 8:25 to take our next witness who had presigned to speak. Peter Townsend your our next speaker. Mr. Townsend, I'm John Galt, the moderator for tonight's meeting. Have a seat here in the chair and make yourself comfortable so you can talk into the microphone. Please remember that the court reporters will be transcribing what you say so keep the speed down to somewhere around 75 or 80.

PETER TOWNSEND: Thank you very much. My name is Peter Townsend. I reside at 29508 12th Avenue Southwest in Federal Way. I'm a past president and

board member of the Regional Commission on Airport Affairs, and we highly oppose this third runway and all the related topics going in with it. I would like to have the five minutes if I can as being a member of an organization.

MR. GALT: Yes, sir, you're signed up for five minutes.

PETER TOWNSEND: Thank you. I will be submitting, along with our organization, detailed written comments to you later. I would like to put a few remarks in the record tonight. Some of our members have been asking Mr. Ossenkop of the FAA for backup information for some of the allegations in the material in the draft EIS. He has not been willing to provide it. He said, "If you want it, you can pay $285 for the whole document." We feel this is very, very unfair treatment of general requests for backup information of certain documents. So we would like that corrected.

R-1-6

So far as the justification for the third runway, the aviation department of the Port of Seattle has said there's bad weather 40 percent of the time. We are fairly confident that we are going to be able to blast them out of the water on that number; it's going to be a lot less and we will have it fully documented.

R-3-20

We have given already to the expert panel,

R-12-11

and we will be giving to the FAA, input which has already come out and been given to the expert noise panel in terms of noise, systems management, demand management, et cetera. The Port of Seattle and the third runway has been, I would say, not completely blasted out of the water, but it's had devastating testimony in front of its expert panel and we intend to give them more.

So far as the financial justification, it looks more and more a non-go and a non-winner, because there is just not enough money in this aviation trust fund, Congress is on a budget-cutting spree and the likelihood of any of the funds being available are going to be very, very remote.

I'm very pleased that the city of Federal Way has started to get into the battle. Right now they're partly in it and partly not in it. My task and our organization's task will be to convince them to get very much more into the fight and join the other four cities up north.

So far as one of the most immediate happenings that will be going on once this third runway, if it is approved, will be a huge amount of truck traffic coming through First Avenue -- sorry Highway 99 and 348 junction in Federal Way. It looks

R-12-11

as if there's going to be incessant traffic, and that's going to be one of the focal points for bringing fill dirt to Seattle. If this goes through, Federal Way is going to be finding out about it in a tremendous hurry.

I would like to take this opportunity if there are any people in the audience who want to get in touch with me my number is 839-2947. There is hope, you are part of the solution. People are frustrated with this whole process. They don't trust the FAA, they don't trust the Port of Seattle. You are part of the solution so come up and talk to me afterwards or write to us and join the organization. Thank you, very much.

MR. GALT: Thank you, Mr. Townsend. The next person that has reregistered to speak is scheduled to be here at 9 o'clock. Is there anybody in the audience now who has not signed up to speak who would like to take the opportunity to offer comments regarding the accuracy of draft EIS? There being nobody desiring to do that at this time, we will again stand at recess.

We'll reconvene at nine clock for the last of the scheduled speakers, and then for those of you who are interested, it is our intent to remain here until ten o'clock. The hearing was advertised to run from six to ten and we are not going to cut it short. So if somebody shows up at the last minute, we will be here to hear them. So we're at recess now until nine o'clock.

(Recess.)

MR. GALT: We'll reconvene our hearing. It's five minutes after nine. This is the nine o'clock hour of the June 14th public hearing on the draft EIS for the Seattle-Tacoma International Airport master plan update. I'm John Galt. I'm the hearing moderator this evening.

We have one person preregistered to speak at nine, and I believe it's her husband who also is going to speak, and the lady needs a few minutes to collect her thoughts, so this is at her request. So we will put her husband in front of her, and we will then start the nine o'clock session with testimony by Peter Mathews. Mr. Mathews, if you'd make yourself comfortable in the chair here and sit in front of the microphone. Go ahead, sir.

PETER MATHEWS: All right. If ephemeral whisps of smoke emanating from various sections of the DEIS relating to mitigating measures have little substance beyond the retoric of vague promises. Nothing very specific, no cost figures, nothing

quantified, just promises to do good.

I would like to offer mitigating measures that might be accepted by airport neighbors provided they are in place and operating prior to turning the first spadeful of dirt for the construction of the third runway.

R-13-32

Water quality: Considering the Port's past dismal record of managing effluent disposal, at the very least the Port should construct a closed route, tertiary treatment plant sized to handle the estimated flow for the next fifty years. This plant should be constructed on airport property and should meet the discharge requirements for the Sacramento River in California.

R-15-12

In conjunction with this, since the third runway will destroy some 6500 feet of Miller and Des Moines Creeks, among others, the Port should build a fish hatchery also on Port property to help offset ruining the years of work performed by volunteers to make these streams clean and fishable.

R-14-7

It is really ludicrous to suggest swapping wetlands displaced by a third runway to the lower Green River. Are you planning to flood Auburn? Are Port employees going to count and catalog all the creepy crawly critters to ensure they are replaced in kind?

I'm sure Auburn will appreciate the added mosquitos.

I would like to recommend that the wetlands be moved to the Port's property on the Seattle waterfront. Major trials could be added with little signs explaining to tourists that they are seeing bugs displaced by the runway they have landed on.

R-14-7

Construction mitigation: To reduce the impacts on public roads caused by moving enough dirt to build an earth-filled damn, the Port of Seattle should finance construction of new roads to and from the location of the fill dirt they plan to import. Upon completion of the third runway, these new roadways would help mitigate the problems caused by great quantities of extra passengers the Port is anticipating.

R-12-26

Air quality: Amazing, aircraft using Sea-Tac Airport do not pollute. The DEIS has gone to great lengths in an attempt to prove this. Some of them are ridiculous. For example, chapter 4, section 9 on air quality, first paragraph, this paragraph equates the emissions of all cars, trucks, buses, taxis, motorcycles, et cetera, of the entire Puget Sound region, which includes Pierce, King, and a big hunk of Snohomish County, to the air emissions of aircraft at Sea-Tac, saying aircraft emit less than 1 percent.

R-10-5

The dilution ratio of this comparison is incredible. What is the ratio of aircraft to motor vehicle pollution in an area between Federal Way and Ballard and between Puget Sound and Lake Washington? The main thrust of the DEIS tries to concentrate attention on ground traffic pollution and minimizes aircraft pollution.

R-10-5

However, there's some interesting information if one digs enough. The DEIS describes a landing and takeoff cycle called an LTO, which consists of four modes: Approach, taxi idle, takeoff and climbout. All of this concerns about between ground level and what they call the mixing altitude, which for Seattle is 2054 feet. In 1994, 26.7 million gallons were consumed within the LTO zone. By the year 2020, 46 million gallons will be consumed within the LTO zone. Within this zone, major pollutants generated by burning this fuel are CO, which is carbon monoxide, and NOX, which is nitrogen oxide. According to the DEIS, aircraft emissions for 1994 were 1,365 tons of CO and 1,378.3 tons of NOX.

The DEIS also claims that 89 percent of NOX is generated during takeoff, climbout and during approach. So 89 percent of 1,378.3 tons equals 1,226.7 tons per year. You divide 1,226.7 tons by 365, and that equates to 3.36 tons per day of the same emissions we get our cars checked for and flunk if we exceed a few grams. Yet Sea-Tac Airport do not pollute.

R-10-44

As a mitigating measure, all aircraft using Sea-Tac Airport shall be equipped with catalytic converters and checked every two years at the closest convenient station.

Noise pollution: All aircraft using Sea-Tac Airport shall be equipped with mufflers that conform to state trucking requirements.

As I said in the beginning, the above mitigating measures should be implemented before the first spade full of dirt for the third runway is turned. We expect nothing less, and you will hear from me again.

MR. GALT: Thank you, Mr. Mathews. The next speaker is Vivian Mathews. Ms. Mathews.

VIVIAN MATHEWS: My name is Vivian Mathews, I'm the deputy mayor of the City of Burien, I live at 15929 Maplewild Avenue Southwest, Burien, Washington.

Should the third runway be built, the 5-plus years construction period will cause unestimatable havoc to our community. Noise, air, and water pollution during this time period will be even greater than the long-term added pollution that will be

generated by the third runway.

The DEIS alludes to this in vague terminology and ends up invoicing the responsibility off to the various construction firms to follow the requirements of the various county and state regulations. Water quality in particular will suffer greatly during this period. There will be five years of misery during which we will be degraded by dirt falling in our streams, truck fumes filling our air, which eventually will enter our streams, and the trucks will plug our roads and eventually destroy them, not to mention all of the roads where they're coming from long distances bringing in the dirt that the Port wants for this farce.

R-13-15

The feeble mitigating measures outlined in the DEIS, such as holding tanks to even out the flow of stormwater runoff, do not address toxics or other harmful pollutants "biofiltration swells" read grass lined ditches are not adequate to handle the volume of runoff they will be deluged with. Using a favorite tactic, the DEIS says deicing only occurs a few times a year so that "relatively small quantities of these substances are used annually during airport operations compared to other large airports.

I supposed they compared it to San Diego?

Which really doesn't have any deicing. Heavy metals are waived off by saying it's uncertain whether or not chronic and acute toxicity standards for these metals are occasionally violated. Then they mumbled something about state water quality standards which are not shown in table 410-2 governing dissolved metals and vary depending on receiving water hardness. Buzz words, buzz words, buzz words.

This is a farce. Human beings don't count in this plan. The members of Trout Unlimited, for example, have given much of their lives to saving salmon and to try to get them to grow, to mature in the streams in our community, Des Moines stream and also -- Des Moines Creek and Miller Creek and other creeks, and now they'll have to try to start back and destruction of Miller Creek will occur. The Port has been excused by the DOE for many years. DOE is not our friend it is not a Department of Ecology, it is the department of letting agencies get away with things because they don't know how to handle these agencies, and I'm talking about the past and from my experience with them. The Port is a greedy entity that won't let go.

R-13-15

The spineless PSRC has no vision. It even has an organization -- now this is not the PSRC, I'm talking about also Air Washington, and Air Washington

is paid by the Port. I've seen the contract. The Port is just a child -- is a parent of Air Washington. So you see all this testimony, Air Washington is told what to say. The Port strikes fear in the hearts of businesses and also in the hearts of airlines by spieling this stuff that is not true.

As past president of Citizens to Save the Puget Sound, I am appalled at the Port and FAA plans. Once the salmons, et cetera, have been destroyed, the Port won't have to address it in the next runway, the fourth runway, because they won't exist.

I also want to talk about this process. This is a very clever way of having people come in and not interacting with an audience and not speaking to the Port commissioners who have the responsibility to come here and listen to us. We are told this is just a written testimony. Where is the public testimony? Where is the public ability to speak to the commissioners and those who are promoting this third runway? I just can't believe how blatant this is. I come all the way out here and not see the Federal Way folks. Maybe they were here earlier but it's very clever to run them in and out by signing them up ahead of time. It's not democracy. Something has to be done.

MR. GALT: Thank you, Ms. Mathews. I have nobody else signed to speak tonight. As I have done all night, I'll ask if there is anybody who has not signed up to speak who would like to do so. The record will show there's not. We are committed to be here until ten o'clock. The Port and the FAA publicized that this hearing would be until ten. We are not going to cut that off. What we will do is have the hearing stand at recess on call. I will be here either in the room or at the narthex of this facility, and if somebody wants to speak, staff can get ahold of me, I will come back in, we can get back in order and I will take that testimony, but unless that happens we will reconvene at ten o'clock to officially close the hearing for the evening.

(Recess.)

MR. GALT: We're back on the record. It's ten o'clock, I've had no request to reopen the hearing for testimony, so at this time I will conclude the June 14th, 1995, hearing. There are no other hearings scheduled on the draft EIS to my knowledge, so this concludes the draft EIS hearing process. I thank everybody who has participated in it. Have a good evening. The hearing is adjourned.

(Hearing adjourned.)

C E R T I F I C A T E

I, TONI L. CHRISTY, RPR, do hereby certify that the foregoing proceedings were stenographically reported by me and that this transcript was prepared by me and is a true, complete, and accurate transcription of same to the best of my ability.

Signed this 15th day of June 1995.

Notary Public in and for the
State of Washington, residing
at Seattle. Commission expires
January 21, 1996. CSR CHRISTL408NM

C E R T I F I C A T E

I, KAREN L. LARSEN, RPR, do hereby certify that the foregoing proceedings were stenographically reported by me and that this transcript was prepared by me and is a true, complete, and accurate transcription of same to the best of my ability.

Signed this 15th day of June 1995.

Notary Public in and for the
State of Washington, residing
at Seattle. Commission expires
January 21, 1998. CSR LARSEKL637B7

COMMENT SHEET

Public Hearing
June 1, 1995

SEATTLE-TACOMA INTERNATIONAL AIRPORT

Draft Environmental Impact Statement for the Master Plan Update

R-8-2

WHY DO PRIVATE RESIDENCE OWNERS GET MORE RELOCATION ALLOTMENTS OR BENEFITS THAN COMMERCIAL PROPERTY OWNER/OCCUPANTS?

(Please Print) Name: ED CHAPIN/AIRPORT AUTO REPAIR
Address: 18634 DES MOINES MEM. DR
City: SEA TAC Zip Code: 98148

Please return comments by August 3, 1995 to: Mr. Dennis Ossenkop, Federal Aviation Administration, Airports Division, ANM-611, 1601 Lind Ave SW, Renton, Washington 98055-4056 or leave in the box as you leave the meeting.

COMMENT SHEET

Public Hearing
June 1, 1995

SEATTLE-TACOMA INTERNATIONAL AIRPORT

Draft Environmental Impact Statement for the Master Plan Update

R-5-4

I live at 10204 - 13th Ave South. The noise of the airplanes going over the house is horrendous - it rattles our windows. No body seems to be concerned about the pollution factor with all the airplanes we having arriving & departing now - what will another runway do?? Also, every time I travel up & down the coast here the planes are half empty.

R-4-7

Why can't the airlines consolidate & run fewer planes but planes that are full - put on a larger plane maybe three times per day instead of every hour every airline flies to San Francisco, Oakland, L.A. Orange County, etc. Surely it would be more economical for everyone concerned. Personally I feel the cost of this 3rd Runway is definitely prohibitive especially in light of the fact that the 3rd Runway will

(Please Print) Name: Margaret Clark
Address: 10204 - 13th Ave South
City: Seattle WA. Zip Code: 98168

Please return comments by August 3, 1995 to: Mr. Dennis Ossenkop, Federal Aviation Administration, Airports Division, ANM-611, 1601 Lind Ave SW, Renton, Washington 98055-4056 or leave in the box as you leave the meeting.

COMMENT SHEET

Page 2

Public Hearing
June 1, 1995

SEATTLE-TACOMA INTERNATIONAL AIRPORT

Draft Environmental Impact Statement for the Master Plan Update

R-4-4

take 10 years to build, by which time it (the airport with the 3rd Runway) will be out of date. The only positive commonsense solution is to take the money it would cost to build a 3rd Runway at Seatac & buy sufficient land down in Chehalis/Centralia area & build an entirely new airport as large as you like. You probably wouldn't spend all the money the 3rd Runway is going to cost on the entire airport in this area. To make

R-4-10

this solution practical - Portland, Olympia, Tacoma, Seattle, Everett & Vancouver B.C. Canada, should be connected by rapid transit in the form of a Monorail - over the top of I-5.

(Please Print)Name: Margaret Clark

Address: 10204 - 13th Ave South

City: Seattle WA.

Zip Code: 98168

Please return comments by August 3, 1995 to: Mr. Dennis Ossenkop, Federal Aviation Administration, Airports Division, ANM-611, 1601 Lind Ave SW, Renton, Washington 98055-4056 or leave in the box as you leave the meeting.

COMMENT SHEET

Public Hearing
June 1, 1995

SEATTLE-TACOMA INTERNATIONAL AIRPORT

Draft Environmental Impact Statement for the Master Plan Update

R-12-15

Question: Who is going to pay for all the broken auto windshields caused by all the 1000's of cubic yards of fill dirt traveling in trucks along our highways.

Answer: Insurance companies and eventually us.

No Third Runway!!!!

(Please Print)Name: Mark Overholt

Address: 12611 4th S.W.

City: Seattle WA

Zip Code: 98146

Please return comments by August 3, 1995 to: Mr. Dennis Ossenkop, Federal Aviation Administration, Airports Division, ANM-611, 1601 Lind Ave SW, Renton, Washington 98055-4056 or leave in the box as you leave the meeting.

COMMENT SHEET

Public Hearing
June 1, 1995

SEATTLE-TACOMA INTERNATIONAL AIRPORT

Draft Environmental Impact Statement for the Master Plan Update

YOU (THE FAA) & THE PORT OF SEATTLE HAVE ABUSED US WITH THE 2nd RUNWAY.

ON WHAT TRUTHFUL & UNBIASED BASIS DO YOU JUSTIFY GOING FORWARD WITH THE 3rd RUNWAY WHICH I SEE AS A RAPING OF THE CHILDREN & THE ADULT CITIZENS OF THE SOUTH END BY OUR BENEVOLENT GOVERNMENT.

GET YOUR COLLECTIVE HEADS OUT OF THE SAND & APPLY YOURSELVES TOWARD A REAL SOLUTION THAT IS COMPATIBLE WITH CITIZENS.

YOUR CURRENT PROPOSAL IS OUTRAGEOUS & PROPOSES TO CONTINUE THE HOLOCAUST.

(Please Print) Name: FRANK OTT
Address: 11921 26th PL SW.
City: SEATTLE (BURIEN) Zip Code: 98146

Please return comments by August 3, 1995 to: Mr. Dennis Ossenkop, Federal Aviation Administration, Airports Division, ANM-611, 1601 Lind Ave SW, Renton, Washington 98055-4056 or leave in the box as you leave the meeting.

430

COMMENT SHEET

Public Hearing
June 14, 1995

SEATTLE-TACOMA INTERNATIONAL AIRPORT

Draft Environmental Impact Statement for the Master Plan Update

R-18-3 R-11-7 R-12-15

Question: Is it true that:
1. This runway is 4 times as expensive as any other runway in the US ?
2. Land fill will extend to First Ave. ?
3. The EIS actually tries to make us believe there will be no community and road impact from the dump truck hauling. Road pavement would be destroyed.

R-12-22

If construction of the third runway actually takes place, transportation of the fill dirt by rail would be more feasible (cheaper and less impact on the infrastructure)

R-18-2

The dollar cost of the third runway makes it unfeasible. Has a cost trade study been made in the buyout of people in the other areas previously (over

(Please Print) Name: Robert K. Vaa
Address: 28817 11th Ave. S.
City: Federal Way Zip Code: 98003

Please return comments by August 3, 1995 to: Mr. Dennis Ossenkop, Federal Aviation Administration, Airports Division, ANM-611, 1601 Lind Ave SW, Renton, Washington 98055-4056 or leave in the box as you leave the meeting.

Considered for a second airport but was stopped by local people with the NIMBY attitude. 431

I recommend that an alternate or second airport be built south of Olympia in the vicinity of the intersection of I-5 and the Yelm-Rochester highway. This area is level and has the necessary open space. R-4-4

432

COMMENT SHEET

Public Hearing
June 14, 1995

SEATTLE-TACOMA INTERNATIONAL AIRPORT

Draft Environmental Impact Statement for the Master Plan Update

I am a NE Tacoma resident. I have not read the Draft EIS because I don't believe the Port of Seattle (or the FAA) are stoppable in their efforts to increase air traffic at Sea-Tac. I believe noise impacts are under estimated and not addressed fairly. Airports, in general, ruin neighborhoods thru air pollution and noise. Sea-Tac has dramatically reduced the desireability of both Federal Way and NE Tacoma and will continue to do so un-checked. I am mainly against the 4-Post Plan takeoffs over NE Tacoma (previously, a much quieter and desireable area). With the 3rd runway, the situation will be exacerbated. I am a member of the NE Tacoma Neighborhood Council & believe that this represents the opinion of the majority of the residents. I put very little stock in any study the Port is involved in. This lack of confidence is based on 5+ years of efforts opposing the 4 post plan - all useless!! R-5-4

(Please Print) Name: Dr. Avril Berg

Address: 61[illegible] [illegible] Dr. NE

City: Tacoma WA Zip Code: 98422

Please return comments by August 3, 1995 to: Mr. Dennis Ossenkop, Federal Aviation Administration, Airports Division, ANM-611, 1601 Lind Ave SW, Renton, Washington 98055-4056 or leave in the box as you leave the meeting.

433

COMMENT SHEET

Public Hearing
June 14, 1995

SEATTLE-TACOMA INTERNATIONAL AIRPORT

Draft Environmental Impact Statement for the Master Plan Update

VICTOR ZEMBRUSKI ; 705 SW 358TH ST ; FEDERAL WAY WA 98023 - REPRESENTING SELF.

RECOMMEND AS ADDITIONAL NOISE MITIGATION:
1) OFFSET ARRIVAL TRACK FOR RWY 34R/L 3° TO EAST - PLACING IT MORE OVER HWY 99 & I5.
2) RAISE RWY 34R/L ARRIVAL GLIDE PATH TO 3.1° VS 3°
3) AFTER SOUTHBOUND DEPARTURE HAS ATTAINED 400' AGL, TURN IT 15° EAST TO PICK UP A DEPARTURE TRACK OVERLYING THE KENT VALLEY WHICH IS PRIMARILY INDUSTRIAL & 600' LOWER IN ELEVATION THAN FEDERAL WAY.

(Please Print) Name: VICTOR ZEMBRUSKI
Address: 725 SW 358TH ST
City: ~~FEDERAL~~ WAY Zip Code: 98023

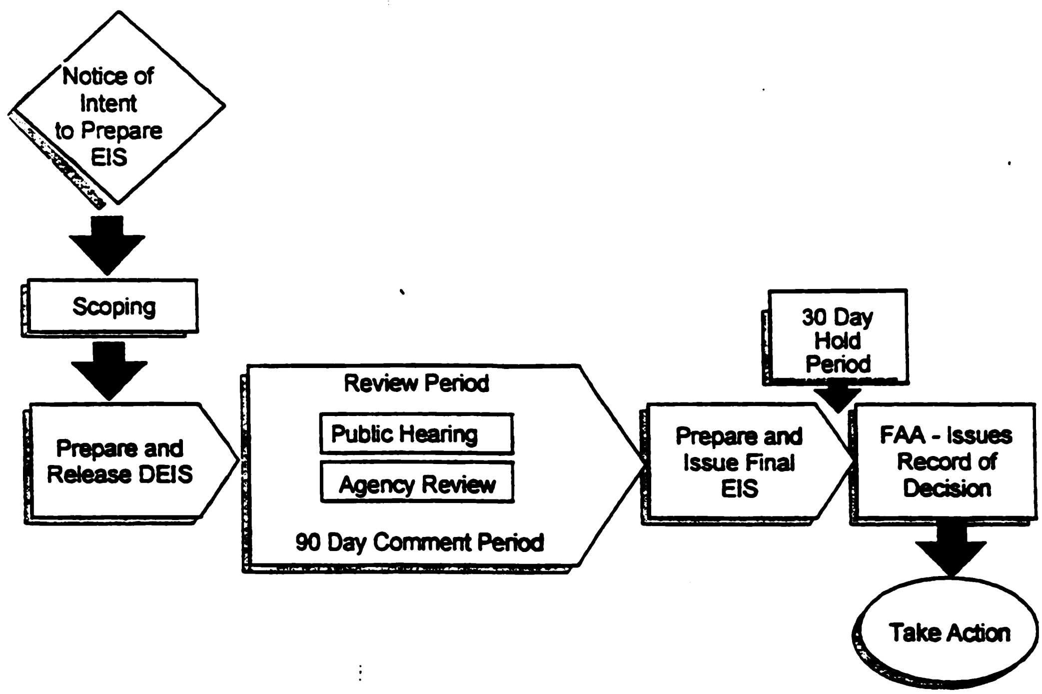
Please return comments by August 3, 1995 to: Mr. Dennis Ossenkop, Federal Aviation Administration, Airports Division, ANM-611, 1601 Lind Ave SW, Renton, Washington 98055-4056 or leave in the box as you leave the meeting.

SEATTLE-TACOMA INTERNATIONAL AIRPORT

Environmental Impact Statement For The Master Plan Update

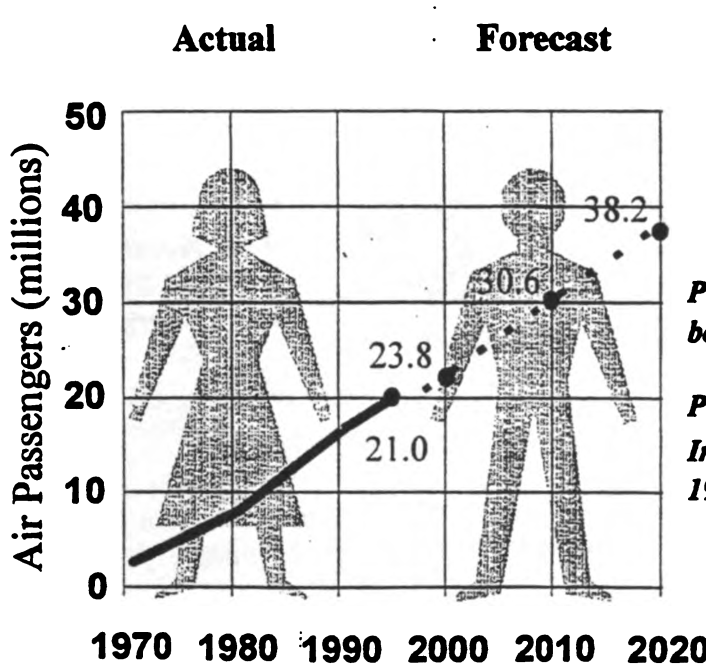
PUBLIC HEARING

EIS PROCESS



2027

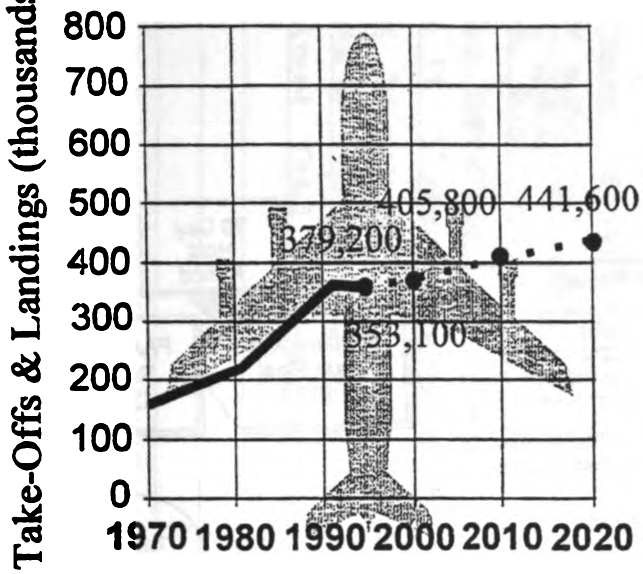
Sea-Tac Air Passenger Growth



Passengers Increased 260 % between 1974 - 1994

Passengers are Forecast to Increase 82 % between 1994 - 2020

Sea-Tac Operations Growth

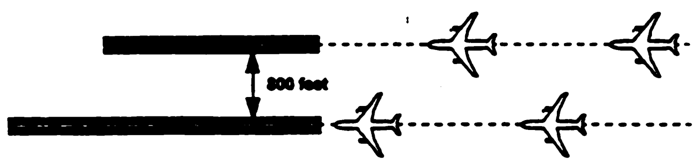


Take-Offs & Landings Increased 120 % between 1974 - 1994

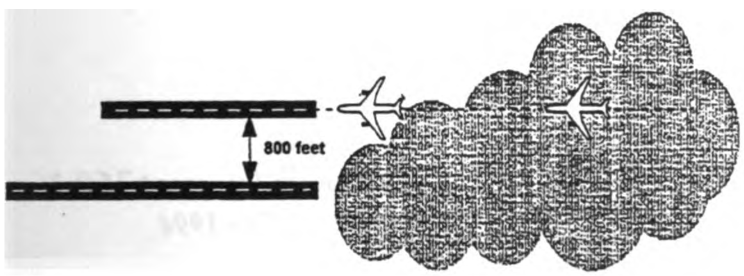
Year 2020 Demand Equals about 300 more Flights per Day (25 % increase)

2028

Existing Poor Weather Capacity Problem



Good Weather (VFR):
2 Arrival Streams = 60 Arrivals / Hour



Poor Weather (IFR):
1 Arrival Stream = 24 - 36 Arrivals / Hour

Up to *45 %* of the Year, Sea-Tac is Reduced to One Arrival Stream because of Limiting Weather and the Closely-Spaced Runways

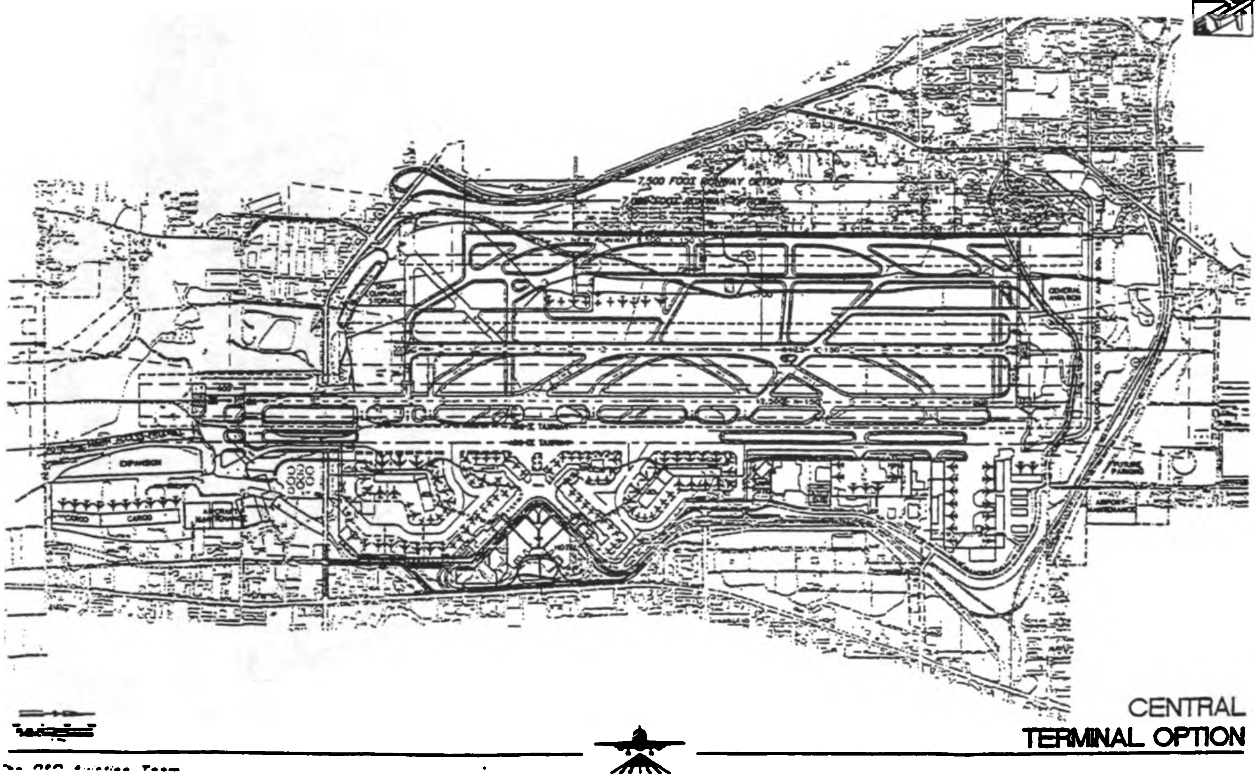
Anticipated Terminal & Ground Access Needs

	Existing	2000	2010	2020
Aircraft Gates *(total number)*	75	86	94	100
Terminal Area *(million sq ft)*	1.9	2.3 - 2.5	2.6 - 3.0	3.0 - 3.4
Curb Front *(feet)*	6,400	-	-	13,000
Public Parking *(spaces)*	9,400	-	-	14,900

2029

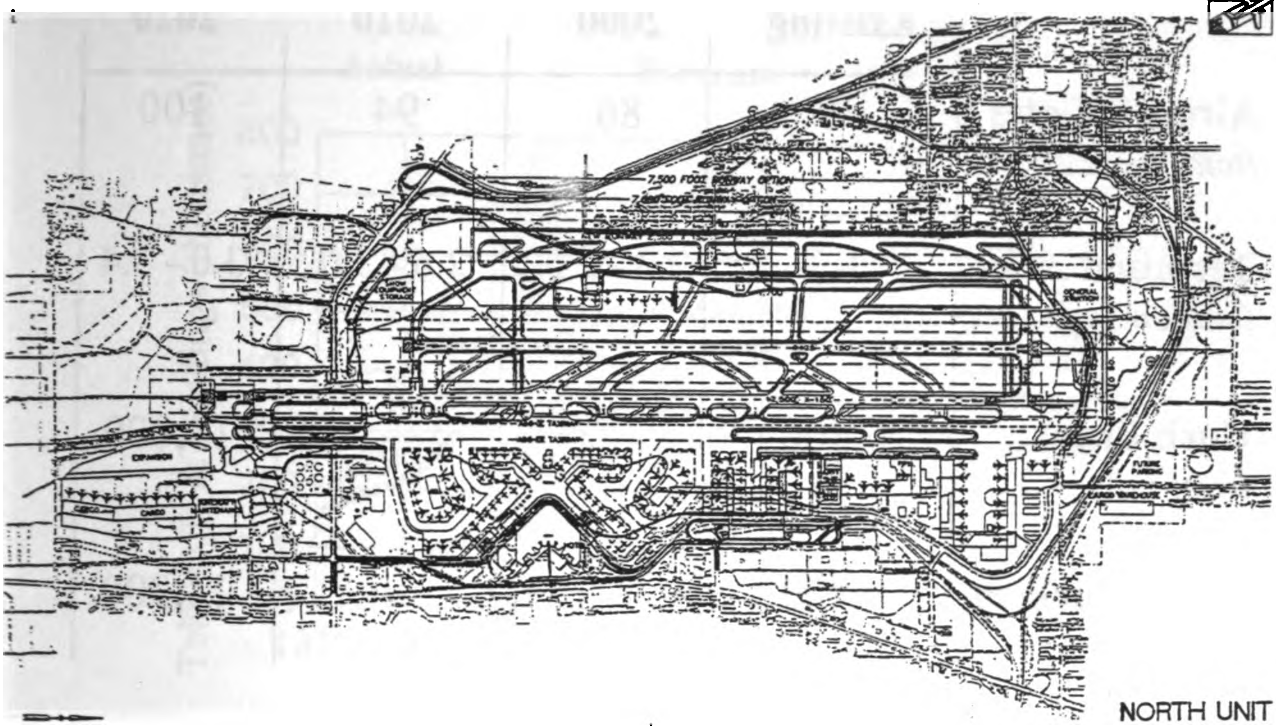
IRPORT MASTER PLAN UPDATE

SEATTLE - TACOMA INTERNATIONAL AIRPORT



AIRPORT MASTER PLAN UPDATE

SEATTLE - TACOMA INTERNATIONAL AIRPORT



NORTH UNIT

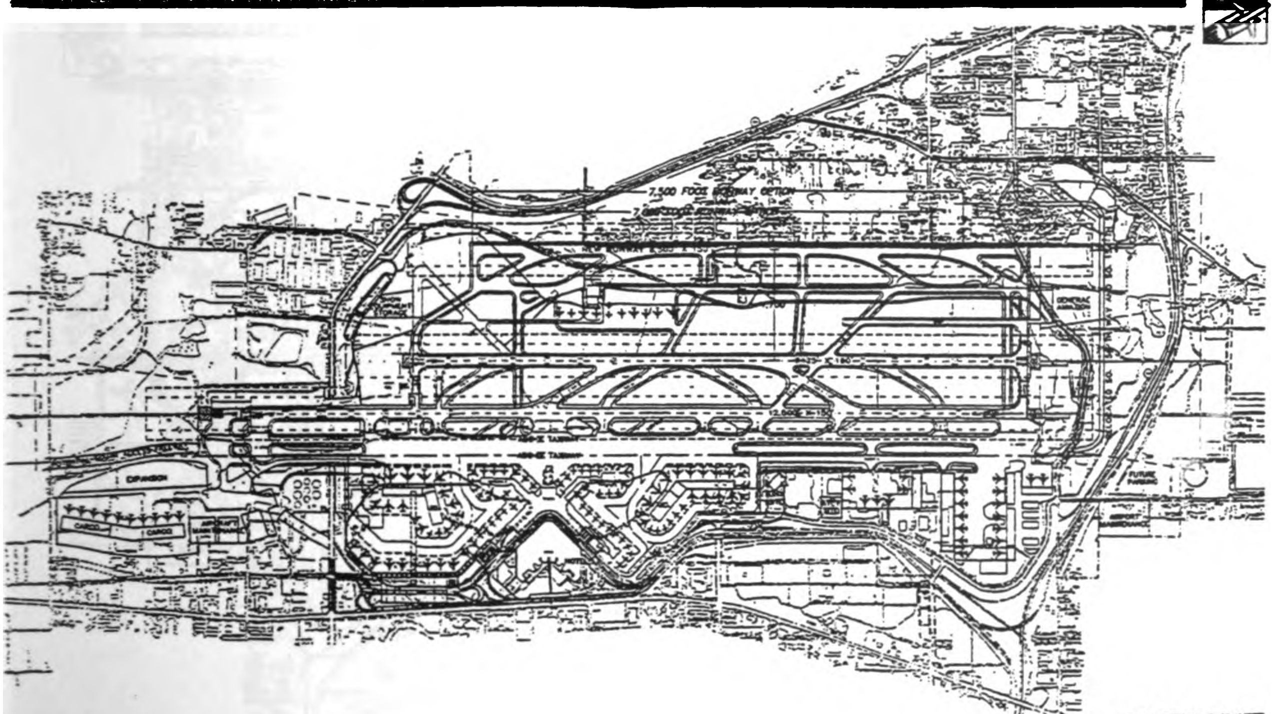
TERMINAL OPTION

The P&D Aviation Team

2030

AIRPORT MASTER PLAN UPDATE

SEATTLE - TACOMA INTERNATIONAL AIRPORT



SOUTH UNIT

TERMINAL OPTION

The P&D Aviation Team

Alternatives Considered

- Use of Other Modes of Transportation
  - Auto/Bus
  - Rail
  - Teleconferencing/Videoconferencing
- Use of Other Airports
  - Use of Existing Airports
  - Development of a New Airport
- Use of Air Traffic/Flight Technology
- Activity/Demand Management
- Development at Sea-Tac Airport
- Blended Alternative
- Do-Nothing/No-Build

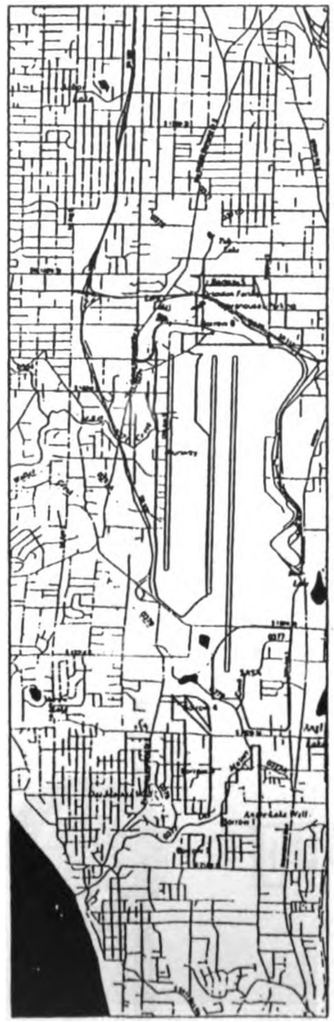
Environmental Impacts

	No Impact	Impact	Significant
Noise			
Land Use			
Cultural, Historic, Archeological			
DOT Section 4(f)			
Prime and Unique Farmland			
Social Impacts			
Human Health Impacts			
Induced Socio-Economic Impacts			
Air Quality			
Water Quality and Hydrology			
Wetlands			
Floodplains			

Environmental Impacts

	No Impact	Impact	Significant
Coastal Zone Management & Barriers			
Wild and Scenic Rivers			
Surface Transportation			
Plants and Animals			
Endangered Species			
Public Utilities and Services			
Earth			
Solid Waste			
Hazardous Waste			
Energy Supply & Natural Resources			
Construction Impacts			
Aesthetics and Urban Design			

Water Resources



Surface and Groundwater Resources:

- Miller Creek
- Des Moines Creek
- Walker Creek
- Unnamed tributaries of Miller and Des Moines Creeks
- Highline Aquifer
- Lora Lake
- Lake Reba Regional Detention Facility
- Northwest Ponds Detention Facility

Class 2. Perennial stream with salmonids.
Class 2. Perennial. Salmonids undetermined.
Class 3. Intermittent stream.
Unclassified stream.
Lake
Water District # 75
Potential Construction Impact Area

Scale 1" = 1,250'
0 2000 4000 6000
SCALE IN FEET

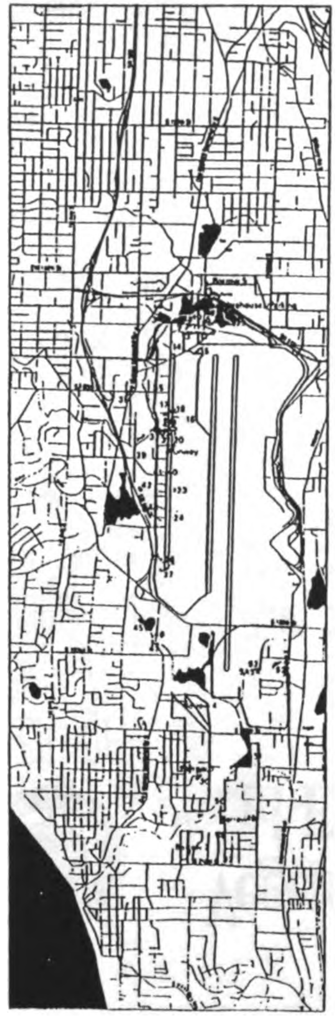
Water Quality/Quantity Impacts

- Realignment/Relocation of:
  - About 3,700 feet of Miller Creek and its tributaries
  - About 2,200 feet of Des Moines Creek (SASA and 34R Extension)
- Increased impervious surface area will increase stormwater runoff rates and volumes by 2% to 11%
- Filling of wetlands: 9 to 10 acres

Mitigation:

- Improved stream habitat
- Detention facilities to mitigate increased stormwater
- Pollutant prevention actions

Wetlands



Master Plan Update will impact about 10 acres of wetlands

- New runway will impact 4 acres of wetland
- 6 acres affected by SASA, warehouse/parking, and south borrow areas

Mitigation

- About 26 acres of new wetland will be created
- "No net loss" policy

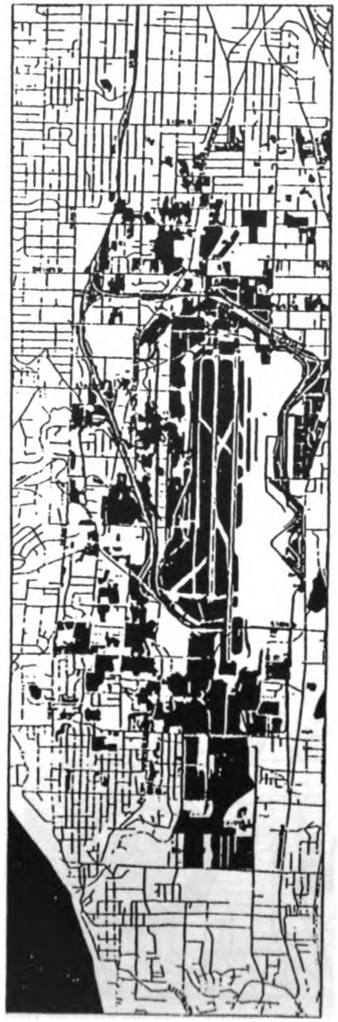
Floodplains

A new 8,500 ft long runway would affect 7 acres of 100-year floodplain

Mitigation:

- 1:1 compensatory mitigation required
- No net loss of flood storage permitted

Vegetation and Threatened and Endangered Species



Vegetation to be removed:

- 303 acres of managed grassland
- 269 acres of forest
- 78 acres of shrub
- 10 acres of wetland
- 52 acres of unmanaged grassland

- Wintering and Resident Bald Eagles and Migrant Peregrine Falcons may use the Airport Area
- no endangered species Critical Habitat will be Affected

Earth Impacts Evaluation

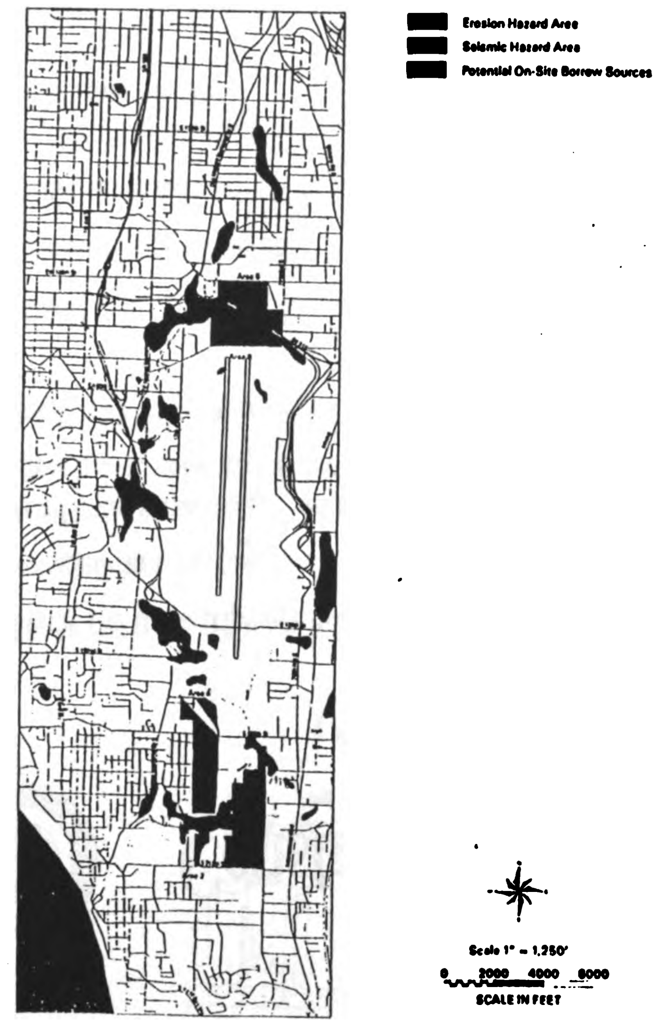
Impacts:

- About 23 million cubic yards needed for Master Plan (17 MCY for the new runway)
- About half of fill needs could be obtained from Port land
- Typical cuts and fills of 30 to 100 feet for new runway

Mitigation:

- An Erosion and Sedimentation Control Plan
- Soft sediment on site of new runway would be excavated to eliminate potential seismic hazards

Earth Impacts



Master Plan Update Construction Activity	Required Fill (Million Cubic Yards)	Shrinkage Adjusted Fill (Million Cubic Yards)
8,500 ft. Third Dependent Runway	17.25	19.84
Runway Safety Area Improvements	0.98	1.13
Relocation of South 154th Street	0.13	0.14
Pre Year 2000 Sub-Total	18.36	21.11
Runway 34R Extension	2.40	2.76
SASA Facilities	2.20	2.53
Post Year 2000 Sub-Total	4.60	5.29
Total Fill Amount Required	22.96	26.40

Summary of Available On-Site Borrow Sources

On-Site Borrow Source	Available Fill Amount (Million Cubic Yards) Minimum	Available Fill Amount (Million Cubic Yards) Maximum	Shrinkage Adj. Fill Amount (Million Cubic Yards) Minimum	Shrinkage Adj. Fill Amount (Million Cubic Yards) Maximum
Area 1	0.00	0.50	0.00	0.00
Area 2	0.33	0.65	0.37	0.75
Area 3	0.00	2.90	0.57	3.34
Area 4	0.30	2.20	0.35	2.53
South Sub-Total	12.13	6.25	1.29	7.20
Area 5	1.10	1.75	1.27	2.00
Area 6	0.00	0.00	0.00	0.00
North Sub-Total	1.10	1.75	1.27	2.00
Total On-Site Fill	2.23	8.00	2.56	9.20
Common Excavation	2.90	3.10	3.34	3.57
Total Available Fill	5.13	11.10	5.90	12.77

Summary of Borrow Source Requirements

Borrow Source	Minimum On-Site (Million Cubic Yards)	Maximum On-Site (Million Cubic Yards)
Common Excavation	3.34	3.57
On-Site Borrow Sources	2.56	9.20
Off-Site Borrow Sources	15.21	8.34
Total Fill Amount	21.11	21.11

Calculated Total Truckloads of Fill

Borrow Source	Minimum On-Site	Maximum On-Site
On-Site Borrow Sources	116,364	418,182
Off-Site Borrow Sources	691,364	379,092
Total Fill Amount	807,728	797,274

Calculated Hourly 2-Way Truck Trips

Borrow Source	Minimum On-Site	Maximum On-Site
On-Site Borrow Sources	20	70
Off-Site Borrow Sources	115	63
Total Hourly 2-Way Truck Trips	135	133

Construction calculations are based on the following assumptions:

- An embankment construction period of 2.5 years (50 weeks per year, 6 days per week, 16 hours per day).
- A truck haul capacity of 22 cubic yards of material.

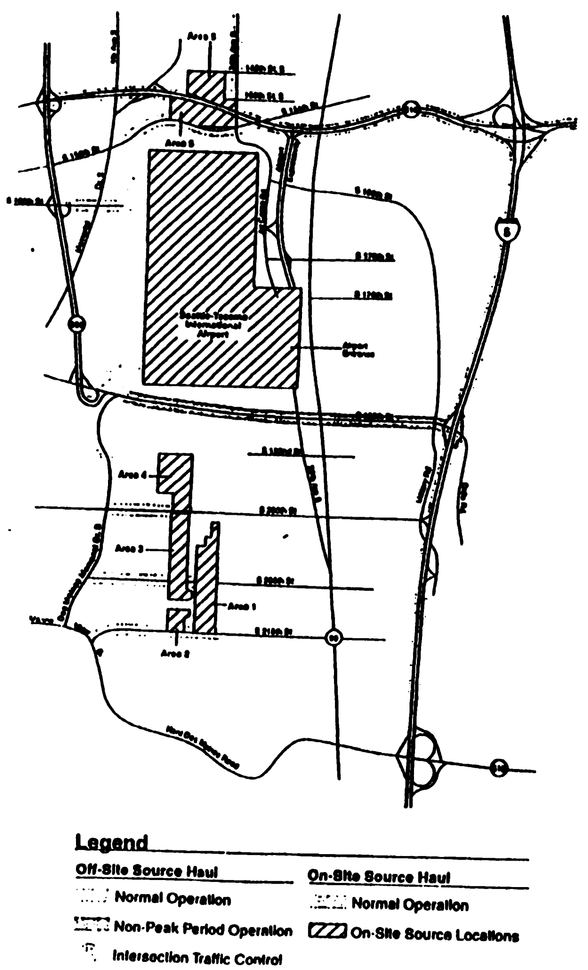
Construction Impacts

- About 135 truck trips per hour
- No significant increase in overall roadway congestion
- Residential areas along haul routes would be affected by construction impacts (air, noise and water pollution)
- Truck trips may cause degradation of roadway pavement

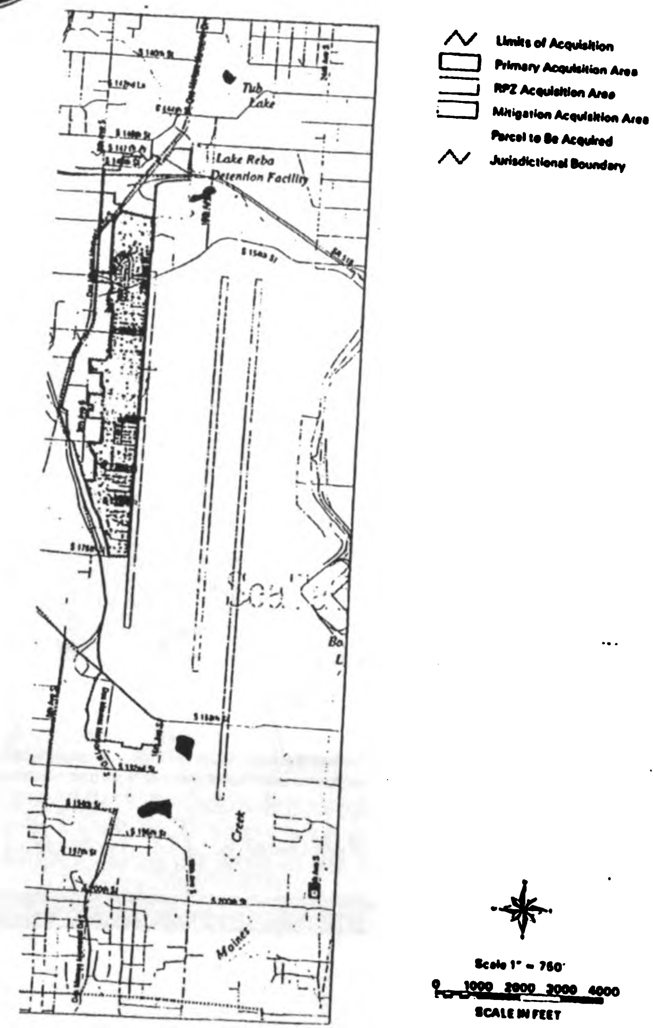
Mitigation:

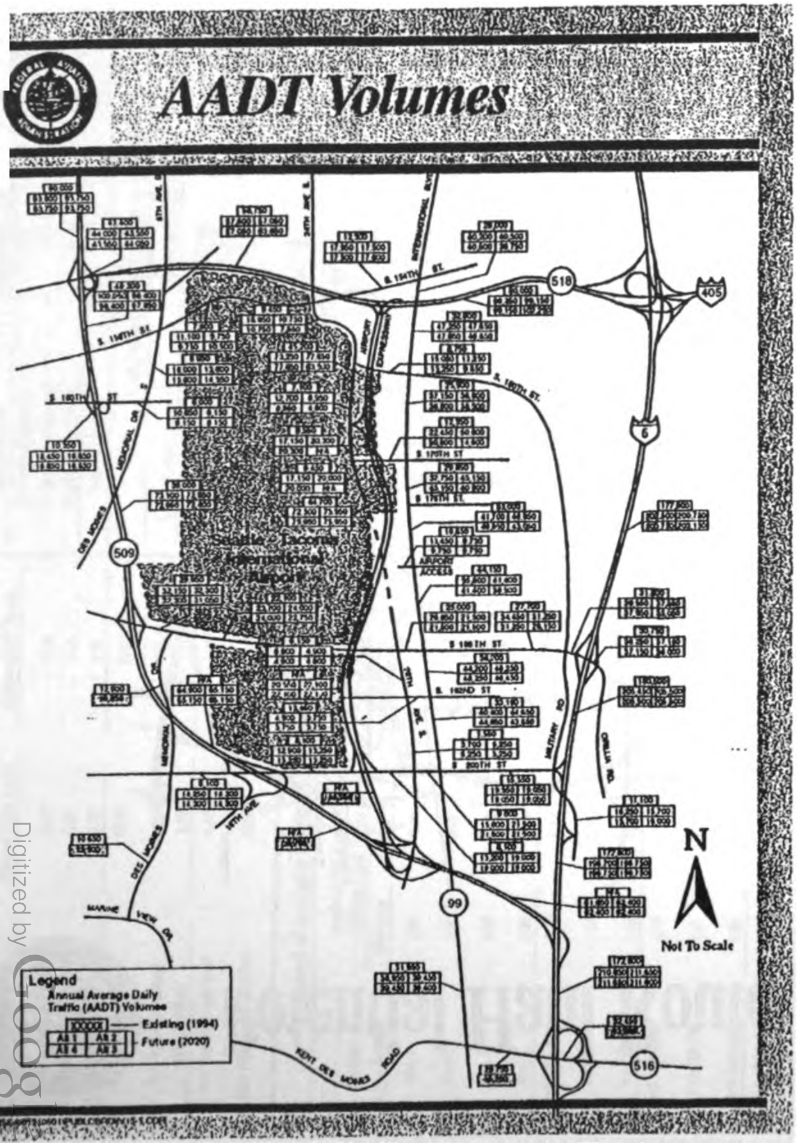
- Detailed Construction and Earthwork Management Plan
- Traffic congestion minimization actions
- Acquisition of homes west of Des Moines Memorial Drive between SR 518 and SR 509

Potential Haul Routes

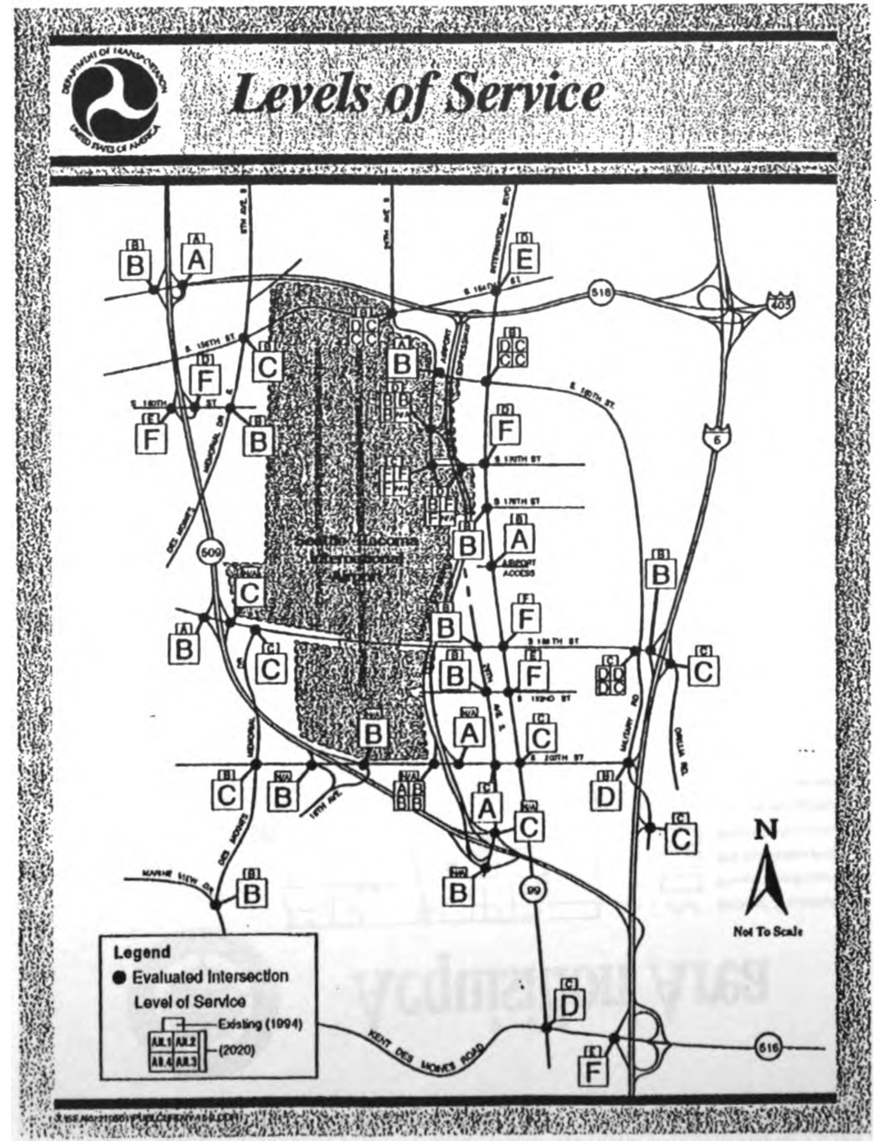


Acquisition Area





AADT Volumes
Seattle-Tacoma International Airport
518
405
6
509
99
516
S. 154TH ST.
S. 156TH ST
S. 160TH ST.
S. 180TH ST.
S 188TH ST
S. 192ND ST
S 200TH ST
MILITARY RD
ORILLIA RD.
MARINE VIEW DR.
DES MOINES
KENT DES MOINES ROAD
AIRPORT ACCESS
N
Not To Scale
Legend
Annual Average Daily Traffic (AADT) Volumes
Existing (1994)
Future (2020)



Levels of Service
DEPARTMENT OF TRANSPORTATION
UNITED STATES OF AMERICA
Seattle-Tacoma International Airport
518
405
6
509
99
516
MILITARY RD
ORILLIA RD.
MARINE VIEW DR.
KENT DES MOINES ROAD
AIRPORT ACCESS
N
Not To Scale
Legend
Evaluated Intersection
Level of Service
Existing (1994)
(2020)

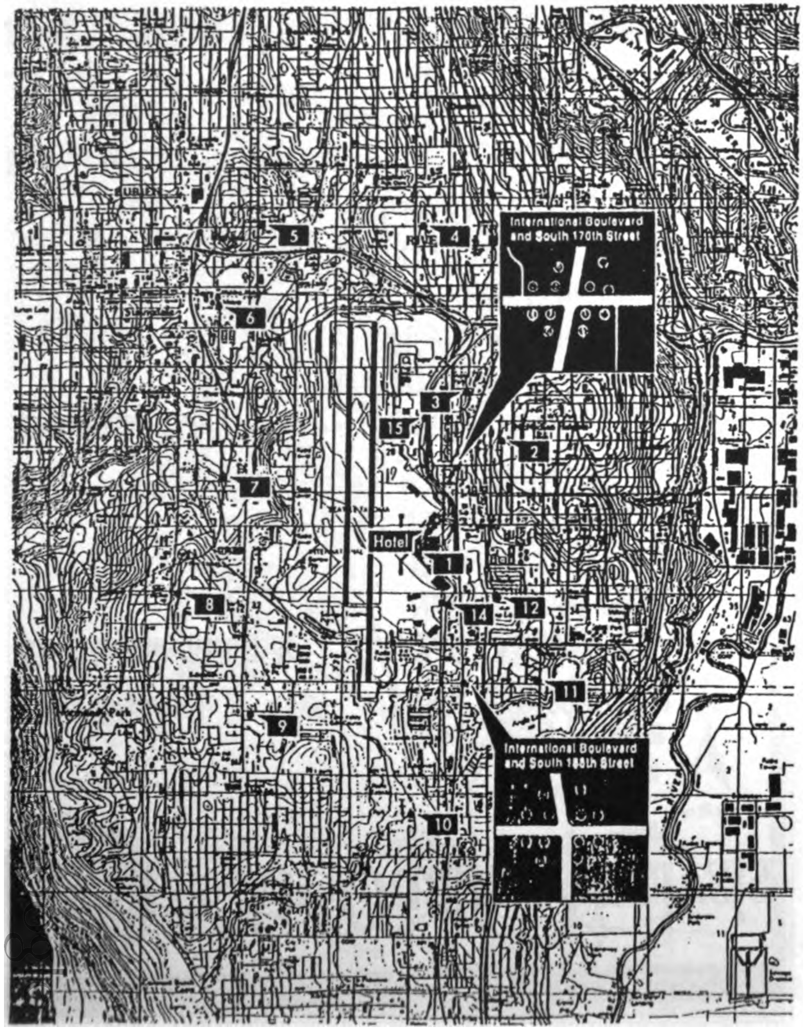
Air Quality Analysis

Years Evaluated:	1994, 2000, 2010, 2020
Air Pollutants Modeled:	Carbon Monoxide (CO), Nitrogen Oxides (NOx), Hydrocarbons (HC), Particulates (PM10), Sulfur Oxides (SOx)
Evaluation Methods:	Aircraft Emissions Inventory Dispersion Analysis Intersection Dispersion Analysis Air Toxics Evaluation Construction Vehicle Emissions Residue Sampling Program
Sources of Pollution Modeled:	Aircraft, aircraft support vehicles, cars, trucks, buses and taxis, parking lots, heating and cooling facilities, aircraft fueling systems, aircraft maintenance, training fires

Results of Air Quality Analysis

- **Cars, trucks, buses, and taxis are the major sources of air pollutants in the Puget Sound Region**
- **Aircraft at Sea-Tac contribute less than 1% of the Region's pollutants for all mobile sources**
- **Aircraft Pollutant Emissions Inventory Emissions increase with or without project**
  - **A new runway:**
    - Results in minor changes in aircraft taxiing patterns
    - Results in minimal changes in emissions
  - **Aircraft emissions are well below the State's goals**
- **Pollutant Dispersion Analysis**
  - **All pollutant concentrations below the standards**
  - **The highest concentrations occurred in the Terminal roadway areas**
  - **No exceedances of the Ambient Air Quality Standards**

Receptor Locations

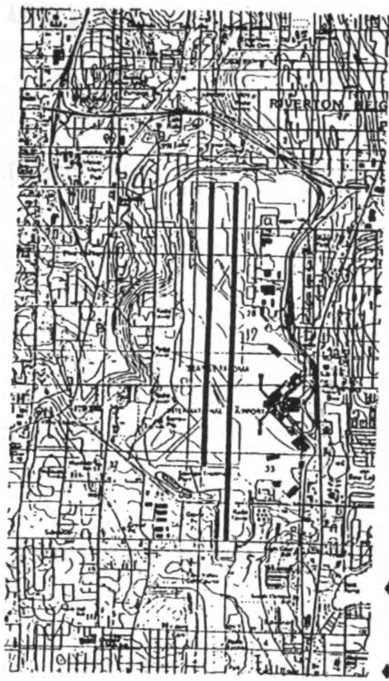


Results of Air Quality Analysis

Roadway Intersection Analysis

- Two congested intersections on International Boulevard evaluated:
  - International Blvd and South 188th Street
  - International Blvd and South 170th Street
- Concentrations would decrease in the future
  - Improvements in automobile emissions offset increases in traffic
- With-Project increases slightly the concentrations over the Do-Nothing
  - Improvements in automobile emissions offset increases in traffic
- Mitigation measures identified

Air Quality Mitigation



Roadway Intersection Impacts

- ♦ Reduce related parking and vehicle trips
- ♦ Consider signalization and lane improvements

Other positive mitigation initiatives:

- ♦ Continued vigorous monitoring to limit vehicle idling in the terminal area
- ♦ Continued support for trip reduction strategies:
  - Employee shuttle bus service
  - Regional light-rail transit system
  - Limit passenger drop-off and pick-up
  - Provide short term metered parking
- ♦ Consider financial disincentives for single occupancy vehicles
- ♦ Consider requiring use of alternative fuels for shuttle buses

Key Findings in Literature on Human Health Impacts

Noise

Research is inconclusive on the effects on cardiovascular system, mortality rates, birth defects, sleep disturbances, and psychological well being.

Air Quality

Exposure to high levels of air toxins may cause cancers.

Water Quality

A contaminated, but still drinkable water supply, may result in unpleasant gastrointestinal effects.

Electromagnetic Fields & Radio Transmissions (EMF)

Studies are inconclusive on the effects of electromagnetic fields on human health.

Aircraft Safety

The airport operates with a low accident/incident ratio.

Human Health — Project Impacts

Noise

Off-airport noise levels are not expected to adversely impact human health.

Air Quality

Air quality levels are typical for an urban area. Levels with the project will be within primary air quality standards (designed to protect human health).

Water Quality

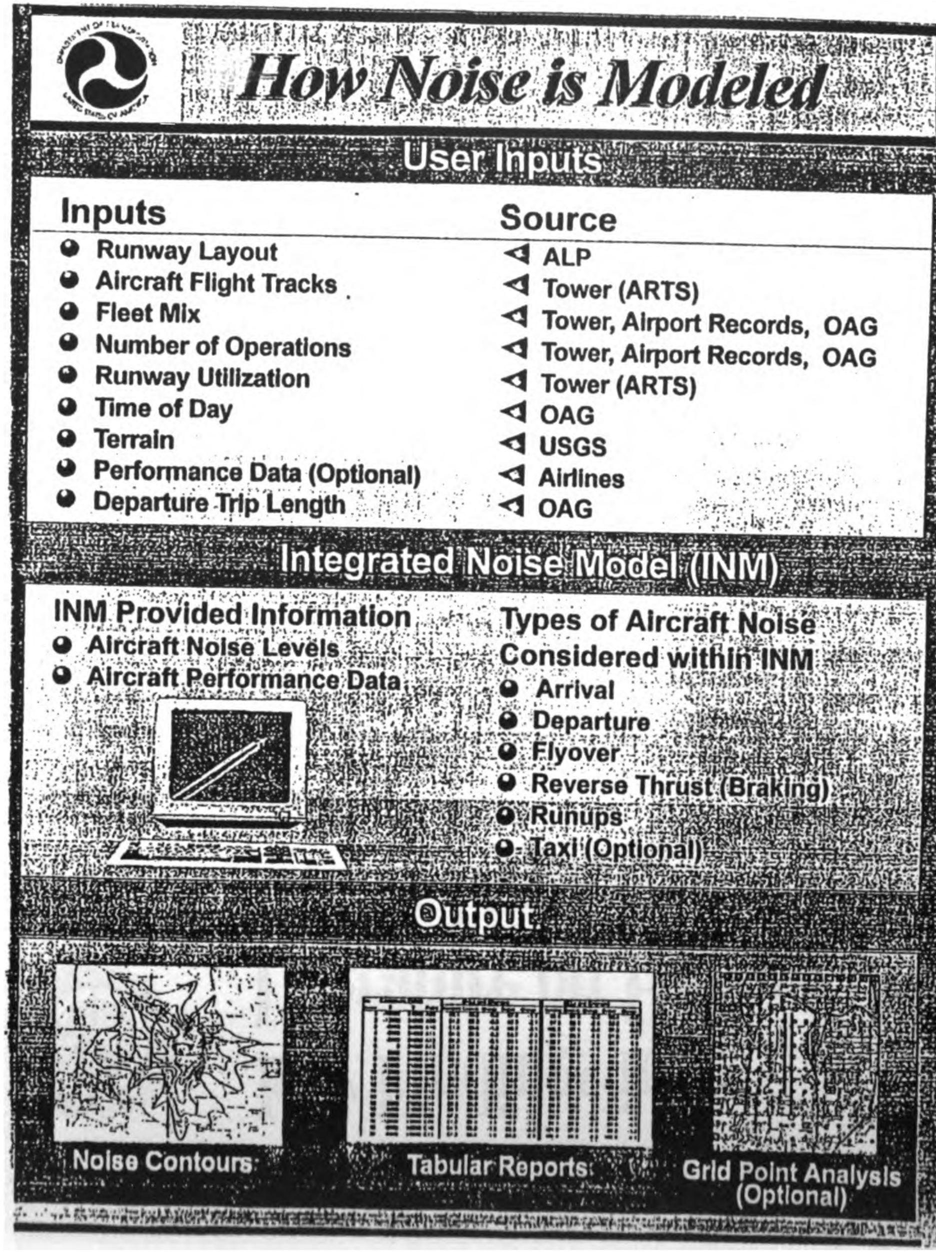
Spill Prevention Control and Countermeasure Plan will prevent pollutants from reaching the drinking water supply.

Electromagnetic Fields & Radio Transmissions (EMF)

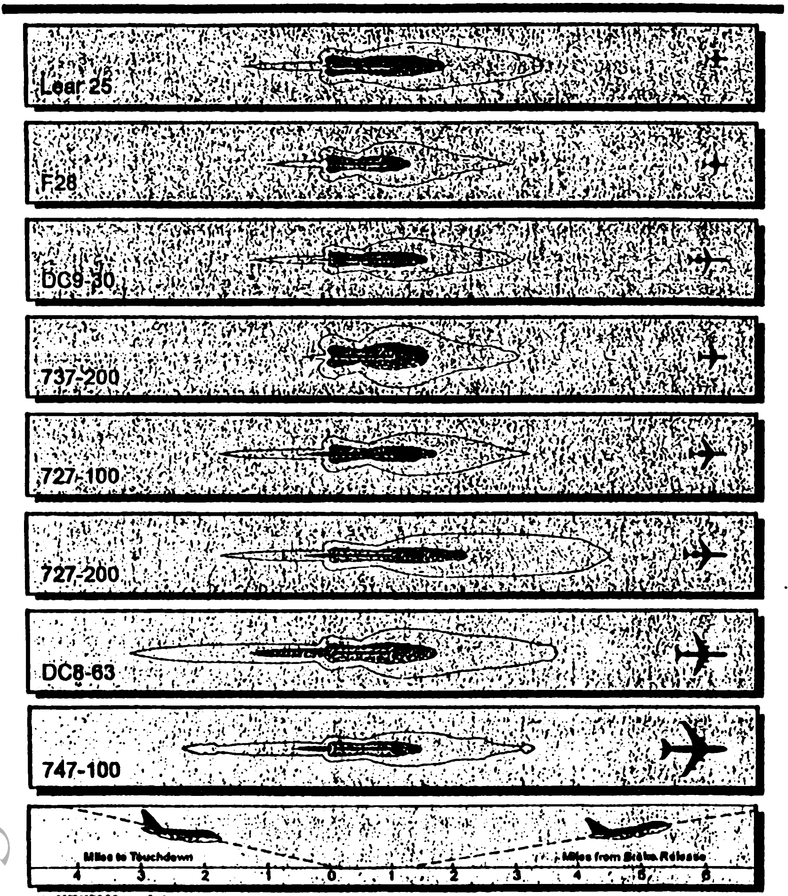
EMF from airport operations is low compared to other, off-airport sources of EMF.

Aircraft Safety

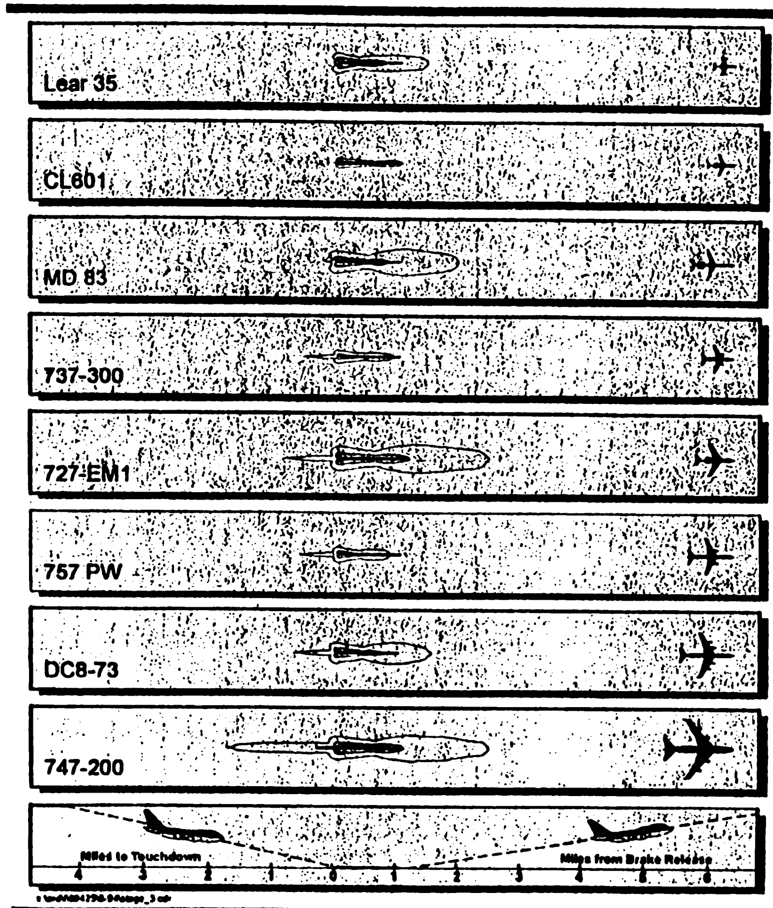
Sea-Tac is one of the more advanced airports. As a result, aircraft accidents/incidents are low.



Stage 2 Jet Footprints



Stage 3 Jet Footprints

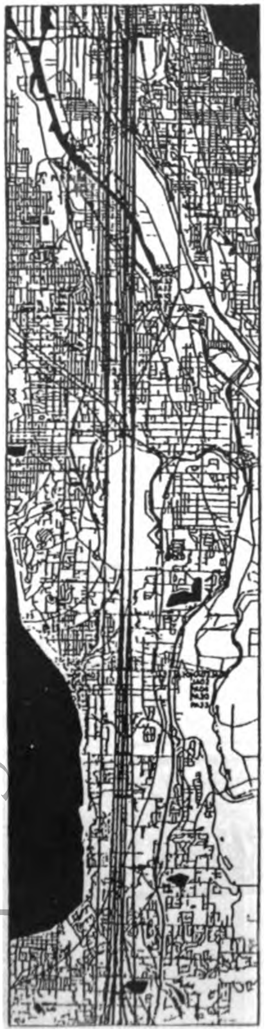


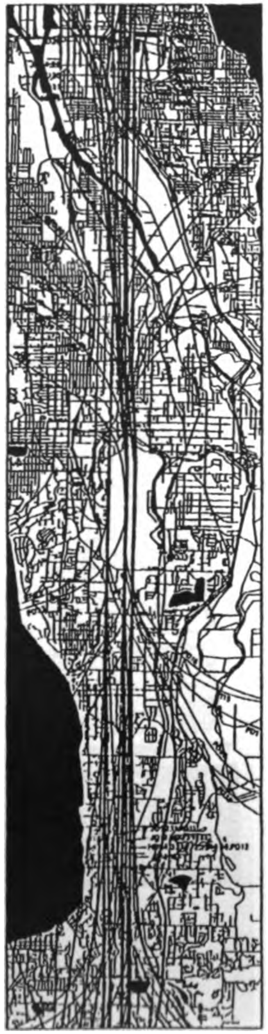
Existing & Future Flight Tracks

Existing Arrival or Takeoff Track
Future (New Runway) Arrival Track
Future (New Runway) Takeoff Track

Track Naming Convention:

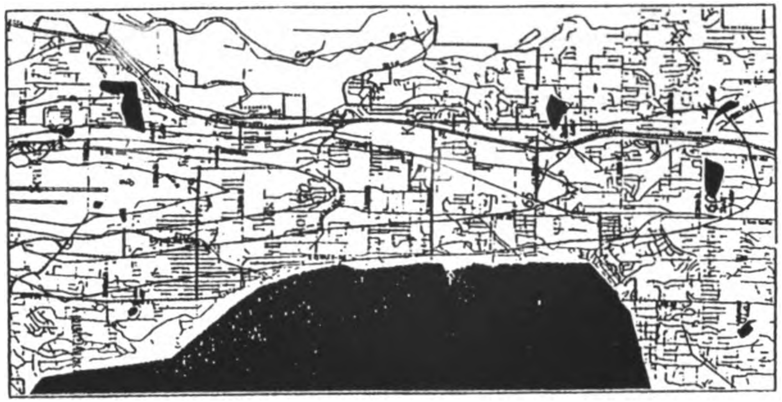
JDxx - Jet Takeoff Track (< 300,000#)
JAxx - Jet Arrival Track (< 300,000#)
PDxx - Prop Takeoff Track
PAxx - Prop Arrival Track
HDxx - Heavy Jet Takeoff Track (> 300,000#)
HAxx - Heavy Jet Arrival Track (> 300,000#)





Scale 1" = 3,000'
0 5000 10000 15000
SCALE IN FEET

Existing Noise Exposure Contours



DNL Noise Contour
Jurisdictional Boundary

Scale 1" = 2,000'
0 2500 5000 7500 10000
SCALE IN FEET

Year 2020 Noise Exposure Contours —Do Nothing Alt.

DNL Noise Contour
Jurisdictional Boundary

Scale 1" = 2,000'
0 2500 5000 7500 10000
SCALE IN FEET

2045

Year 2020 Noise Exposure Contours —Alt 2

DNL Range	Area*	Population	Dwelling
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
Greater than 75	0	0	0
Greater than 65	[illegible]	[illegible]	[illegible]

* [illegible]

DNL Contours (Alternative 2)
DNL Contours (Do Nothing)
Area of Noise Increase with Project
Area of Noise Decrease with Project
Area Not Changing DNL Contour Range
Jurisdictional Boundary

Scale 1" = 2,000'
0 2500 5000 7500 10000
SCALE IN FEET

Year 2020 Noise Exposure Contours —Alt 3

DNL Range	Area*	Population	Dwelling
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	0	0	0
[illegible]	[illegible]	[illegible]	[illegible]

DNL Contours (Alternative 3)
DNL Contours (Do Nothing)
Area of Noise Increase with Project
Area of Noise Decrease with Project
Area Not Changing DNL Contour Range
Jurisdictional Boundary

Scale 1" = 2,000'
0 2500 5000 7500 10000
SCALE IN FEET

2046

Year 2020 Noise Exposure Contours —Alt 4

DNL Range	Area*	Population	Dwelling
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	0	0	0
[illegible]	[illegible]	[illegible]	[illegible]

DNL Contours (Alternative 4)
DNL Contours (Do Nothing)
Area of Noise Increase with Project
Area of Noise Decrease with Project
Area Not Changing DNL Contour Range
Jurisdictional Boundary

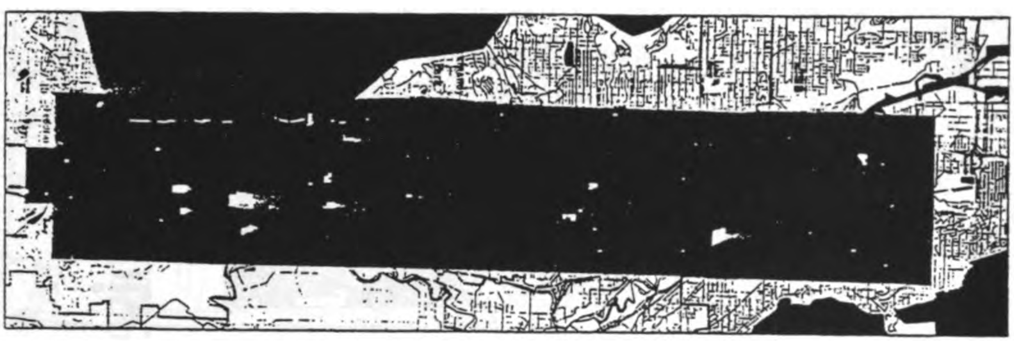
Scale 1" = 2,000'
0 2500 5000 7500 10000
SCALE IN FEET

Noise Impacts

POPULATION												
Noise	**1994**	**2000**				**2010**				**2020**		
Exposure		Alt 1	Alt 2	Alt 3	Alt 4	Alt 1	Alt 2	Alt 3	Alt 4	Alt 1	Alt 2	Alt 3	Alt 4
65-70 DNL	26,230	8,250	9,220	9,220	9,220	8,690	9,190	9,180	9,180	9,860	10,480	10,450	10,480
70-75 DNL	5,570	720	670	670	670	760	680	680	680	940	790	790	790
75 DNL/Greater	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL 65 DNL+	31,800	8,970	9,890	9,890	9,890	9,450	9,870	6,860	9,860	10,800	11,270	11,240	11,270
NOISE SENSITIVE FACILITIES													
Schools	29	12	7	7	7	11	8	8	8	13	12	12	12
Churches	24	12	10	10	10	12	10	10	10	13	10	10	10
Libraries	2	0	1	1	1	0	1	1	1	1	1	1	1
Hospitals/ Nursing Homes	3	1	0	0	0	10	0	0	0	1	1	1	1
Public Parks/ Rec. Facilities	12	4	4	4	4	4	4	4	4	4	5	5	5

2047

Generalized Existing Land Use



Single Family Residential
Multi-Family Residential
Mobile Home Park
Commercial
Manufacturing/Light Industry
Public Facilities
Government Services
Parks, Agricultural Lands, Freeways
Water Resources and Recreation
Airport
Jurisdictional Boundary

Scale 1" = 3,000'
0 3000 10000 15000
SCALE IN FEET

Generalized Future Land Use: Comprehensive Plan Designations

- Low Density Residential
- Medium and High Density Residential
- Commercial
- Industrial
- Airport
- Parks and Open Space
- Institutional
- Water Body
- Jurisdictional Boundary

Scale 1" = 3,000'
0 5000 10000 15000
SCALE IN FEET

Noise Sensitive Facilities

- School
- Library
- Church
- Hospital or Nursing Home
- Section 4(f) Park/Recreation Area
- Non-Section 4(f) Park/Rec. Area
- Archaeological Site
- National Historic Site
- State Historic Site
- Inventoried Historic Site

Scale 1" = 3,000'
0 5000 10000 15000
SCALE IN FEET

Noise Remedy Area — 2020 Contours

Jurisdictional Boundary
Noise Contours of 65 DNL and Above
60 DNL Noise Contour
Proposed Approach Transitional Zone and RPZ for the New Parallel Runway
Noise Remedy Program Zones:
Remedial Acquisition
Custom Remedial Measures
Standard Remedial Measures

Scale 1" = 3,000'
0 5000 10000 15000
SCALE IN FEET

Acquisition Area — 8,500 Runway

Limits of Acquisition
Primary Acquisition Area
RPZ Acquisition Area
Mitigation Acquisition Area
Parcel to Be Acquired
Jurisdictional Boundary

Scale 1" = 750'
0 1000 2000 3000 4000
SCALE IN FEET

Noise Mitigation

Current Noise Abatement Measures

- Noise Budget--Limits Total Noise Energy Until Carriers are Stage 3
- Nighttime Limitations Program--Limits Hours for Stage 2 Aircraft
- Ground Noise Control--Reduces Noise of Power-backs and Run-ups
- Flight Corridorization--Maintains Runway Heading of Jet Flight Tracks
- Flight Track/Noise Monitoring--Maintains Records to I.D. Deviations

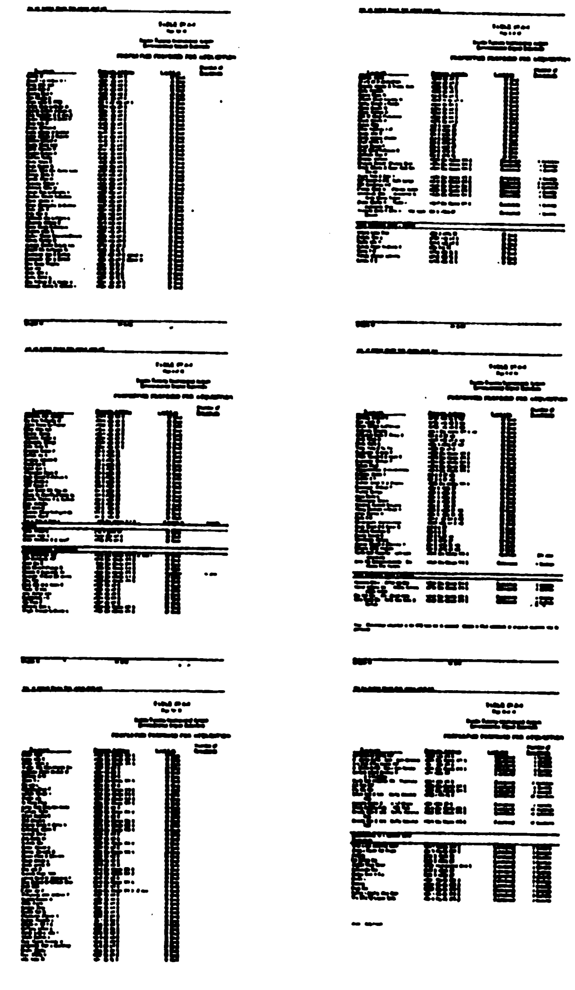
Current Land Use Remedy Measures

- Acquisition and Relocation--Purchase of Homes Exposed to 75 DNL
- Insulation and Transaction Assistance--Sound Insulate Homes and Schools in 65-75 DNL Area; Assist Home Sellers in 70-75 DNL Area
- Community Involvement--Active Roles by Citizens on Committees

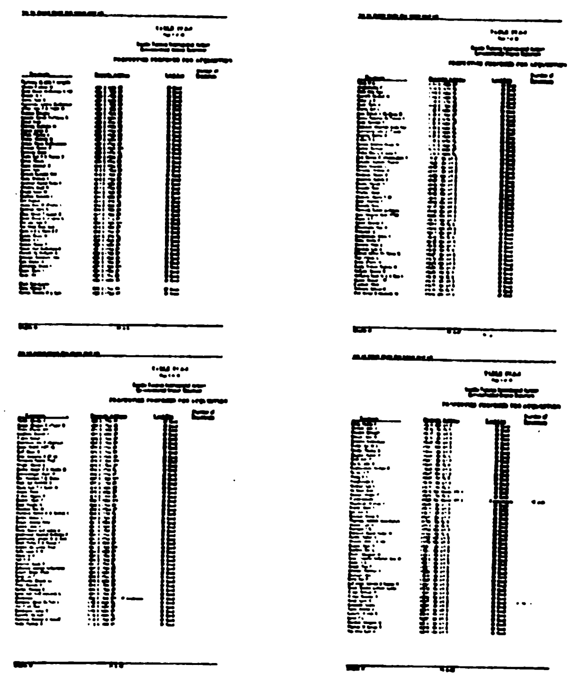
Proposed Remedy Measures

- Mitigate for Significant Noise Impacts--Extend Current Land Use Remedies to Six Project-Impacted Homes and Noise-Sensitive Facilities Not Now Covered by Program
- Provide Directional Soundproofing--Some homes insulated prior to 1992 may require additional insulation on newly exposed side of house; might affect 300-500 homes
- Acquire Homes in Approach Transitional Area—Extend a 5,000 ft. Long, 2,500 ft. Wide Buffer Area from Each End of New Runway; Would Affect up to 153 Homes

Homes Proposed for Acquisition



Homes Proposed for Acquisition



Project-Impacted Noise-Sensitive Uses

Uses Impacted Above Significant Levels—1.5 DNL increase due to project build vs. no-build—years 2000, 2010, 2020

Institutions Above 65 DNL

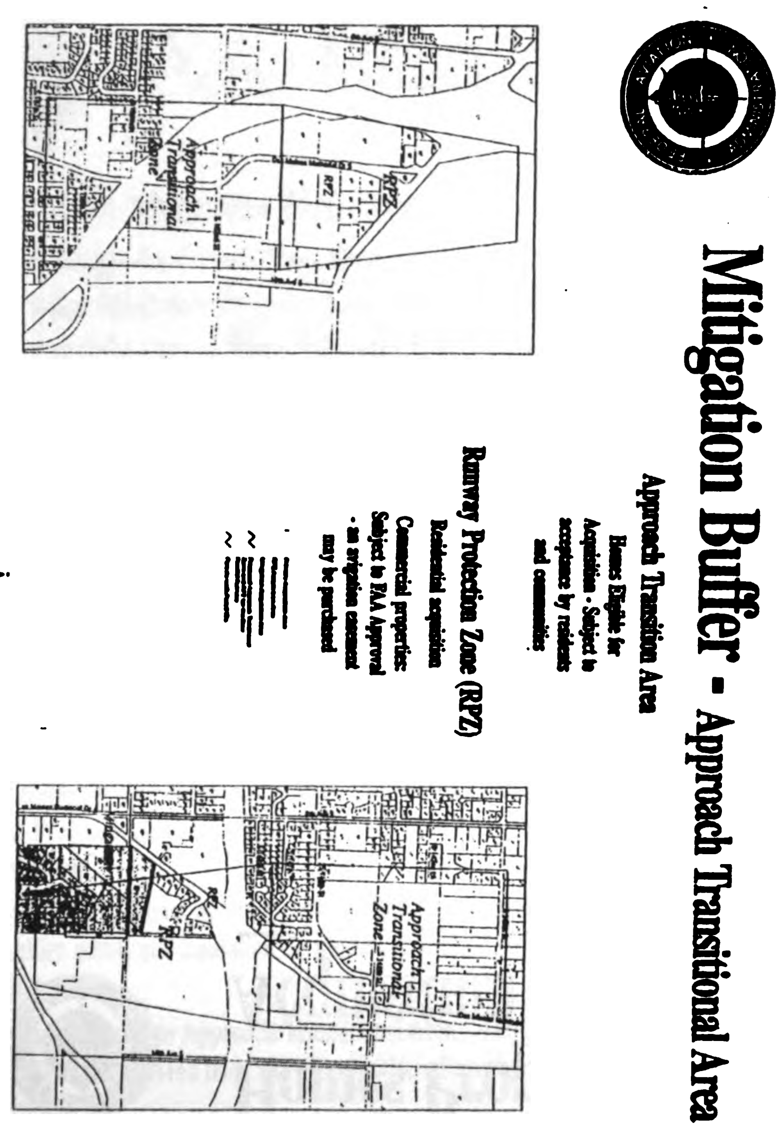
- Sea-Tac Occupational Skills Center—3.1 DNL increase
- Marine Technology Laboratory—3.1 DNL increase
- Woodside Elementary School—1.7 DNL increase (currently a Administration Center)
- Sunny Terrace Elementary School—2.6 DNL increase (currently a Mental Health Facility)

Public Parks and Recreation Areas Above 75 DNL

- None Impacted

National Register-Eligible Historical/Cultural Sites Above 65 DNL

- None Impacted



CITY OF BURIEN

415 Southwest 150th Street
Burien, Washington 98166-1973

Phone: (206) 241-4647
Fax: (206) 248-5539

Mayor

Deputy Mayor

Councilmembers

TESTIMONY

Arun Jhaveri, Mayor
City of Burien

TO: Federal Aviation Administration / Port of Seattle at the Red Lion Hotel in SeaTac, Washington

FOR: Response to the Draft Environmental Impact Statement (DEIS)

RE: Chapter II -- Purpose and Need and Alternatives for Satisfying the Need.

Summary: My name is Arun Jhaveri, a resident of Burien since 1967 and also the Mayor of the City of Burien since incorporation in 1992. I am here to provide both the general and specific comments on Chapter II of the DEIS: "Purpose and Need."

A. General Comments:

R-1-7

1. It is absolutely critical that both the Federal Aviation Administration (FAA) and the Port of Seattle (POS), as the joint lead agencies for this DEIS and the anticipated Final EIS, clearly and categorically state in writing that they are both equally and fully responsible, as well as legally accountable, for the total contents of the EIS, no matter whether the documented adverse and unavoidable environmental impacts from the proposed master plan/airport expansion activities are of local, regional, statewide or national significance.

2. In no way, a preparation of the DEIS and Final EIS by these two lead agencies, constitute an approval or appeal of approval, of the proposed master plan/airport expansion project, irrespective of the multi-million dollars expended in preparing such a document. On the contrary, the DEIS and final EIS, as required by the applicable state and national laws, must go through a detailed scrutiny as part of the public review and decision-making processes that can very well completely reject the

proposed action as not in the public interest, cost-prohibitive and/or creatin: ...ersible damage to the human, natural and physical environments. R-1-7

B. Specific Comments:

1. The DEIS provides no support for its conclusive assumption that "with or without airport development, airport activity is expected to increase as a consequence of regional population growth." R-3-7

2. The DEIS defines the need to address poor weather airfield operating capability in such a way that it appears to preclude consideration of any alternative other than a third 7,000 to 8,500 foot runway. R-4-1

3. There are glaring contradictions between the DEIS and its direct relation to the Flight Plan Final EIS (the DEIS incorporates by reference the Flight Plan Final EIS) R-3-9

   - According to the Flight Plan Final EIS, increasingly lengthy delays at the Sea-Tac International Airport, during poor weather conditions, would result in airlines rescheduling and diverting aircraft to other airports and contribute to a decline in the scheduling of new service;

   - Based on the above documented discrepancy, the kind of growth in demand projected in the DEIS is not inevitable; the Flight Plan Final EIS indicates that it would not occur;

   - The Flight Plan Final EIS concludes that a third runway is needed to attract new capacity to Sea-Tac, while the DEIS asserts that a third runway is necessary to accommodate growth in demand that would inevitably occur.

Therefore, the fundamental question remains, namely "what is the purpose and need for the proposed airport expansion? To foster an increase in demand or to accommodate an inevitable growth in demand?

In conclusion, the DEIS makes a gross error in judgment with its assumptions that defy common sense to think that the airlines and the flying public would countenance the kinds of delays the Port projects to occur as a result of an "inevitable" increase in demand. Thanks.

Federal Aviation Administration
and
Port of Seattle
Public Hearing on

The Draft Environmental Impact Statement
for the Proposed Master Plan Update
at Seattle-Tacoma International Airport

Red Lion Hotel
18740 Pacific Highway South
Seattle, Washington

June 1, 1995

Statement by
Guy H. Cunningham
General Counsel

Battelle, Pacific Northwest Laboratories
P.O. Box 999
Richland, WA 99352

Good Afternoon:

My name is Guy Cunningham, and I am General Counsel of the Pacific Northwest Laboratory in Richland, Washington, operated by Battelle Memorial Institute.

I am here this afternoon to express the Laboratory's support and endorsement for the proposal to build a third runway at the Seattle-Tacoma International Airport. Because we are located in Eastern Washington, I believe it would be inappropriate for me to comment on specific impacts to the Seattle-Tacoma environment such as noise, land use, and so forth; so I will limit my remarks to socio-economic considerations as they relate to Battelle and the U.S. Department of Energy's Pacific Northwest Laboratory.

Battelle has operated the Pacific Northwest Laboratory in Richland for the federal government since 1965. We conduct research and development programs in environment, energy, health, and national security. Currently, we have about 4,000 employees, and our business volume in 1994 was $548 million.

While our work is funded largely by the Department of Energy, our current customer base includes other domestic and foreign government agencies and industries. Our business dealings with these customers involve frequent air travel, on their part as well as ours, and we depend upon the adequacy of services provided by the Seattle-Tacoma International Airport. If recent trends continue, we will rely on Sea-Tac even more heavily in the future.

In 1991, more than 7,500 people—360 of them from other countries—visited the Pacific Northwest Laboratory. Last year, the total exceeded 10,000 and included almost 800 foreign nationals—more than double the number just four years earlier. These visitors came from all 50 states and 65 nations; but the majority of our foreign visitors, 78 percent, arrived from Europe or Asia most often through Sea-Tac.

Battelle staff members also travel extensively. Over the past three years, they have averaged more than 17,000 business trips per year, quite a number of them to the Seattle area where we have many business interests. In fact, our Marine Sciences Laboratory is located at Sequim on the Olympic Peninsula. We value Sea-Tac not only for the air service it provides but also for its convenient proximity to one of our most active customer bases.

Our staff also averaged more than 450 business trips to foreign countries in 1993 and again in 1994, and they have traveled overseas 360 times during the first eight months of fiscal year 1995. Speaking for myself, I assure you that I appreciate the convenience of having an international airport less than an hour's flying time from my home. In April I flew from Sea-Tac to Copenhagen in just nine hours. I was traveling for pleasure rather than business, and the non-stop flight was definitely far more convenient than the alternative—flying from Pasco, to Salt Lake City, and then on to New York or Atlanta before making international connections.

With the greatest numbers of our customers traveling from the United Kingdom, Japan, Russia, China, India, and South Korea, easy access to an international airport that provides non-stop air service to cities such as Copenhagen, London, Tokyo, and Seoul is truly an asset to Battelle, the Pacific Northwest Laboratory, and the Tri-Cities.

The addition of the 8,500-foot runway appears to be the most sensible, cost-effective answer to expected increases in aviation demand resulting from regional growth and delays caused by single arrival stream during poor weather. As Northwest businesses and industries become more fully engaged in the global marketplace, convenient, accessible air service becomes an increasingly important asset. Reliable air service enables organizations such as Battelle to do business beyond the boundaries of the United States and, at the same time, it establishes the Seattle-Tacoma area as a major international hub and stimulates the economic development of the Pacific Northwest.

Thank you for the opportunity to comment this afternoon. I have a copy of my statement which I will leave for the record.

CITY OF FEDERAL WAY 33530 1ST WAY SOUTH
(206) 661-4000
FEDERAL WAY, WA 98003-6210

June 1, 1995

Dennis Ossenkop
ANM-611
Federal Aviation Administration
1601 Lind Avenue S.W.
Renton, Washington 98055-4056

Re: *Draft Environmental Impact Statement on Seattle-Tacoma International Airport's Master Plan Update*

Dear Mr. Ossenkop:

<u>Introduction</u>
Good afternoon, we are Mayor Mary Gates and City Council Member Skip Priest representing the citizens of the City of Federal Way. We would like to begin our remarks this afternoon by thanking the Federal Aviation Administration ("FAA") for extending the comment period on the draft environmental impact statement ("EIS") for this project. In addition to the extended comment period, the City is appreciative of the second public hearing scheduled in Federal Way on June 14, 1995. The City of Federal Way will have additional City Council representatives testifying on behalf of the Federal Way community at that hearing.

R-6-1A

The project upon which the public is being asked to comment is one with potentially devastating results to Federal Way. The addition of a new runway will result in significant disruption to our community. There is no single more important issue facing Federal Way residents today than the proposed addition of a third runway at Seattle-Tacoma International Airport ("SeaTac").

The Federal Way City Council responded to this concern with passage of Resolution No. 91-56. This Resolution, which is attached to my written comments, opposes construction of a third runway at SeaTac.

Although not an exclusive factor, Federal Way's proximity to Seattle-Tacoma International Airport ("SeaTac") plays an important role in growth and development of certain elements of the city's economy. However close proximity to SeaTac also introduces significant impacts on the health, welfare and economy of area residents.

Complexity of these issues requires a careful balance between economic, social and environmental issues within Federal Way. The city's approach on regional air transportation issues to date has encouraged careful consideration and protection of sensitive residential areas.

However, Federal Way has also encouraged viable alternatives to expansion at SeaTac to foster continued economic growth and development within the Puget Sound region. This position was confirmed by the city's recent adoption of Resolution 95-195, also attached to my written comments, encouraging statewide search for a major supplemental airport as an alternative to expansion at SeaTac.

Direct Adverse Impacts

Analysis and recommendations of the EIS are highly technical and require special expertise to review, understand, and comment upon. This document has taken months to prepare, involves extensive professional expertise, and is backed by millions of the Port's dollars. The EIS, containing no less than six full inches of technically complex analysis of airport impacts, will take every day of the ninety-day comment period for Federal Way and other citizens to provide meaningful comments.

Opportunity for commenting on the NEPA EIS presupposes meaningful input from the public. It is critical for both the City and you, as lead agency, to fully understand and address the potential for significant adverse impacts resulting from the addition of a third runway at SeaTac before any final action is taken.

Previous decisions by the Port of Seattle ("POS") and FAA on the four post pattern, passenger facility charges and nighttime limitations program have been made in spite of overwhelming opposition or challenge. We hope, against the odds, for some recognition of this loud and compelling voice of the people to play a part in your decision on this project. But reality, and the history of this project, compels us to expect that your decision on the third runway will be no different.

R-5-2

Based on our initial review to date, one feature of the EIS conspicuous in its absence is the lack of meaningful evaluation of impacts beyond the immediate airport area. This is particularly true of impacts to the City of Federal Way. Although background data was collected within Federal Way, many of the graphics depicting impact analysis appear to have lopped off the Federal Way community entirely.

The lack of analysis to outlying regions formed the basis of the previous Ninth District Federal Court challenge to SeaTac's four post plan. It is hoped that FAA would have learned by this example and corrected this deficiency in order to prevent similar litigation for the current proposal.

Expansion of SeaTac will have serious negative effects on our community by reducing property values, increasing community uncertainty, disrupting community planning, reducing private investment, and seriously degrading quality of life. I hope I am wrong, but the EIS appears to be fatally flawed in that it fails to mention, except in passing, the specific level of impacts on the City of Federal Way as a result of the third runway. As I mentioned, more specific analysis and written comments on the EIS will be forthcoming to address these issues.

R-5-4

As we have previously commented to FAA and the POS, Federal Way suffers from at least three direct adverse impacts from SeaTac. First, noise is the primary impact resulting from commercial overflights. Aircraft noise has become increasingly worse within Federal Way due to both the increased number of flights, and shifting of the four post pattern.

The City has actively pursued a reduction in aircraft noise impacts through the Part 150 noise exposure map process, negotiations with FAA on the four post pattern, and our involvement with the POS through this master plan update process.

The City will also suffer health and economic related impacts as a result of any decision to expand the capacity of SeaTac. In terms of overall quality of life, aircraft noise disrupts area residents sleep, affects mental health, disrupts learning, and disrupts enjoyment of our outdoor environments associated with homes, businesses and public facilities.

In terms of regional economic growth, Federal Way holds some of the last significant affordable housing and business opportunities in the region. Further impacts from SeaTac, particularly aircraft noise impacts, will make this area less desirable for economic growth. This is not only true for the City of Federal Way but also the region as a whole. Negative impacts to area citizens have been lightly dismissed over the years by FAA and the POS.

In terms of economic prosperity for this region, it is in SeaTac's best interest to protect our area from adverse impacts to ensure that the region's growth will continue to prosper. Without a livable environment, businesses and their employees will look at alternative areas outside the region in which to locate, and to live.

In the press, those who support the third runway are called "regionalists." Those of us who oppose the runway are termed "NIMBYS." In fact, the opposite is true. South end communities, with their quality schools, affordable housing and reasonably priced commercial property is the last area within the Puget Sound region that can compete nationally.

R-16-9

More specifically, sixty percent of Federal Way's property tax revenues come from residential properties. Property taxes account for 13 percent of the City's total budget. Our research indicates that moderate noise levels, within the 65 to 70 DNL range reduces home values from between 3.9 to 7.7 percent overall.

It is estimated that ten percent of Federal Way's residential properties are encumbered by the 65 DNL contour. Therefore we have estimated that the total assessed valuation for this area is reduced from between $6.7 million to $15.5 million due to aircraft noise exposure under existing conditions. The issues have not been adequately addressed in the EIS. R-16-9

Summary
As evidenced by the people here today, citizens of this region will accept nothing less than a thorough, reasoned review of all impacts to all citizens. We look forward to submittal of written, technical comments on the EIS addressing the specific deficiencies of adverse impacts. Again, thank you for this opportunity to publicly comment on this proposal.

Sincerely,

Mary E. Gates
Mary E. Gates
Mayor

Sincerely,

Skip Priest
Skip Priest
Federal Way City Council

c: Federal Way City Council
Kenneth E. Nyberg, Federal Way City Manager
Greg Fewins, Federal Way Senior Environmental Planner
Pat Davis, Port of Seattle Commissioner
Gary Grant, Port of Seattle Commissioner
Paul Schell, Port of Seattle Commissioner
Jack Block, Port of Seattle Commissioner
Paige Miller, Port of Seattle Commissioner
Randy Tate, U.S. Congressional Representative, 9th District
Jim McDermott, U.S. Congressional Representative, 7th District
Slade Gorton, U.S. Senator
Patty Murray, U.S. Senator

enc. Federal Way Resolution No. 91-56
Federal Way Resolution No. 95-195

d10:3runways.wp

RESOLUTION NO. 91-56

COPY

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF FEDERAL WAY, OPPOSING THE CONSTRUCTION OF A THIRD RUNWAY AT SEA-TAC AIRPORT.

WHEREAS, Puget Sound Air Transportation Committee is considering a recommendation to address air capacity needs of the region; and

WHEREAS, one of the proposed configurations under consideration would add a commuter runway or a dependent runway for commercial air carriers; and

WHEREAS, the addition of any runways would have a significant negative impact upon the community of Federal Way; NOW, THEREFORE,

THE CITY COUNCIL OF THE CITY OF FEDERAL WAY HEREBY RESOLVES AS FOLLOWS:

Section 1. The Federal Way City Council opposes the addition of runways at Sea-Tac Airport.

RESOLVED BY THE CITY COUNCIL OF THE CITY OF FEDERAL WAY, WASHINGTON, this 2nd day of April, 1991.

CITY OF FEDERAL WAY

Debra Ertel
MAYOR, DEBRA ERTEL

RESOLUTION NO. 95-195

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF FEDERAL WAY, WASHINGTON, SUPPORTING SEARCH AND SITING OF A MAJOR SUPPLEMENTAL AIRPORT AS AN ALTERNATIVE TO A THIRD RUNWAY AT SEA-TAC AIRPORT AND SUPPORTING STATE LEGISLATION FOR ECONOMIC INCENTIVES AND COMPENSATION FOR COMMUNITIES IMPACTED BY ESSENTIAL PUBLIC FACILITIES.

WHEREAS, the Puget Sound Regional Council ("PSRC") conducted a search process for a major supplemental airport within the counties of King, Snohomish, Pierce, and Kitsap, as an alternative to adding a third runway at Seattle-Tacoma International Airport ("Sea-Tac"); and

WHEREAS, PRSC adopted Resolution No. EB94-01 wherein PRSC affirmed the General Assembly's approval of a third runway for Sea-Tac, conditioned upon the project meeting the independent evaluation of the noise and demand management conditions set forth in Resolution A93-03, and satisfying the environmental impact review process ("Resolution"); and

WHEREAS, the Resolution further provided for PSRC deferring evaluation of long term state-wide air and ground transportation needs to the State of Washington; and

WHEREAS, the Resolution further recommends the State enact legislation allowing for substantial and equitable incentives and compensation for communities impacted by proximity of essential public facilities.

Copy
~~ORIGINAL~~

WHEREAS, the Federal Way City Council adopted Resolution No. 91-56 opposing the construction of a third runway at Sea-Tac because the addition of any runways would have a significant negative impact upon the community of Federal Way; NOW, THEREFORE,

THE CITY COUNCIL OF THE CITY OF FEDERAL WAY HEREBY RESOLVES AS FOLLOWS:

<u>Section 1. Major Supplemental Airport</u>. The Federal Way City Council strongly supports siting of a major supplemental airport ("MSA") as an alternative to adding a third runway at Sea-Tac. The Federal Way City Council supports a further search of potential sites for a MSA including without limitation a search in Thurston County and Lewis County, Washington.

<u>Section 2. Legislation</u>. The Federal Way City Council strongly encourages the State legislature in the 1995 Session to adopt legislation providing for economic incentives and compensation to communities impacted by essential public facilities.

<u>Section 3. Department of Transportation</u>. The Federal Way City Council recognizes that substantial planning is required in connection with siting of a new airport. The City Council strongly encourages the Washington State Department of Transportation ("WSDOT") to include the siting of airports in its planning process. The City Council further supports WSDOT planning for all long term state-wide air and ground transportation needs.

<u>Section 4. Severability</u>. If any section, sentence, clause or phrase of this resolution should be held to be invalid or

unconstitutional by a court of competent jurisdiction, such invalidity or unconstitutionality shall not affect the validity or constitutionality of any other section, sentence, clause or phrase of this resolution.

Section 5. Ratification. Any act consistent with the authority and prior to the effective date of the resolution is hereby ratified and affirmed.

Section 6. Effective Date. This resolution shall be effective immediately upon passage by the Federal Way City Council.

RESOLVED BY THE CITY COUNCIL OF THE CITY OF FEDERAL WAY, WASHINGTON, this 7th day of February, 1995.

CITY OF FEDERAL WAY

Mary E. Gates
MAYOR, MARY E. GATES

ATTEST:

CITY CLERK, MAUREEN M. SWANEY, CMC

APPROVED AS TO FORM:

CITY ATTORNEY, LONDI K. LINDELL

FILED WITH THE CITY CLERK: January 31, 1995
PASSED BY THE CITY COUNCIL: February 7, 1995
RESOLUTION NO. 95-195

K:\RESO\AIRPORT.HSA
2-6-95

Res.# 95-195, Page# 3

ATTEST:

CITY CLERK, MAUREEN M. SWANEY, CMC

APPROVED AS TO FORM:

CITY ATTORNEY, SANDRA DRISCOLL

FILED WITH THE CITY CLERK: 3/29/91
PASSED BY THE CITY COUNCIL: 4/2/91
RESOLUTION NO. 91-56

91L415

COMMENT SHEET

Public Hearing
June 1, 1995

SEATTLE TACOMA INTERNATIONAL AIRPORT

Draft Environmental Impact Statement for the Master Plan Update

33 [illegible] attachment by
Arlene Brown [illegible]
page by [illegible] Brown
[illegible] Spencer

Please respond!

Thank you for your time.

(Please Print) Name: Arlene Brown
Address: 239 SW 189 PL
City: Normandy Park Zip Code: 98166

Please return comments by August 3, 1995 to: Mr. Dennis Ossenkop, Federal Aviation Administration, Airports Division, ANM-611, 1601 Lind Ave SW, Renton, Washington 98055-4056 or *leave in the box as you leave the meeting.*

: Summary of Assessment of DEIS

Ddf:

Legend:
Not an Issue ○ Some Concern ◉ Significant Problem ●
? Insufficient data

Topic	DEIS Data	TRUTH Complete Data	Comments
Endangered Species	○	●	Bald eagles living on west side of airport
Landslide hazards	?	●	West side airport
Erosion Hazards	?	●	West side airport
Earthquake fault	see below	●	Contact U of WA, Geophysics or see enclosed article
Seismic Anomalies	◉	●	mitigate by removing & replacing unstable soil per DEIS
Wetland destruction	◉	●	
Flooding	◉	●	
Higher % pollution in creeks	●	●	Creeks were repopulated after aviation fuel spill in 1960's killed fish

6/1/95

Table 1 : Summary of Assessment of DEIS

2

Topic	DEIS Data	TRUTH Complete Data	Comments
Carbon monoxide levels	●	●	Already above safety standards
Air Toxins	●	●	Probably already above safety standards
Noise impact on health	●	●	Already unacceptable when based on dBs rather than noise models
Property values	○	●	Already devalued 10 - 50 % in last few years
Burien, NP, Des Moines Home Real Estate Tax Revenues excluding aquisitions	○	●	Billions of dollars over the next 15 years will be irrevocably lost
Sea-Tac Real estate tax revenue due to acquisitions	◉		DEIS says about 5% loss so insignificant
Uprooted families	◉	◉	389 homes & 260 condos/apartments
Uprooted businesses	◉	◉	105 businesses 822 jobs $292 million property tax
Cargo plane capability	●	●	Third runway too short for fully loaded cargo planes when warm
Departure Capability	●	●	Provides only 2.6% increase
Arrival Capability	●	●	Provides only 12 % increase

6/1/95

Table 1 : Summary of Assessment of DEIS

3

Topic	DEIS Data	TRUTH Complete Data	Comments
Construction costs		●	Order of magnitude higher than comparable runway projects
Construction risks		●	How long does it take for 8 Kingdom's worth of fill to settle so its safe to start construction?

Legend:
Not an issue ○ Some Concern ◉ Significant Problem ●
? Insufficient data

6/1/95

Engineer's Assessment of the Sea-Tac Airport Master Plan Update Draft Environmental Impact Statement (DEIS)

(4)

Conclusions

- Full of false premises
- Lacks vital data
- Ignores the accurate data it has
- Full of unsupported conclusions
- Provides ammunition for a long drawn-out anti - third runway lawsuit

Supporting documentation follows.

(5)

Evaluation of DEIS

Most of the data does not support the conclusions.

Data says the third runway is bad for environment, people's health and the location is geologically unsuited.

When data is incomplete or missing, the issue is dismissed rather than pursuing data that will not justify a third runway.

No data on erosion hazard north of South 192 (IV pg. 4) R-11-1

Estimated average values for MANY Air toxins above the allowable annual limits and aircraft % contribution projected to increase (IV pg. 7-8) but tests were not run long enough to prove we exceed the annual limits R-10-35

When the data is conflicting as to the extent of damage something inflicts, the report concludes that there is no detrimental impact.

If it doesn't deafen you, noise is OK (last sentence pg. 7-5 section IV which contradicts much of the preceding pages)

The study area is much too small to provide an accurate assessment of the damage to be inflicted by the third runway. R-5-2

Losses in real estate revenue alone will be in billions but the report says there is no change in property value on IV pg. 7-4 when assessing economics. However, on IV pg. 7-5 the report says "noise property value related stress" will continue upon implementation of the third runway R-16-9 R-16-35

Incredible noise and vibration levels outside the generalized study area are not addressed even though they clearly identified at the Arbitration hearings last summer and in December (12/1/94). R-6-1A

6

Why does the assessment, particularly the economic one, seem to focus on the east side when the runway is planned for the west side? Why isn't Normandy Park, whose real estate values are being devastated by the threat of a third runway, mentioned by name in the Executive Summary? R-5-2

Falsely assumes that all problems can be mitigated satisfactorily and economically

How can carbon monoxide levels that already exceed safety standards be mitigated when 57 trucks an hour, delivering 8 Kingdom's worth of dirt, must travel to a tiny area that already without either significant pollution control devices being placed on hundreds of trucks or increasing the length of construction time ? Moving the employee parking area can't compensate for pollution from trucks that are constantly moving. R-5-4

Doesn't address the differences in community's perception of noise and vibration with the highly disputed computer noise contour models

Why aren't the results from the Arbitration hearings, particularly those related to noise addressed ? R-2-5

Why is vibration a problem over 1.3 miles outside the 65DNL boundary ?

Why is noise a significant problem over 1.3 miles outside the 65DNL boundary ? See Arbitration hearing information.

Why are 60 to 80 dBs common for miles outside the 65DNL area ? R-6-22

Are heavily loaded cargo planes really considered in the noise contour maps, both for the 600 foot runway extension as well as the third runway ?

Does the current increase in noise that occurs with the large number of cargo planes at Christmas time and the significant noise increase that occurs when temperatures exceed 70F fully considered in the noise model ? R-6-12

7

The construction of retaining walls and nearby buildings on the north end of the runway about doubled the noise over a mile away. Has the effect of bouncing noise off buildings and walls been accounted for in the noise models ?

Is it the loss of natural sound absorbers that were replaced with concrete, the unstable ground, and/or the shape of the terrain that makes the sound travel so much further than the noise models predict ? R-6-20

What percentage of homes are subjected to 45 dBs or above (the level one can no longer communicate accurately according to the report) ? R-6-8

What percentage of the homes really are "cold climate" homes so the use of 65DNL is at least justifiable when comparing to other airport assessments (see IV pg. 7-4). The DEIS assumes most homes are "typical cold climate" and therefore, they would experience a 20 - 25 dB reduction in noise inside compared to outside. Insulation was not required when most of the homes in the impacted area were built, so the cold climate assumption is false in many cases. R-7-34

Conclusions are based on false premises

Tiny study boundary area neglects majority of area impacted both from economic and environmental standpoint R-5-2

Assumes there will be less noise

Assumes current noise contour maps correct

Assumes projected noise contour maps correct

Neglects that areas far outside the 60 DNL boundary are regularly is exposed to over 80 dBs R-6-1B

Assumes "virtually all of the available air traffic improvements and technical improvements have been implemented" report pg. iii R-3-21 B

8

Additional Details

Inaccurate geological information

High probability of landslides according to King County Report but none according to DEIS except possibly one school (see hazard map) R-11-1

On a earthquake fault of the type that is more destructive than the typical kind (a 6 will do the damage of a typical 8) according to U of WA, but report mentions only 2 minor seismic anomalies that require removing and replacing dirt

Inaccurate information on Endangered species

Pretends that the bald eagles don't live and breed around the airport. (occasional "transient" according to the report - Exec pg. xi). After Airport pollution killed the fish in the mid 1980's (see Exec pg. x), Trouts Unlimited repopulated the creeks with fish. The Eagles moved back and now even at least one baby eagle lives on the west side of the airport. R-15-1

Impact on health virtually ignored

Only health concern it recognizes is if it is so loud it makes you go deaf. Although it mentions MANY other effects, it dismisses them. R-6-18

A study of the children in the airport area will reveal they have more headaches, cry more often and suffer clinical depression more often than children who are not subjected to 60 dBs or more every week (not the 65 DLN noise measurement). According to the DEIS report, 45 dBs is the maximum for normal voices to achieve reliable communication yet the study area is set by the DLN level.

Why are many of the high frequency traffic accident locations near the airport? R-16-2

What mitigation measures can be taken to reduce the increased cancer risks related to the air toxin levels that the DEIS suggests already exceed safe limits. The DEIS projects an increase in these toxins as air traffic increases (see IV 7-8) ? R-10-36

31 May 1995

9

Inaccurate economic assessment

Report ignores that BILLIONS in Real Estate Tax Revenues that will be irrevocably LOST. See attached calculations R-16-9

Report ignores that BILLIONS in Real Estate property values that will be irrevocably LOST. See home devaluation discussion that follows.

Report ignores the costs associated with the current 45 minutes a day lost to airline noise in Highline schools, not all of which are scheduled for noise insulation. DEIS just mentions there is an impact. R-7-9

Report ignores the development and implementation costs for sound insulation that really works as opposed to the current methods which as reported at the 1994 noise panel hearings give 1 dB improvement - not enough for the people to notice but enough that the Port can declare victory by using sensitive equipment to measure the reduction. R-7-32

Report ignores the development and implementation costs of pollution control if you really are to mitigate the carbon monoxide levels that already exceed safety limits and which will be increased when the 16-57 dump trucks per hour (Port Forum May 1995 estimate) come to dump 8 Kingdom's worth of dirt. R-10-40

Report ignores the costs associated with increased crime that studies show accompanies aircraft noise R-5-1

Report ignores the costs associated with health care for increased cases of depression, stress and allergies from the construction activity and the increased aircraft activity.

Report ignores unemployment costs for the <u>temporary</u> construction workers when the job is complete.

31 May 1995

10

Typically, it ignores the devaluation of property outside the boundary area and underestimates the impact in the boundary area.

R-8-1
R-16-9

The devastation to the real estate revenue to Burien, Normandy Park, Des Moines, and other towns, has been grossly underestimated in the impact report. It mentions a possible 5 % reduction in real estate revenue because of displaced businesses for Sea-Tac, dismisses that as insignificant and ignores the other communities.

R-16-9

The DEIS doesn't cover the current impact or forecast the future impact even though SIGNIFICANT devaluations have already occurred on home sales in the surrounding communities, particularly outside the boundary study area. Many of the areas whose homes are already devalued because of third runway discussions, are OUTSIDE the study boundary area. Aircraft are so loud people can't converse in these locations but the noise isn't constant so it doesn't count as far as the Port is concerned.

Some homes have already experienced a 50 % drop in sales price while less expensive homes have experienced 10 - 20 % over just the last <u>two</u> years. This data is available by reviewing King County house sales records.

For example, it is estimated that between now and the year 2020 the amount of lost real estate revenue will be approximately 20 million dollars for a small building development near Marvista School in Normandy Park (Normandy Province). The homes have already gone down in value by over $200,000 and are expected to fall further when the runway is officially approved. See calculations attached which are very conservative since some of the 50 homes have really been devalued by more than $ 350,000 ALREADY !!!!.

Imagine what the number would be if all the homes, apartments, and businesses impacted were really considered! The number would easily be at least in the billions.

31 May 1995

11

Risks

R-11-6

Have the difficulties associated with constructing 60 foot retaining walls been adequately forecast in the cost estimates?

Has sufficient time scheduled to let the 27 million cubic tons of fill settle before preceding ? Has the amount of extra dirt that should be piled on top to help pack it down been considered ? Denver's new construction at their airport is settling and now must be repaired.

31 May 1995

12

Summary

It's irresponsible to build a part time runway that costs over an **order of magnitude more** than comparable runways by transporting 8 Kingdom's worth of fill, at a rate of 57 dump trucks an hour, to a high probability **landslide** area that's by an **earthquake fault** where **endangered** bald eagles are living. This creates **pollution** exceeding safety standards, wetland **flooding**, significantly **reduces** the local tax **revenue** base and **devalues property** by more than 20%, **uproots** thousands from their homes and businesses, for a **12% increase** in air traffic . This will cause a scandal that leads to billions of dollars in law suits to recover the billions of dollars in lost real estate revenue and recover for the gross negligence in failing to report accurately the environmental, health and economic impact as well as choosing to ignore detrimental impacts it does report such as air toxins levels or inadequately mitigating detrimental impacts such as carbon monoxide levels that already exceed safety standards.

Ironically, all this scandal, and the 8500 foot third runway option is still too short for fully loaded cargo planes to use in warm weather. Consequently, the other runway has to be lengthened. Also, the whole airport has to be brought up to 1988 safety standards, a new tower, and assorted other buildings are needed. Because the third runway is projected to be able to handle ONLY 12 % of the arrivals and 2.6 % of the departures, the Port projections indicate this multi billion dollar project will be inadequate by 2010.

Considering Baltimore's new runway cost only $48 million, and Tampa's cost $55 million, how can we justify paying over a half billion dollars for a part time runway, that does the following:

- Loses billions in real estate tax revenue
- Destroys home values particularly outside the study area
- Uproots thousands of people and some businesses
- Uproots endangered bald eagles

13

- Subjects thousands of more people to sleepless nights because the noise measuring system allows the equivalent of a motor bike to be turned on regularly in your house, just so long as it doesn't run continuously
- Subjects thousands to unsafe carbon monoxide and cancerous air toxin levels
- Constructs a runway in a landslide/erosion hazard zone by using 8 Kingdom's worth of fill ?

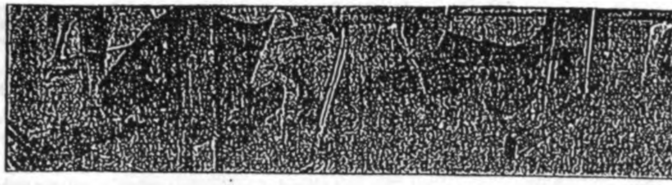
Burien already rebelled against Seattle and became its own city because of the third runway and the belief that the local government in this area is "By the Port and For the Port".

The Airlines, Washington and King County all lose if the third runway is approved. Who gains? We need to address the LONG TERM NEEDS of the Airlines, not spend a fortune on a "quick fix" that may even be inadequate by the time construction of the third runway is completed.

(15)

.nt #1

,nline is subject to the same
as the rest of the county."
had Burcham, program spe-
at the King County Office of
gency Management.
n bridge and overpass col-
to possible landslides, folks
o prepare to be on their own.
d
ING County Sensitive Areas
used as a general planning
evelopment tool, indicates po-
lly hazardous areas.
hline has several areas where
uld liquefy during seismic
y. The strong shaking action
arthquake causes wet or
soil to behave like a liquid
ctures on top of the soil sink
with landslide action. Liq-
on usually causes the worst
ural damage.
map outlines the tip of Three
oint and areas on both sides
Avenue South just west of
ic Airport as seismic hazard
ubject to liquefaction.
es on the shoreline stretch-
m Three Tree Point north-



Seahurst Elementary School third graders Kathleen Costello (front) and Nicole Dydasco dive under their desks during a class earthquake drill

ward are also at risk for landslide.

Due for a shake

Pacific Middle School principal Lamar Strain talks about earthquakes every fall to his students. He does it, not because he holds a masters degree in geology from the University of Washington, but as a

See Big One, page A2

did not copy well

CONT. #2

oy waits as Dad helps it L.A. quake victims

rc Stiles

RIEN—Ryan Graves has a birthday wish.
Burien boy wants his dad, oy Graves, to return home from his medical mission in uake-ravaged Los Angeles. birthday is in four more days 's not going to be here for it. n kind of sad," said Ryan, ten mulls the perils his fa-w faces.
particularly concerned

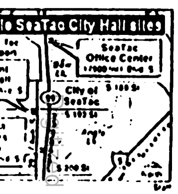
Ryan Graves

about an aftershock. "It could really kill him," said the Valley View Elementary School student who turns 8 Monday.

Dr. Graves, a member of the Seattle-King County Disaster

See Graves, page A2

uncil members examine new city headquarters



By Jennifer Steiner

SEATAC—City hall could have a new home as soon as March if the city council approves a new lease at its Tuesday meeting.

City headquarters are currently housed in a converted elementary school just south of the airport. But City Manager Scott Rohlfs told the council it should expect significant remodeling costs, as well as serious growing pains, if it wants to stay put while staff looks into building a new city hall.

"We are already out of compliance with our own codes," Rohlfs said of the city hall at last Tuesday's study session. "If we're really going to stay here three more years, we have to say we're not special."

Rohlfs predicted it would cost the city about $143,000 to bring the building up to code. And it would take at least three years to construct a new city hall, he said, considering council members haven't even chosen a site on which to build.

Rohlfs showed the council a cost breakdown of renting three different buildings for the next three years: the Alaska Airlines Plaza Building, SeaTac Office Center Tower and from its current home, the Angle Lake School Complex were presented over three years.

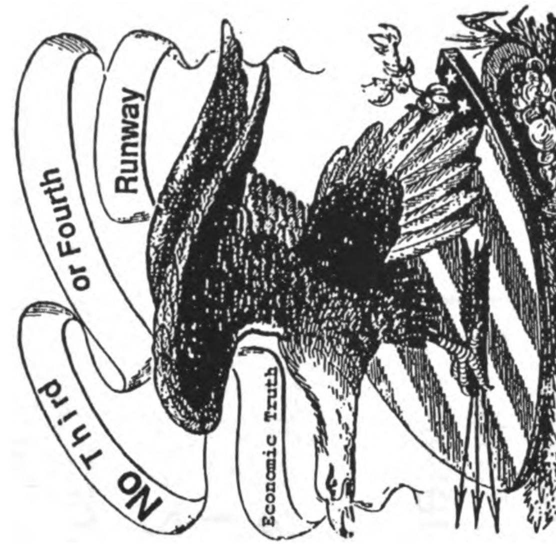
Remodeling costs at the SeaTac

See City hall, page A10

Note:
15?
183 ?
189 ... map
How Does The South East States Sound to you ??

(14)

Environmental Impact Statement Misleading



Endangered Species : Bald Eagles

Westside Landslides 1

Earthquake FAULTS 2

1 King Dept. Parks, Planning and Resources hazards map contradicts IV pg 19-4

2 Contact U of WA, Geophysics Dept. about faults under Seattle. Also see Science News Vol 147

(16)

Seismic Risk: When Less Means More

Anyone who has lost a battle with a slippery bathtub or an errant kitchen knife knows all too well that most accidents occur at home. Seismologists may now have to apply that maxim to earthquake hazards in Seattle, Portland, Vancouver, and surrounding areas.

Researchers in the Pacific Northwest spent the last decade focusing on the potential for huge quakes occurring off the coast, some distance from the major urban centers. These megaquakes remain a concern, but smaller shocks closer to the population centers may present an equal, if not greater threat, suggest studies reported last week at a meeting of the Seismological Society of America in El Paso, Texas.

For major northwest cities, "the strongest ground shaking will probably come from [a] nearby earthquake occurring on a crustal fault," says seismologist Ivan G. Wong of Woodward-Clyde Federal Services, a consulting firm in Oakland, Calif. Wong reached this conclusion after estimating how severely different types of quakes would shake Seattle.

Quakes in the Pacific Northwest fall into three categories, all driven by a subsurface plate tectonic collision that stretches from northern California to southern British Columbia. Known as the Cascadia subduction zone, this region marks where a patch of ocean floor is diving beneath the western edge of North America, an act called subduction.

Until the mid-1980s, seismologists believed that the bending of the ocean plate accounted for most of the region's quake hazard because the two major Washington State jolts this century came from 60 kilometers below the surface. Although such shocks in 1949 and 1965 caused major damage, their depth limited the strength of shaking.

In the last decade, researchers discovered that great tremors of magnitude 8 to 9 also have walloped the region repeatedly, although not since the advent of written records there. These so-called subduction quakes originate offshore where the ocean plate scrapes beneath the edge of North America.

A third type of quake attracted attention in 1992 after geologists found a fault running right through Seattle that caused a major jolt 1,100 years ago.

Wong studied the triple threat by modeling the peak shaking in Seattle from three quakes: an offshore subduction quake of magnitude 8.5, a magnitude 7.5 shock 60 km beneath the city, and a magnitude 7.0 shock only 3 km under Seattle. The smallest quake produced the greatest shaking because of its proximity, a conclusion bolstered by the destructive magnitude 6.8 quake directly under Kobe, Japan, in January.

While shallow, nearby shocks can cripple a city, seismologists in the Pacific Northwest remain unsure where such tremors might strike or how often. At the meeting, Garry Rogers of the Geological Survey of Canada in Sidney, British Columbia, noted that three major crustal quakes have occurred on either side of the border in last 150 years, a rate of one every half-century.

But measurements of small earthquakes in the region suggest that major shocks should come far less frequently. "These quakes are the biggest unknown in trying to get a handle on seismic hazard here," Rogers says.

In contrast, researchers have a better sense of the threat from subduction quakes but nevertheless debated at the meeting whether a giant one will hit anytime soon. Dieter H. Weichert of Canada's Geological Survey has analyzed the regularity of megaquakes by studying deposits of offshore debris flows. Such slides occurred when giant quakes destabilized sediments that had built up over the centuries in ocean canyons. The thickness of each debris layer reflects the time between successive quakes, he contends.

Seattle-King County News Bureau

The technique suggests that massive shocks hit much more regularly than previously thought. For the last 13 quakes, the interval between jolts averaged 590 years, with the shortest span measuring roughly 435 years. Since the last quake occurred around A.D. 1700, Weichert concludes the risk of another giant one anytime soon is low, perhaps only 10 percent in the next 2 centuries.

Thomas H. Heaton of the U.S. Geological Survey in Pasadena disagrees. "In other parts of the world, it's hard to make a case for regularity. There are enough really amazing exceptions." — R. Monastersky

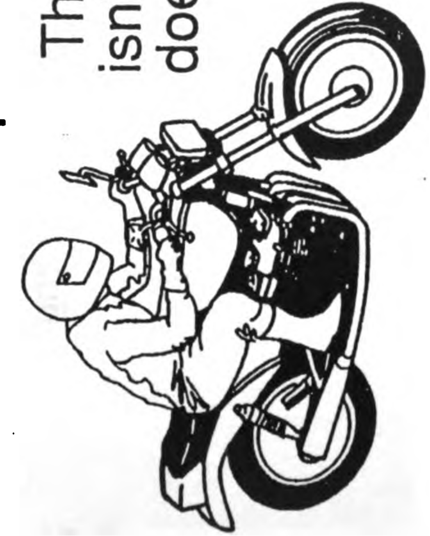
Baby's AIDS virus infection vanishes

Why do some 75 percent of infants ... tests. For all practical purposes, the two ...

(17)

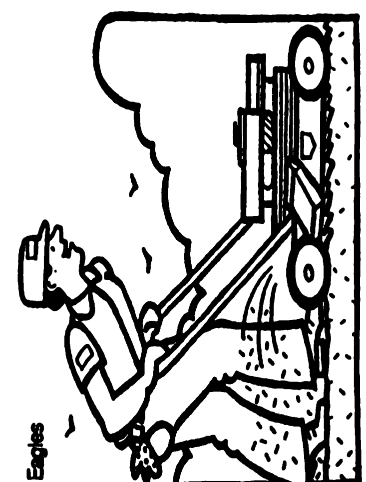
Environmental Impact Statement Misleading

This is NO Noise - it isn't constant and it doesn't cause deafness.



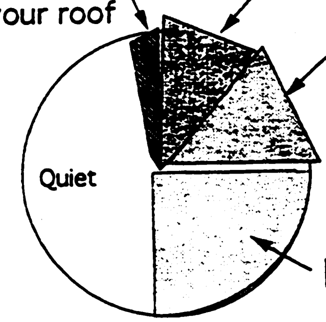
Stage 2 "noiser", using Ldns, than Stage 3 aircraft

"Quieter" Stage 3 aircraft noise still wakens people and can last longer than Stage 2



Bald Eagles

Don't Buy your Home based on a Noise Contour Map



Contour Map defines many of these situations as:
Low or No noise.
Is the Contour Map based on
1) Insufficient noise monitoring stations,
2) Inadequate information on impact of terrain and wind on acoustics, and
3) Average dBs instead of maximum decibels ?

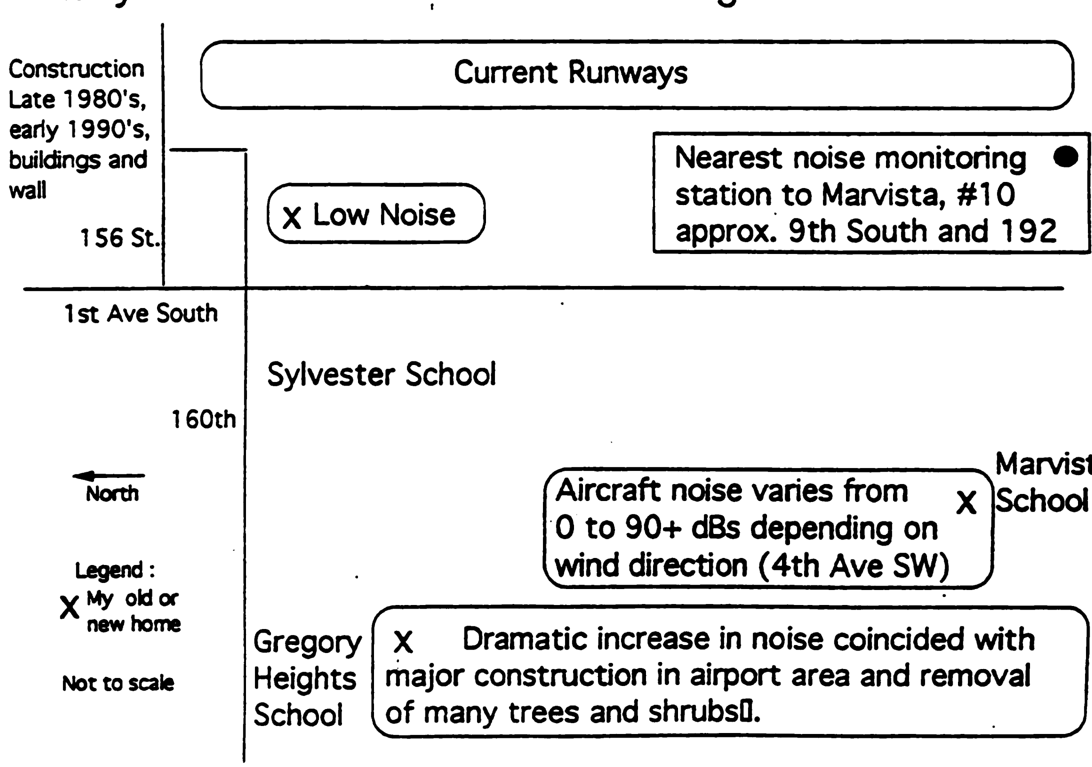
Aircraft Noise Profile ↕ REALITY

Interrupted Learning
Loss of Sleep
Increased Stress and Crime

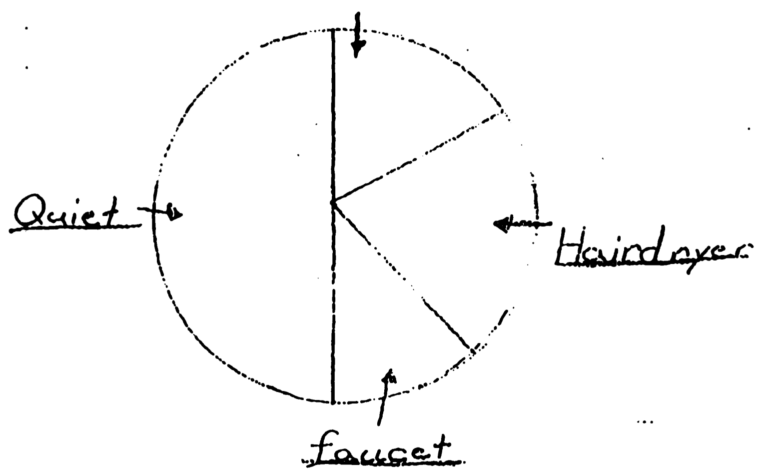
Most of Burien, Normandy Park, Des Moines and Sea-Tac need noise insulation IF you want our children to grow up in an environment with a reasonable noise level.

2069

Can sound like airplane is about to land on your roof, many blocks west of noise monitoring stations.



Lawn Mower in your House



Son's Graft

12/94

(20)

Port of Seattle

(21)

October 18, 1994

Ms. Arlene Brown
239 SW 189th Pl
Seattle, WA 98166

Dear Ms. Brown:

Thank you for contacting the Sea-Tac Noise Abatement Office with your call concerning an aircraft overflight. Your call was about a flight that occurred on October 7, 1994 at 0805 hours. We have conducted research regarding the overflight and were not able to identify an aircraft that corresponded with the information provided.

The Port utilizes the Airport Noise and Operations Monitoring System (ANOMS) to monitor Sea-Tac's noise abatement programs and operational trends. ANOMS uses air traffic control data provided by the Federal Aviation Administration (FAA). On occasion, data is lost due to the FAA's equipment being shut down for maintenance purposes or technical difficulties with the ANOMS system itself. In addition, military and other high security operations are filtered from the data we receive, and jet flights operating out of airports other than Sea-Tac do not always appear in our data. However, please contact our office again should you observe another aircraft overflight you would like us to research. Please be as specific as possible about the time of the event you would like us to investigate when you call.

Informational presentations about the Port of Seattle's noise reduction programs and the use of ANOMS are scheduled frequently. If you have any questions concerning this information, or if you are interested in visiting the Noise Abatement Office for a presentation, please give me a call at 431-4091.

Sincerely,

Stephanie Shadle

Stephanie Shadle
Noise Abatement Specialist

cc: FAA Air Traffic Control

nomatch

On 10/7/94 between 07:50 and 08:15 am Sea-Tac had a high level of operations that reason it is difficult to a one particular flight to the time provided of: 08:05, 08:10, and so. I have provided you a listing jet activity from this time, and a from the noise monitor nearest your h

22

10/7/94 Sea-Tac Jet Operations between 07:50 and 08:15 a.m.

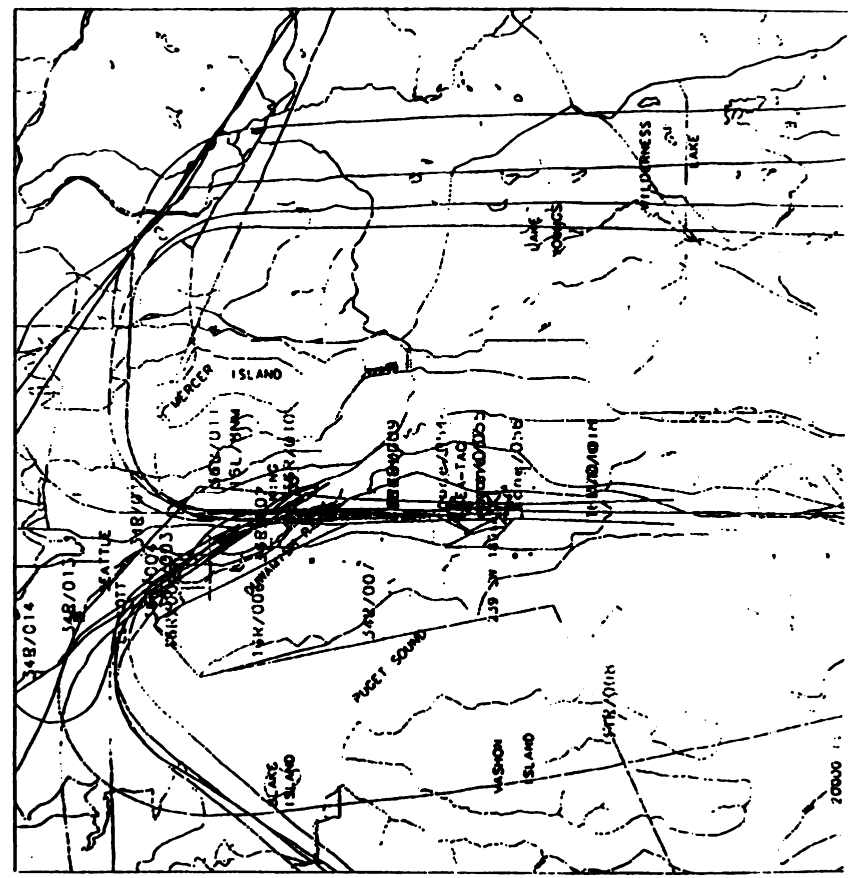
ACTUALTIME	AIRLINE	AIRCRAFTTYPE	ADFLAG
10/07/94 07:50:24	QXE	FK28	D
10/07/94 07:51:33	LHN	B727	D
10/07/94 07:55:05	UAL	B73S	D
10/07/94 07:56:05	ASA	B73F	D
10/07/94 07:58:23	ASA	B73F	D
10/07/94 07:58:24	TWA	L101	A
10/07/94 07:59:45	ROA	MD82	D
10/07/94 08:00:51	ASA	B737	D
10/07/94 08:05:08	AAL	MD80	D
10/07/94 08:05:39	NWA	B757	A
10/07/94 08:06:02	ASA	MD80	D
10/07/94 08:06:20	OXE	FK28	D
10/07/94 08:09:05	ASA	MD80	D
10/07/94 08:12:43	UAL	B73S	A
10/07/94 08:15:47	UAL	B73S	D

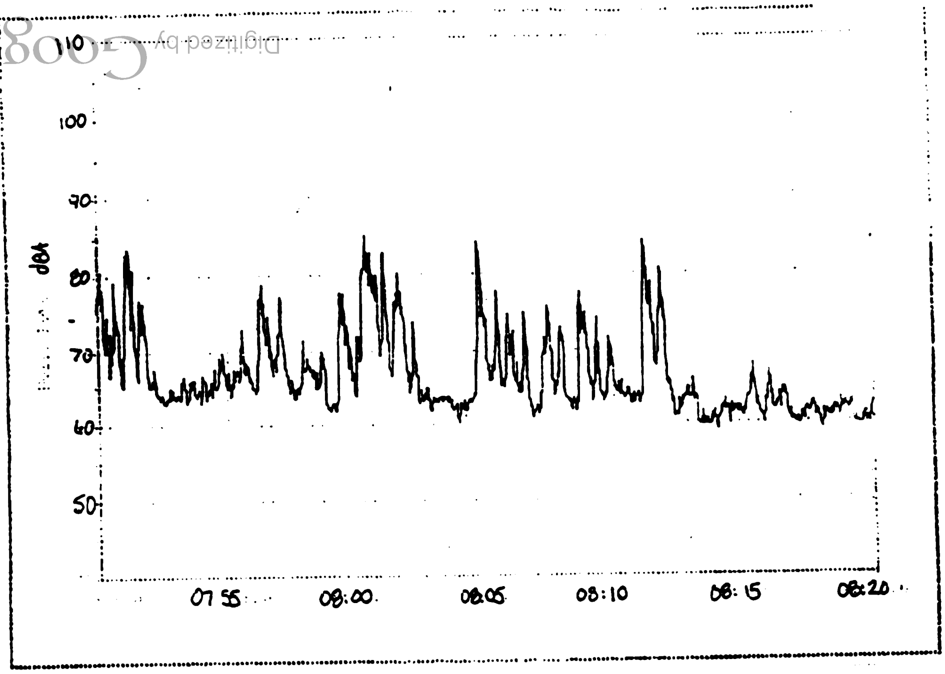
23

Port of Se

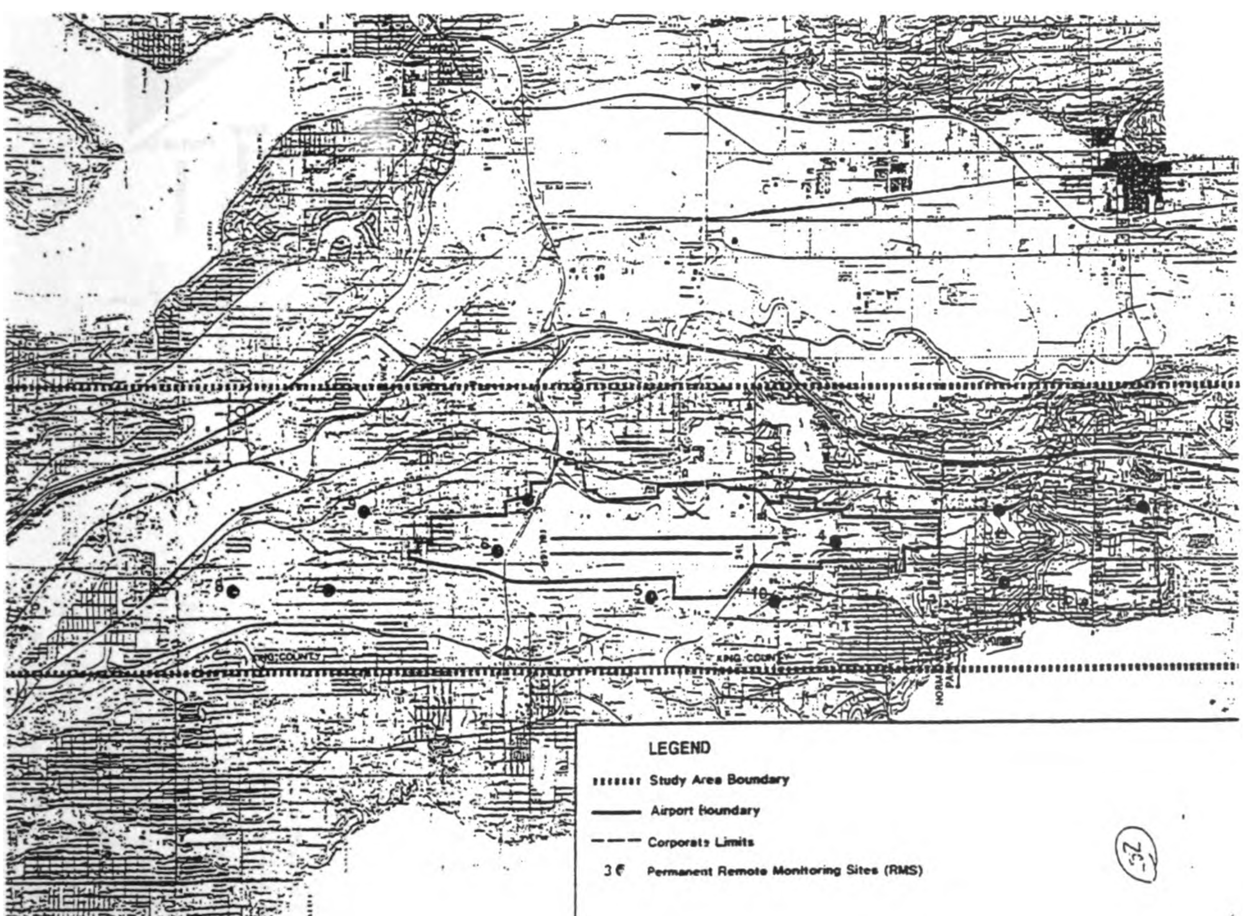
10/7/94

07:50 - 08:15 a.m.




110
100
90
80
70
60
50
dBA
07:55
08:00
08:05
08:10
08:15
08:20

2072


KING COUNTY
LEGEND
Study Area Boundary
Airport Boundary
Corporate Limits
Permanent Remote Monitoring Sites (RMS)
32

26

1501 SW 164 St
Burien, WA 98166
11 March 1992

Flight Plan Project	Port Commissioners
P.O. Box 68727	P.O. Box 1209
Seattle, WA 98168-0727	Seattle, WA 98111

Attention :Flight Plan Committee Members

To Everyone it may Concern,

Thank you for this opportunity to express my opinions on the third runway and related proposals.

As a 14 year resident of Burien, I can say with certainty that the aircraft noise in 1991 and 1992 has been at an all time record high in the Gregory Heights area and downtown Burien (many don't bother to call because noise abatement program lacks credibility in light of the ever increasing amount of noise ! !). According to the Noise line, the noise increase is not due to a change in aircraft. Therefore, I assume it must be a direct result of the removal of natural sound barriers (wall and construction just North of the airport). Studies show increased noise lead to increased crime. Burien has had an increase in crime and allergy clients. Burien has **already surpassed the "safe" noise level** for at least 30 blocks west of the airport, therefore, I am opposed to any plan which increases noise or pollution. I am opposed to a third runway because I don't believe sufficient limitations can be imposed and enforced to ensure we have less noise than we do now.

The opinions I have expressed are shared by the vast majority , if not by all of those living in the area I mentioned. During our recent effort to become a city I had the opportunity to discuss the airplane noise problem personally with a couple of hundred of my fellow residents.

Sincerely,

Arlene Brown
Arlene M. Brown
Home Phone 431-8693 Work Phone 544-2221

27

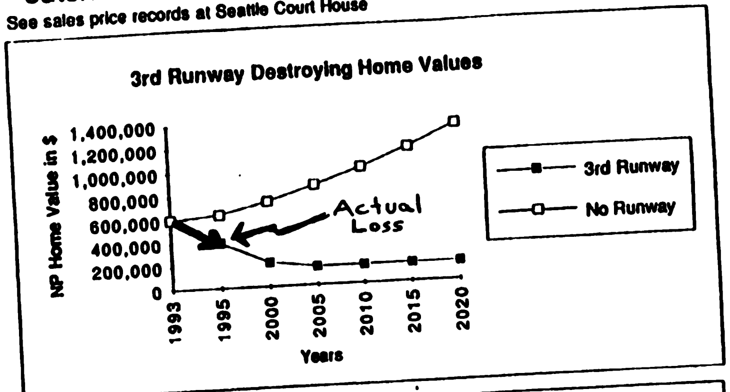
name
Commissioner Jack Block
Commissioner Paige Miller
Commissioner Paul Schell
Commissioner Gary Grant
Commissioner Pat Davis
Flight Plan Committee Members

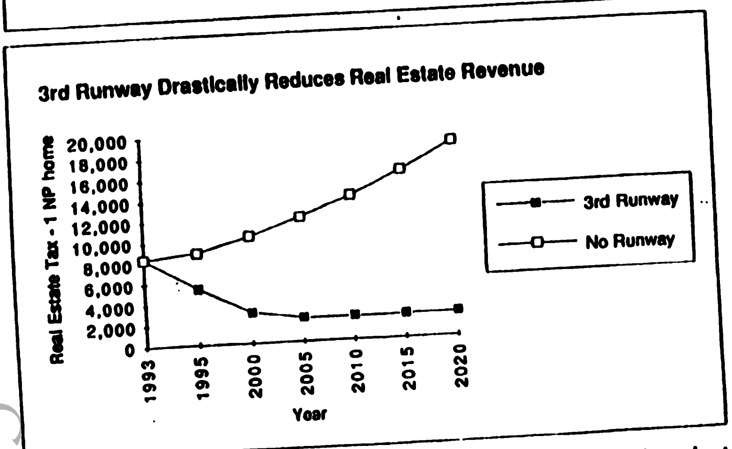
IV pg 7-4 , "No Impact"on property values is Wrong !

25

50 Homes adjacent to Marvista School have been devalued by over 33% in the last 2 years because of third runway fears. These Normandy Park homes are outside the Generalized study area.

See sales price records at Seattle Court House





For only 50 homes, over the next 15 years, this leads to over $13 million dollars in lost real estate tax revenue

Seattle-Tacoma Inte
Environmental Imp
for the Master

Exhibit I

Alternative 1 (D
Aircraft Noise Exposu

File SEA

Jurisdictional Bo

Generalized Stud

Noise Contours

60 DNL Noise C

Normandy Province
Single family homes
Drastically
Devalued!
(beside k in Normandy Park)

Report Ignores that Billions in Real Estate Tax Revenues will be Lost (30)

In last 2 years, property values have already decreased by more than 33 %
but report found no impact (IV pg 4-4).
Calculations just based on small area beside Marvista School in Normandy Park

Third Runway kills Home Values				NO third runway	
Year	Home Value	Real Estate Tax 1.4% value		Home Value	Real Estate Tax 1.4% value
1993	600,000	8,400		600,000	8,400
Actual Devaluation!					
1995	390,000	5,460	Real	636,540	8,912
1996	250,000	3,500	Loss	655,636	9,179
1997	240,000	3,360		675,305	9,454
1998	230,000	3,220		695,564	9,738
1999	220,000	3,080		716,431	10,030
2000	210,000	2,940		737,924	10,331
2001	200,000	2,800		760,062	10,641
2002	190,000	2,660		782,864	10,960
2003	180,000	2,520		806,350	11,289
2004	170,000	2,380		830,540	11,628
2005	160,000	2,240		855,457	11,976
2006	160,128	2,242		881,120	12,336
2007	160,256	2,244		907,554	12,706
2008	160,384	2,245		934,780	13,087
2009	160,513	2,247		962,824	13,480
2010	160,641	2,249		991,709	13,884
2011	160,770	2,251		1,021,460	14,300
2012	160,898	2,253		1,052,104	14,729
2013	161,027	2,254		1,083,667	15,171
2014	161,156	2,256		1,116,177	15,626
2015	161,285	2,258		1,149,662	16,095
2016	161,414	2,260		1,184,152	16,578
2017	161,543	2,262		1,219,676	17,075
2018	161,672	2,263		1,256,267	17,588
2019	161,801	2,265		1,293,955	18,115
2020	161,931	2,267		1,332,773	18,659
1995 -2020 totals					
1 house		67,976		1 house	343,568
50 houses		3,398,792		50 houses	17,178,387
Economic loss for one Normandy Province home				1,170,843	16,392
% loss in 2020 using today's dollars				88%	88%
50 houses in Normandy PROVINCE For 1995 through 2020				58,542,131 Lost Value	13,779,595 Lost Real Estate Tax

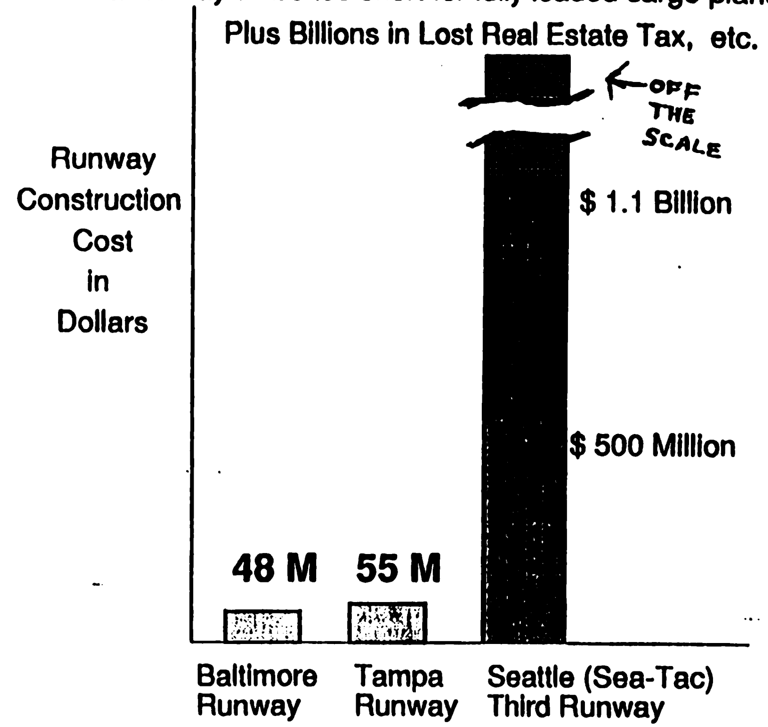
Note : from 2005 assumed .08% appreciation per year for third runway houses
For no third runway, used 3% appreciation per year

Airport no port6/95 5/31/95

(31)

Multi-BILLION Dollar Third Runway for 12 % Arrivals and 2.6 % Departures

and a runway that's too short for fully loaded cargo planes



Arrival and Departure data from page xi of Exec. Summary
Baltimore and Tampa data from Highline Times May 24,1995
Real estate tax revenue lost based on actual devaluation of some Normandy Park single family homes (see calculations - 33% by Q2 1995) and familiarity with Burien and Normandy Park property values
Presumably, the third runway construction costs include hauling 8 Kingdom's worth of fill (23 million cubic yards per Forum May 1995) to the landslide/earthquake fault area.

(32)

Considering I've spent the last 17 years in the aerospace industry as a Materials Engineer, the health of the Airlines, not just the surrounding communties, is important to me. The data says it will be a mistake if we continue to try to put a huge square peg into a tiny round hole (or, in this case, a build up a tiny thin valley that's about 2 stories below the existing runways).

The reports conclusions are not supported by the data.

For example, the report assumes there is no depreciation in property values - which then leads to a reduction in real estate tax revenues. Just considering the 50 homes in the building project beside Marvista school, homes have already been devalued by 33 to 50 %. over the last few years. The calculations I brought used 33 % and led to a projected loss in revenue of 13.8 million over the next 15 years for a tiny x on the map that is outside the generalized study area. Imagine the billions it must be when you consider that most of Normandy Park and Burien are impacted.

NOISE - Although it contains pages of data that says noise above 45 dBs is a problem, it then contradicts itself by only considering noise that makes you go deaf.
Then there is the whole issue of noise contour maps and measuring systems. Within 1 hour you could have 5 motor bikes for 30 second each and 5 lawn mowers for 1 minute each and it could still be considered ZERO noise using the DNL/Ldn system. I don't think a jury would embrace the DNL noise measuring system as enthusiastically as the Port does. Do you?

The report is missing vital data. For example, bald eagles are living and breeding by the airport. I wasn't going to bother bringing them up but as we drove home from the library after studying the DEIS there was a bald eagle under an airplane that was taking off to the north so I figured I was obligated to mention it.

(33)

Then of course there are the landslide and earthquake fault high hazard areas where the 8 Kingdom's worth of fill is being dumped that the report failed to mention.

It is fitting that I spent Memorial day preparing for this. I know that most people in the area feel that the government here is "By the Port and For the Port" but I KNOW the third runway won't meet the Airlines needs so it is not worth destroying anyones home - man or beast. or for that matter subjecting us tocarbon monoxide and air toxins above established safety standards. The third runway only increases capacity by 12% but will cost over an order of magnitude more than a standard runway.
The third runway is extravagence Washington can't afford.

The only real questions are:
Are we going to have to go to court to stop it ?
How big a scandal is the EIS going to cause if it isn't revised to address comments such as those you've heard today ?
When are we going to put together a plan that really meets the Airlines long term needs?

Good Evening.

I am Joseph R. McGeehan, Superintendent of the Highline School District. The building of a third runway at the Seattle-Tacoma International Airport will have an impact on the schools, the communities which we serve, and the quality of life in this area. As superintendent of schools, I have the opportunity to listen to many points of view about this issue.

R-7-9

First, I want to address the allegation that the school district will not cooperate with the Port of Seattle concerning sound attenuation issues. The Board of Directors believes they have a responsibility to keep open the opportunity to challenge and to seek assistance and financial relief from any future airport developments which adversely affect noise levels around schools. The proposals which have been offered by the Port request that the Board renounce any future claims if we accept sound attenuation monies. The Board is paying careful attention to the EIS study. The Board in conjunction with its legal counsel is seeking to create appropriate language which protects its future rights and responsibilities and establishes some standards, to which both parties can agree, so that a sound attenuation program can move forward. We also are considering the need for the affected schools to be air conditioned.

It is a source of frustration that we are expected to resolve this issue and other related matters from the school district's budget, particularly, when other citizens and travelers benefit from the airport without providing any financial assistance to those of us who will bear the burden of the third runway. We do not wish to demonize this issue but we believe fairness and community responsibility are being ignored.

We also receive criticism for having schools in the flight path. We have received no offer to move schools out of the flight path. The impact of such a decision has profound

economic and social consequences for the communities in which these schools are located. The transporting of students away from their neighborhoods is always a source of legitimate concern.

My communication with several Port officials has been forthright and cordial. To the best of our ability, all of us need to work at being good neighbors toward one another. Your assessment of the impact of the third runway on children and their parents can be beneficial.

R-7-9

We want learning environments in which the noise level and the air quality meet safe standards for students, employees and the community. We are concerned about issues related to loss of concentration and the inability to hear one another. We are involved in a research study to assess the impact of the airport on students. We also are working with the Airport Communities Coalition on impact issues. We will send you more information about these matters during the next several months.

Attached to this statement are several past studies for your review and consideration.

Thank you for your time.

Derek B.

It will cost about one billion dollars to make the third runway. Most runways cost about 50 million dollars. The third runway will not be able to carry fully loaded cargo planes. It will only be able to increase by 2 % the take-offs, and it will only be able to increase by 12% the landings. Plus, it will also annoy the people, animals like dogs, cats and most importantly bald eagles. When I am at school I hear airplanes very often so probably other schools do too. R-5-4

The grass filled part of the box is the woods and grass. The empty part of the box is the concrete walls, new buildings, and runways. The ball will substitute the noise of the planes. See how the ball will make more noise on the concrete walls, buildings and runways than it will on the woods and grass.

Thank you for your time.

Parents note : This was written by our 9 year old son, who obviously has been listening to us discuss the third runway during meals. I added this post script, he did the rest. He attends Marvista School in Normandy Park. This was prepared for the DEIS June 1, 1995 hearing.

Highline Public Schools

COMMENTS OF THE SUPERINTENDENT
DR. JOSEPH R. McGEEHAN

June 1, 1995
Public Hearing Regarding a Third Runway
and Its Environmental Impact

The questionnaire and cover-letter were both in Chinese. The questionnaire was designed in such a simple form that the teachers would not have any difficulty in answering the questions. In addition, because of the usual difficulty experienced in having sufficient responses from a postal survey, the questionnaire was kept as short as possible. Including the questions on the personal statistics of the teachers, a total of 10 questions was asked. Masking questions, as adopted in the surveys of other workers [1–4], were not included.

Besides the questions on the annoyance due to aircraft noise, questions on the annoyance due to traffic noise, as found in the schools, were also included. The questions on the aircraft noise annoyance were graded in a similar way to the seven-point scale suggested by the London survey [1, 2]. Similarly, the questions on the traffic noise annoyance were graded in the seven-point scale of dissatisfaction suggested by Griffiths and Langdon [13] and Bottom [14]. Other questions on the interference of aircraft noise on speech and teaching, the effects on responses and activities, duration of loss of teaching and other effects were also included in the questionnaire.

4. AIRCRAFT NOISE LEVELS

As has been discussed by Ko [9] and Ko *et al.* [12], the channelling and shielding effect of the numerous tall buildings in the areas rendered the prediction of aircraft noise extremely difficult. Thus, it was decided to measure the actual aircraft noise levels as found in the schools investigated.

Only the noise due to aircraft was measured inside the school compound. No attempt was made to measure the background noise, which was mainly due to traffic. The period of measurement was from 09.00 to 17.00 hours, over the whole school period. The location of the Bruel and Kjaer 1 inch condenser microphone and the sound level meter Type 2204 was always within the school compound, but not inside the classrooms. The noise level, in A-weighting, of each aircraft was read off the sound level meter and the frequency of overflights was also noted.

It was found during the noise measurements that fourteen schools were not affected by aircraft noise. The main causes were the large distance from the aircraft and the shielding of aircraft noise by the tall buildings surrounding the school. In this respect, they are excluded from the following discussion.

The daily frequency of aircrafts coming in and leaving the airport is presented for the period considered, 09.00 to 17.00 hours (see Figure 2). The daily flights shown are the averages of the scheduled flights over a whole week. Over a 24 hour period there was a total of 170 flights, including both the take-offs and landings. In the period considered, the number of flights amounted to 94, about 55% of the total. Of these 94 flights, 27 occurred in the period 09.00 to 13.00 hours and 67 in the period 13.00 to 17.00 hours, indicating more flights in the afternoon. Of the afternoon flights 33 were take-offs and 34 landings, compared with 15 take-offs and 12 landings in the morning. Also within the period considered, the maximum number of flights in an hour is 23 and occurred between 14.00 and 15.00 hours, followed by 18 flights between 15.00 and 16.00 hours.

Under normal weather conditions, most of the landing aircraft approach from the west; that is, they use the western approach where most of the schools are located (see Figure 1). Thus, these schools had a frequency of eight landing flights between 13.00 and 14.00 hours and fourteen landing flights between 14.00 and 15.00 hours.

The averages of the peak aircraft noise levels, dB(A), in the schools vary from 65 to 106 dB(A) with an overall mean of 86.7 dB(A) and a standard deviation 7.2 dB(A). The

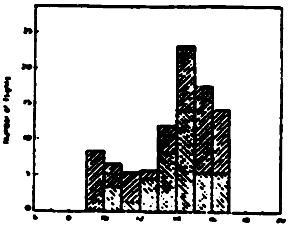


Figure 2. Hourly distribution of scheduled flights. ▨, take-off; ▧, landing.

averages include the noise levels from both the take-off and landing aircraft. Numerically, there are five schools which had a level of above 100 dB(A), sixteen schools above 95 dB(A) and fifty-five schools above 90 dB(A). However, it seems there are two peaks in the histogram of the averages. One is found at about 90 to 91 dB(A) and the other at about 84 dB(A). The cause of these two peaks may be associated with the dominance of either taking-off or landing aircraft near that particular school.

As observed by Ko *et al.* [12], the standard deviation of the peak aircraft noise level depends mainly on the mean peak level. This means that a higher mean peak level would give a higher standard deviation. The standard deviations observed in the schools, as shown in Figure 3, indicate the same trend (the linear regression has a correlation coefficient (r) of 0.55). Part of the reasons for the high standard deviation of the peak aircraft noise level at some schools can be attributed to the influences of both taking-off and landing aircraft. It is observed at these schools that the take-off aircraft noise is

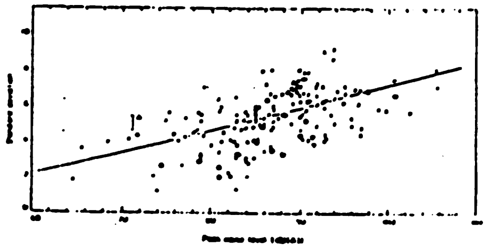


Figure 3. Variation of average peak noise level of aircraft with standard deviation. •, Ko *et al.*; ▼, Kapland; △, Bishop; ⊕, Rylander *et al.*; □, Crook and Langdon.

usually higher than the noise of landings. The indoor results of Ko *et al.* [12] are also shown and have lower values, which may be due to the shielding of the buildings and the effect of reverberation inside the buildings.

The results obtained are compared with those of other workers. The actual peak aircraft noise levels in the school yards of schools in Itami City near Osaka International Airport, having levels of 75 ± 15 dB(A) [15], are much lower than the ones observed in this investigation. The indoor noise levels of five schools around London Airport (Heathrow) [6], 70.6 and 72.2 dB(A), even if one allows for attenuation during its propagation indoors, are at the lower end of the present results.

The standard deviation of the outdoor results of Rylander *et al.* [3], Bishop [16] and Kapland [17] and indoor results of Crook and Langdon [6] are also shown in Figure 3. Good agreement is found.

5. SOCIAL SURVEY

5.1. ANNOYANCE

Of the 2100 teachers who responded to the questionnaire 31.5% are male and 68.5% female. About 47% of the responding teachers were within the age groups of 25 to 34 years old, followed by 25.7% within the age group of 35 to 44 years old. Also, of these 2100 teachers, 21.4% had taught in that particular school for more than 10 years, followed by 21.5% for 5 to 7 years and 19.0% for 1 to 4 years in the school.

The sources of noise nuisance in the schools investigated are mainly aircraft and traffic. 64.5% of the teachers cited aircraft noise as most annoying and 22.0% cited traffic noise. Other types of noise were cited by only 13.5% of the respondents.

The presentation of the responses of the teachers in the following sections relies basically on the mean responses at each school. It was found during the analysis that the results from schools having respondents of less than fourteen teachers were statistically unreliable. Thus, these results are excluded from the discussion.

The results for the mean aircraft noise annoyance of the teachers in the schools as correlated with the Noise and Number Index (NNI) are shown in Figure 4. The annoyance scale is the seven-point scale of the London surveys [1, 2], with scale one for "not annoyed" and scale seven for "very annoyed". The mean annoyance shown in Figure 4 is the average of the annoyance responses to aircraft noise found in the morning and afternoon. The Noise and Number Index is based on the peak noise level of the aircraft in the school and the number of overflights [1, 2].

Though the linear regression of the data points with the Noise and Number Index is shown in Figure 4, non-linear regression has also been tried. An exponential function, a power function and a logarithmic function have been attempted, giving correlation coefficients (r) of 0.84, 0.84 and 0.85, respectively. These are comparable with the linear one of 0.86, and therefore the linear function has been adopted for the analysis.

Besides the linear regression of the mean aircraft noise annoyance with the Noise and Number Index, regression with the average peak aircraft noise level has also been attempted. A correlation coefficient of 0.69 was found, which is lower than that of 0.86 for the Noise and Number Index.

Results shown in Figure 4 also indicate the noise condition due to aircraft in the schools investigated. There are four schools which have a Noise and Number Index value higher than 60 and twelve schools above 55 NNI. These constitute, respectively, 6% and 17% of the schools shown in Figure 4. Furthermore, the twelve schools have Noise and Number Index values higher than the range of 35 to 55 covered by the survey of Crook and Langdon [6].

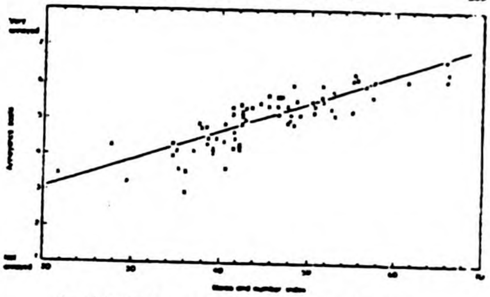


Figure 4. Variation of mean aircraft noise annoyance with Noise and Number Index.

The observed linear increase in the mean aircraft noise annoyance with the Noise and Number Index gives an extrapolated value of 70 NNI for scale seven, that is, "very annoyed". This value of 70 NNI is only slightly higher than the ones observed in the three noisiest schools, by 4 NNI (see Figure 4).

Also indicated by Figure 4 is the fact that the mean annoyance always had a rating above 3. This is true even for a Noise and Number Index as low as 22. As will be discussed later, this implies an effect of aircraft noise on teachers, even at such low aircraft noise levels.

The effect of traffic noise on the mean aircraft noise annoyance was also investigated. Since the background traffic noise level in the schools was not measured, the isolation of the effect due to traffic is based on the mean traffic noise annoyance of the teachers. In addition, the average of the traffic noise annoyance in the morning and afternoon in that particular school is used.

Three categories of the mean traffic noise annoyance are adopted. The first category includes the responses having ratings of 1.0 to 2.99. The second is from 3.0 to 4.99 and the third 5.0 to 7.0. The resulting linear regressions of the mean aircraft noise annoyance in these three categories of traffic noise annoyance are shown in Figure 5. The number of schools and the correlation coefficients obtained are shown in Table 2 (the coefficients obtained in these categories suggest a significance criterion less than 0.1 per cent level [18]).

The regression lines of Figure 5 do not show much variation among themselves. The biggest variation has only a difference in the annoyance scale of 0.5 and is found in the highest and lowest Noise and Number Index regions. The agreement between the overall line and the one of the category of 3.0 to 4.99 is due to the largest number of schools ($N = 34$) in this category.

The findings shown in Figure 5 indicate that at a high value of Noise and Number Index there is a tendency of higher mean aircraft noise annoyance at higher mean traffic noise annoyance. For a low value of Noise and Number Index the reverse of lower

Journal of Sound and Vibration (1979) 62(2), 277–292

RESPONSES OF TEACHERS TO AIRCRAFT NOISE

N. W. M. Ko

Department of Mechanical Engineering, University of Hong Kong, Hong Kong

(Received 30 May 1978, and in revised form 21 August 1978)

Acoustic measurements of aircraft noise in 139 schools in Hong Kong have been carried out. The schools are located under and very near the flight paths of aircraft coming in and leaving the international airport, Kai Tak. Coupled with the acoustic measurements, measurements of the subjective responses to the aircraft noise of 2100 Chinese teachers in these schools have been made. It is found that the subjective responses of the teachers correlate well with the Noise and Number Index. Besides the effect of annoyance, it is further found that the more serious effect of aircraft noise is the disruption of verbal communication, resulting in speech and teaching interference during lessons.

1. INTRODUCTION

Subjective responses of the general public to aircraft noise have been extensively surveyed and well documented [1–4]. The responses, such as annoyance, arousal, speech interference, and others, were found to correlate well with the acoustic measurements of the aircraft noise and the frequency of overflight [1, 2]. Besides the adoption of the basic aircraft noise level for the correlation [3, 4], different noise indices and criteria have also been found to correlate well with the subjective responses [5]. However, there was similarity among all these derived aircraft exposure indices [5].

In the vicinity of airports the presence of population renders the establishment of schools for children necessary. In these schools under and near the flight paths the teachers and pupils may be subjected to an aircraft noise environment which may or may not be different from that to which the general public living in the area is subjected. In other words, the teachers and pupils are disturbed by aircraft noise during the whole period of their stay in the schools. On the other hand, there is the possibility that the general public may not stay in the residential area, especially those who work elsewhere, in the day time. This suggests that the disturbance by aircraft noise of teachers and pupils may mainly occur in their school periods, while the disturbance of the general public may occur at either their working or relaxation period or wherever their activities are. In this respect, there may be difference in the subjective responses of teachers and pupils from that of the general public.

The effects of aircraft noise in schools around London Airport (Heathrow) have been reported by Crook and Langdon [6]. The work was concentrated on classroom observations within five schools, having an estimated Noise and Number Index (NNI) of 52 and 56. Besides the objective measurements of the aircraft noise and the frequency of overflights, direct observations of the interference of aircraft noise on teachers and pupils have been obtained. Although subjective responses of teachers have also been attempted by the above workers, the number of teachers chosen for the investigation was too small, 36 respondents at six schools [6].

0022-460X/79/062277 + 16 $02.00/0

A more recent survey at 78 secondary schools, having over one thousand respondents, has been carried out by Sargent [7]. Unfortunately, the results are not yet readily available.

Because the international airport of Hong Kong, Kai Tak, is situated within the urban areas of the highly populated city, the population which may be affected by the aircraft noise amounts to 2·1 millions [8]. Thus, in these areas the demand for schools for the education of children is extremely high, and all schools established in these areas, under or near the flight-paths, are affected by the aircraft noise. The noise intensity, besides being dependent upon other important factors such as the type of aircraft, payload, mode of operation and others, depends on the distance of the school from the passing aircraft and on the local topographical conditions [9]. The findings of Ko et al. [10] have pointed out that the general public might choose to live just next to the runway. It is thus not surprising that schools have been established very near the runway or just adjacent to the touch-down point, resulting in these schools having very high aircraft noise levels.

It was the aim of the present investigation to study the aircraft noise environment inside these schools and the responses of teachers who taught in these schools. The study was made in the summer of 1977, during which aircraft noise measurements were taken inside the school compounds and the subjective responses of teachers were determined, by postal methods.

2. SITES

Due to the location of the international airport, both taking-off and landing aircraft fly over the highly populated urban areas [8], where a lot of schools are located (Figure 1). Basically, the runway has two approaches. The western approach, which is directly over

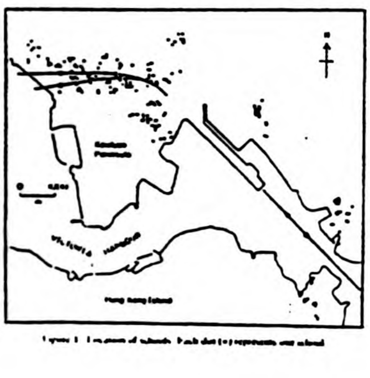


Figure 1. Locations of schools. Each dot (•) represents one school.

the city, has a population of 1·3 millions in the areas under it, much higher than the population under the eastern approach, which is 0·8 million. Correspondingly, there are more schools, both secondary and primary, in the urban areas under the western approach. The actual distribution of the schools with respect to the runway and the flight-paths is shown in Figure 1. Each dot on the map represents one school.

In the present investigation it was decided to include all the schools, both secondary and primary, which might possibly be affected by aircraft noise, a total of 139 schools in all. Out of these 139 schools, 61 schools were secondary and the rest primary.

Nearly all the schools were built of concrete. The walls were all plastered. Besides the usual standard school furniture and furnishing, no particular attempt was made at diminishing or minimizing the noise. There was no acoustic treatment of the classrooms. As has been observed in other buildings of the city [11, 12], the indoor noise level was only marginally lower than the outdoor one. It is mainly due to the hot climate in the summer and the mild weather in the winter that the windows are kept open most of the year. Furthermore, the existing installed ceiling fans in the classrooms was not sufficient to ventilate the classrooms when windows were shut. Thus, the small benefit of the attenuation of noise through closed windows was really not available.

The teacher population of the 139 schools was 4794. The maximum number of teachers in one school was 100 and the minimum number was 2. The average number of teachers of all the schools was 34·5 and the standard deviation 19·0 (see Table 1).

The number of teachers who responded to the survey is also included in Table 1. 2100 teachers from 91 schools answered the questionnaire, which is 44% of the total teacher population in the areas considered. However, this number excludes the teachers in seven schools which responded but were not affected by the aircraft noise. Likewise, the average of the responding teachers is 25·0 and the standard deviation is 12·4. The lower average is due to the fact that even in schools which responded some teachers did not answer the questionnaires distributed.

TABLE 1

Number of schools and teachers in the survey

	Number of schools	Number of schools not affected by aircraft noise	Number of teachers	Average number of teachers	Standard deviation
Sample	139	14	4794	34·5	19·0
Response	91	7	2100†	25·0	12·4

† Excludes the teachers in the schools not affected by aircraft noise.

3. METHODS

In the present study the sampling procedure was by a postal technique. Copies of the questionnaire, with the usual cover-letter explaining the importance of not communicating with other fellow teachers and the technique of answering, were sent by post to the principals of all the 139 schools. It was through the principals that the questionnaires were distributed to the teachers. The returns of the answered questionnaires were again through the principals of the schools. Three reminders were sent to the schools for the returns.

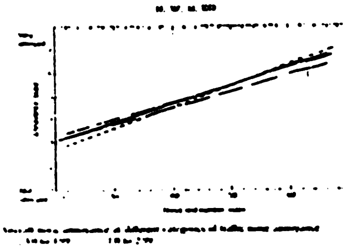


Figure 5. Aircraft noise annoyance at different categories of traffic noise annoyance. ——, Overall; ·····, 5·0 to 7·0; – – –, 3·0 to 4·99; — · —, 1·0 to 2·99.

aircraft noise annoyance at higher traffic noise annoyance is true. This phenomenon is illustrated by the regression line of the category of 5·0 to 7·0 of the mean traffic noise annoyance crossing the regression lines of the other two categories. However, the regression line of 3·0 to 4·99 is always higher than the one of 1·0 to 2·99.

The results of Figure 5 seem to suggest that at high values of Noise and Number Index, due either to high aircraft noise level or to high frequency of overflights, the teachers respond more to both aircraft and traffic noise. This means that the annoyance of one would trigger off the annoyance to the other noise present, resulting in high annoyance ratings on both types of noise disturbances. To put it in another way, one might say that in this case of very high aircraft noise level, 100 dB(A) or more (Figure 3), one would not expect the high background traffic noise level (L_{10} values in the range of 75 to 79 dB(A) [12]) would make much difference to the aircraft noise annoyance. Nevertheless, at low aircraft noise level the high background traffic noise would more or less "mask" the former. Thus, the aircraft noise annoyance in such a high traffic noise condition would be correspondingly affected and reduced.

Even though the above presentation is on the averages of the annoyance responses of the teachers in the morning and afternoon, it may be interesting to look at the responses separately. It is found that the mean aircraft noise annoyance of all the teachers in the morning is 4·6 while the one in the afternoon is 5·1. This gives a difference of half an annoyance rating. The higher annoyance response in the afternoon may be due to the higher number of flights in the period (see Figure 2). This argument can further be

TABLE 2

The correlation of the mean aircraft annoyance in different categories of mean traffic annoyance

Mean traffic annoyance	Number of schools	Correlation coefficient
1·0–2·99	21	0·85
3·0–4·99	44	0·82
5·0–7·0	15	0·90†
Overall	80	0·86†

supported by the following discussion. With the assumption of the same noise levels of aircraft flying over the particular school in the morning and afternoon, the difference in the overflights in these two periods amounts to a change of 5·9 *NNI* (Figure 2). By referring to the overall responses of Figure 5, this difference of 5·9 *NNI* gives an increase in the annoyance rating of 0·45 in the afternoon. This agrees very well with the results observed above.

5.2. SPEECH INTERFERENCE

Besides the questions on the annoyance responses to aircraft and traffic noise, the questionnaire also contained questions on the disruption of verbal communication, such as "speech interference in the classroom", "raise voice during teaching", "shout during teaching" and "pause because of aircraft noise". The teachers were asked to choose an answer from the four degrees of response suggested: "very", "moderate", "little" and "not at all" [1, 2]. Unless otherwise stated, the following presentation will concentrate only on the responses of the teachers who chose the degree of "very" on that particular question.

The linear regressions of the percentages of teachers who chose "very" as their answers for the interference of verbal communication in the classroom with the Noise and Number Index are shown in Figure 6. The corresponding correlation coefficients (*r*) are tabulated in Table 3 and indicate good correlation for "speech interference", "raise voice", "shout" and "pause". The respective coefficients are 0·69, 0·50, 0·46 and 0·59.

Non-linear regressions of the above responses with the Noise and Number Index have also been tried. As before (see section 5.1), an exponential function, a power function and a logarithmic function were used. Their respective coefficients are marginally lower than the ones of the linear regression.

The results of "speech interference" shown in Figure 6 illustrate the seriousness of aircraft noise on the disruption of speech. At 10 *NNI* 27% of the teachers who responded chose "speech interference" as the most severe form of interference caused by aircraft noise. At 65 *NNI* it increases linearly to a value of 84%. Because of the "speech interference", the teachers have to raise their voices during teaching in order to be heard. At 10 *NNI* 36% of the teachers "raised their voices" and at 65 *NNI* 78%. This difference in the rate of increase results in the cross-over of the two regression lines of "speech interference" and "raise voice".

The cross-over of the two lines occurs at 53 *NNI*. This suggests that at a low value of Noise and Number Index (or, say, a low peak aircraft noise level), the teachers are

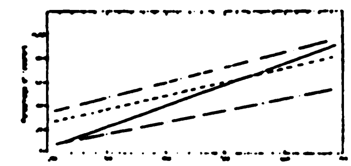


Figure 6. Percentages of teachers reporting disruption of verbal communication. ——, "Speech interference"; – – –, "raise voice"; – · –, "shout"; ·····, "pause".

TABLE 3

The correlation coefficients between the Noise and Number Index and different responses and activities

	Coefficient		Coefficient
Speech interference	0·69	Nervous pupils	0·29
Raise voice	0·50	Startle	0·46
Shout	0·46		0·46
Pause	0·59	Feel more tired	0·55†
Teaching interference	0·70	Feel tense and edgy	0·57
Continuity of teaching	0·64	Headache	0·46
Concentration of teacher	0·38	Affect health	0·52
Change teaching method†	0·11	Lose [illegible]	0·59
Loss of concentration of pupils	0·56		

† Include responses from both "very" and "moderate" category.

prepared to raise their voices when aircraft fly over. However, at a high value of Noise and Number Index (above 53) (or, say, a high peak aircraft noise level), the teachers are not as prepared to raise their voice as in the lower Noise and Number Index regime.

The above argument is further supported by the results for "shout" and "pause" during teaching when an aircraft passes by (Figure 6). At the same value of Noise and Number Index the percentage of teachers who "shout" is low while the percentage of teachers who "pause" is high. For example, at 65 *NNI* 90% of the teachers "pause" while only 50% "shout". This implies that more teachers prefer to pause than to shout when aircraft pass by.

The results in Figure 6 also illustrate the fact that the commonest way adopted by the teachers to overcome the effect of speech interference by aircraft noise is to "pause" and is followed by "raise voice". Even at as low as 25 *NNI*, 48% of the teachers adopt "pause" as the way to overcome the interference. It must be borne in mind that these teachers are the ones who chose the most severe degree "very" as their answers. Thus, the total number of teachers who would use "pause" would be even higher.

Using "shout" to overcome the speech interference by aircraft noise is not so readily adopted by the teachers. This is the reason why the cross-over point of the regression lines of "speech interference" and of "shout" occurs at a very low value of Noise and Number Index, about 23. Thus, at a high value of Noise and Number Index fewer teachers would shout, meaning that they would give up the attempt to shout against the high aircraft noise.

5.3. TEACHING INTERFERENCE

The interference of aircraft noise on teaching has also been investigated. The "teaching interference", "disruption of the continuity of teaching", "effect on the concentration of teachers" and "change of teaching method" have all been assessed. The results are shown in Figure 7 and the correlation coefficients in Table 3.

The correlation coefficients of the first two responses, "teaching interference" and "continuity of teaching", are high, 0·70 and 0·64, respectively. The coefficient of "concentration of teachers" is slightly low, 0·38 (significance 0·1%). For the results of "change of teaching method" the regression gives a coefficient of 0·16 (significance 5%), but these are not included in Figure 7. For comparison with the results of Crook and Langdon [6],

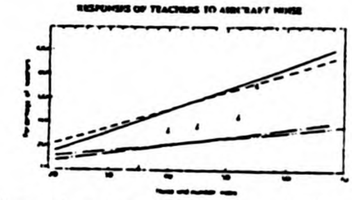


Figure 7. Percentages of teachers reporting disruption of teaching. ——, "Teaching interference"; – – –, "continuity"; ·····, "concentration"; – · –, "change teaching method" ("very" + "moderate"); Δ, "alter way you teach" [6].

the results of teachers who answered "very" and "moderate" are included and are shown in Figure 7. The resulting coefficient is 0·31 (significance 0·4%). Again, as for the ones for speech interference, the above coefficients of the linear regression are marginally higher than the respective ones obtained by the non-linear regressions.

The results of Figure 7 indicate that basically there is not much difference in the regression line of "teaching interference" and of "continuity of teaching", with 25% of teachers being affected at 25 *NNI* and this increasing to 90% at 65 *NNI*. At such a high Noise and Number Index level nearly all the teachers have had their teaching and the continuity of teaching disrupted. This may suggest that the "teaching interference" by the aircraft noise is mainly due to the "disruption of continuity of teaching".

The "concentration of teachers", however, is not so severely affected by aircraft noise, having a value of 10% at 25 *NNI* and 37% at 65 *NNI*. Nearly the same results as the ones for "concentration of teachers" are found for the ones for "change of teaching method" (Figure 7).

The two regression lines of "teaching interference" and "continuation of teaching" are similar to the ones of disruption of verbal communication, except "shout", shown in Figure 6. This strongly implies that the "teaching interference" is mainly due to the "disruption of continuity of teaching", because of the adoption of "pause" by teachers when aircraft passes by.

Comparison of the results of "change of teaching method" with the ones of Crook and Langdon [6] is also shown in Figure 7. The results of the above workers are the ones who answered "yes" to the question of "alter the way to teach". It is found from the comparison that the present results are lower than the ones of the above workers for the Noise and Number Index less than 40. Care has to be taken for the comparison because of the small sample, 76 respondents, of Crook and Langdon [6] and the difference in the percentage of teachers who answered "yes" to the ones who answered "very" and "moderate".

5.4. EFFECTS ON PUPILS

The effects of aircraft noise on pupils, as reported by the teachers, are shown in Figure 8. The corresponding correlation coefficients are tabulated in Table 3. The coefficients of the "loss of concentration of pupils" and "nervous pupils" are 0·56 and 0·29, respectively (significance 0·1% and 0·1%). The former is marginally higher than the ones of the regression with the other three non-linear functions. The latter, however, is the lowest of

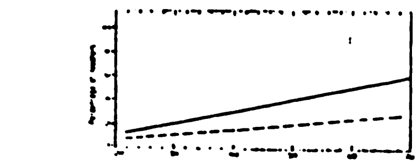


Figure 8. Percentages of teachers reporting effects on pupils. ——, "Loss of concentration of pupils"; - - -, nervous pupils.

the four functions used. The highest is 0.37 for the power function. The percentage of teachers who stated the former is higher than the percentage who stated the latter. The higher percentage of the former may be due to the disruption of verbal communication which results in the "pause" of teachers during lesson and the "disruption of the continuity of teaching" (Figures 6 and 7). The low percentage of "nervous pupils" may imply that even the pupils find it hard to compete with aircraft noise.

5.5. OTHER RESPONSES

The results of other responses of the teachers are shown in Figure 9. The correlation coefficients are in Table 3. The above coefficients are slightly higher than the ones of the other three non-linear functions. Besides the results of the "startle", which are slightly lower, the results of "feel more tired", "feel tense and edgy", "headache" and "affect health" are roughly the same, about 5% at 50 NNI and 10% at 65 NNI.

The results of "feel more tired" of Crook and Langdon [6] are also shown in Figure 9. They are composed with the combined ones of "very" and "moderate". Similar to the results discussed above, the results of Crook and Langdon [6] are higher than the ones of the present survey at Noise and Number Index values equal to and greater than 40 but lower at values less than 40. The reasons discussed before may also be applied here.

The daily losses of teaching due to aircraft noise, as estimated by the teachers, are shown in Figure 10. The regression is based on the scale used, which represents the time

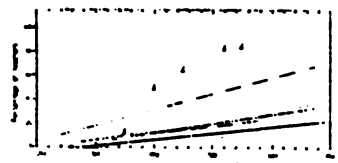


Figure 9. Percentages of teachers reporting other responses. ——, "Startle"; ——, "feel more tired" (very); feel tense and edgy; ——, "headache"; ——, "affect health"; ——, "more tired"; Crook and Langdon, ▲, more tired [6].

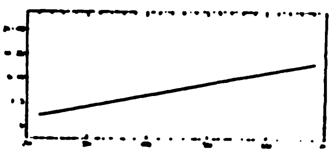


Figure 10. Variation of time loss with Noise and Number Index.

loss rather than the actual time. The results give a loss of 2 to 5 minutes at 50 NNI, increasing to 6 to 10 minutes at 65 NNI.

For the results of the question "whom affected most" by aircraft noise no linear regression is found with the Noise and Number Index. However, the summarized results of all the teachers are tabulated in Table 4, in which 6.9% of the teachers stated that they suffered most, 11.9% stated the pupils and 81.2% stated both. These results compared with the corresponding 38%, 1% and 57% of Crook and Langdon [6].

The acclimatization of all the teachers to aircraft noise is shown in Table 5. 48% of the teachers have become used to the aircraft noise while 17.2% are more bothered now. 25.3% are about the same.

The linear regressions of the acclimatization results with the Noise and Number Index are shown in Figure 11 and the corresponding correlation coefficients are also tabulated in Table 5. As shown in Figure 11, although the percentage of teachers who "have become used to aircraft noise", is fairly constant with the Noise and Number Index, more teachers are "more bothered now" at higher values of Noise and Number Index. The latter may be mainly responsible for the decrease in the percentage of teachers who stated "about the same" with the increase in the Noise and Number Index.

"Consideration to transfer" by the teacher is also included in Figure 11 and the coefficient obtained is 0.16. Only a total of 3.5% of all the teachers does "consider to transfer".

TABLE 4

The percentage of teachers who stated the person affected most by aircraft noise

Teacher	6.9
Pupil	11.9
Both	81.2

TABLE 5

The percentage of teachers with self-rating on acclimatization to aircraft noise and the correlation coefficients with the Noise and Number Index

	More bothered now	Have become used to them	About the same	New to the school
Percentage	17.2	48.0	25.3	9.5
Coefficient	0.44	0.01	0.37	

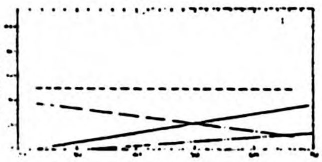


Figure 11. Acclimatization of teachers. ——, "More bothered now"; - - -, "have become used to"; ——, the same; ——, consider to transfer.

Compared with the coefficients obtained with the non-linear functions, the highest coefficient of the "more bothered now" is 0.55 for the power function. The linear one of "the same" is the best, while the ones of "have become used to" for the four functions are basically the same. The best one of "consideration to transfer" is 0.47 for the exponential function.

6. COMMENT

The present study has shown that the schools near and around the Kai Tak Airport are under very severe aircraft noise conditions. Nearly all the schools investigated have a mean peak aircraft noise level above 70 dB(A), which is the indoor level established by Crook and Langdon [6] as causing appreciable discomfort to teachers in schools around Heathrow. Indeed, some schools have a mean peak aircraft noise level of more than 100 dB(A) with the maximum at 106 dB(A).

The subjective responses of teachers obtained in these schools indicate good correlation of annoyance ratings of the teachers with the Noise and Number Index observed in the school period. The effect of traffic noise on the mean aircraft noise annoyance responses has been looked into by means of three categories of traffic noise annoyance ratings. There is a tendency that at high levels of Noise and Number Index, higher aircraft noise annoyance is found at high traffic noise annoyance. The reverse, of lower aircraft noise annoyance at high traffic noise annoyance, is true for low levels of Noise and Number Index.

The speech interference and teaching interference due to aircraft noise are found to be the most severe disruption experienced by the teachers. They seem to be inter-related. In overcoming the speech interference by aircraft noise, the teachers are prepared to raise their voices in order to be heard. However, they seem to be not so willing to shout. The reason may be due to the effort involved. In this respect, they adopt "pause" as the means to overcome the disruption on the verbal communication by aircraft noise. Because of the frequent pauses during lessons, the teachers find their teaching disrupted. The high percentage of teachers who stated that there was disruption of continuity of their lessons suggests that this is the main cause of disruption in teaching; this again is mainly due to the frequent pauses adopted. Furthermore, this may also be the reason for the loss of concentration of pupils.

The effects of aircraft noise on the responses and activities of the teachers are not as serious as the interference on speech and teaching.

The effects of aircraft noise on pupils are based on the estimations of the teachers investigated. The present study does not include the subjective responses of the pupils, the disruption of aircraft noise on learning, performance and other activities of pupils. More information is needed in order that the effects of such high aircraft noise levels on pupils can be better understood.

ACKNOWLEDGMENTS

The work reported here was the result of co-operation between the Educational Research Establishment, Education Department, Hong Kong Government and the Department of Mechanical Engineering, University of Hong Kong.

The author wishes to thank Mr H. J. Head, Dr J. Chan and the staff of the Educational Research Establishment who collected the data on subjective responses and part of the acoustic measurements. The valuable suggestions and contributions of Mr Head and Dr Chan are greatly appreciated. The author also wishes to thank Mr S. Y. Chan of the Department of Mechanical Engineering, who helped with analysis of the data collected. In addition, the author wishes to thank Dr R. A. Perry, Urban Service Department, in helping to obtain part of the acoustic results. The arrangement made by Mr W. I. Ho, Urban Service Department, was necessary for the completion of the acoustic measurements. Thanks are also due to Mr H. K. Tsang, Computer Centre, University of Hong Kong, in helping to process the data.

Lastly but not least, the author wishes to thank the principals and teachers in the schools who kindly co-operated in the survey.

REFERENCES

1. Command 2056 1963 *Noise. Final Report of the Committee on the Problem of Noise*. London: Her Majesty's Stationery Office.
2. Anon. 1971 *Second Survey of Aircraft Noise Annoyance Around London (Heathrow) Airport*. London: Her Majesty's Stationery Office.
3. R. Rylander, S. Sörensen and A. Kajland 1972 *Journal of Sound and Vibration* 24, 419–444. Annoyance reactions from aircraft noise exposure.
4. R. Rylander, S. Sörensen, A. Alexandre and Ph. Gilbert 1973 *Journal of Sound and Vibration* 28, 15–21. Determinants for aircraft noise annoyance—a comparison between French and Scandinavian data.
5. D. W. Robinson 1970 *National Physical Laboratory Current Paper No. 1112*. An outline guide to criteria for the limitation of urban noise. London: Her Majesty's Stationery Office.
6. M. A. Crook and F. J. Langdon 1974 *Journal of Sound and Vibration* 34, 221–232. The effects of aircraft noise in schools around London Airport.
7. J. W. Sargent 1978 *Institute of Acoustics Lecture April 1978*. External noise and schools.
8. K. W. J. Topley 1972 *Hong Kong Population and Housing Census 1971, Main Report*. Hong Kong: Hong Kong Government.
9. N. W. M. Ko 1975 *Journal of Sound and Vibration* 38, 512–516. Aircraft noise in a high rise city.
10. N. W. M. Ko, A. S. H. Kwan and W. T. Chan 1976 *Journal of the Hong Kong Institution of Engineers* 4, 27–34. Noise pollution in Hong Kong.
11. N. W. M. Ko 1976 *Journal of Sound and Vibration* 47, 599–601. Indoor traffic noise in a high rise city.
12. N. W. M. Ko, A. S. H. Kwan and W. T. Chan 1976 *Journal of Sound and Vibration* 49, 575–591. Further investigations on the responses of lecturers to noise.
13. I. D. Griffiths and F. J. Langdon 1968 *Journal of Sound and Vibration* 8, 16–32. Subjective response to road traffic noise.

14 C. G. Bottom 1971 *Journal of Sound and Vibration* 19, 473–476. A social survey into annoyance caused by the interaction of aircraft noise and traffic noise.
15 Y. Ando, Y. Nakane and J. Egawa 1975 *Journal of Sound and Vibration* 43, 683–691. Effects of aircraft noise on the mental work of pupils.
16 D. E. Bishop 1966 *Journal of the Acoustical Society of America* 40, 108–122. Judgments of the relative and absolute acceptability of aircraft noise.
17 A. R. Kanaan 1974 *Journal of the Acoustical Society of America* 56, 129–131. Measured variations in aircraft noise near Atlanta Airport.
18 B. J. Cooper 1969 *Statistics for Experimentalists*. New York: Pergamon Press.

Journal of Sound and Vibration (1979) 62(2), 293–299

SIMULATION OF A NON-STATIONARY STOCHASTIC PROCESS WITH RESPECT TO ITS PROBABILITY DENSITY FUNCTION

J. Čačko and M. Bílý

Institute of Machine Mechanics of the Slovak Academy of Sciences, 809 31 Bratislava, Czechoslovakia

(*Received 15 February 1978, and in revised form 22 August 1978*)

Various relationships are developed for simulation of a non-stationary stochastic process. They are based on modelling of its time-dependent amplitude probability density, expressed analytically. Although the approach presented has a general application, its main purpose is to reproduce an environmental loading process and use it as the on-line input of computer controlled loading machines.

1. INTRODUCTION

In a recent paper [1] the simulation of environmental loading processes has been described from the point of view of the resulting fatigue life. It was emphasized that computer controlled loading systems are used not only to generate ordinates of random processes and realize them on the actuator but also to read and compute certain characteristics, to output data and to make decisions. The simulation (or computation of each process ordinate) must be, therefore, as quick as possible.

In section 5 of that paper [1] problems that one meets when simulating non-stationary processes were briefly mentioned. They arise mainly from the fact that there is no adequate methodology which allows a general and at the same time sufficiently fast simulation of all types of non-stationarities.

Following the work reported in the previous paper [1], the theoretical approach to the simulation of non-stationary processes has been elaborated more deeply, and this has resulted in derivation of the formulas to be presented in what follows here. Their practical application is limited, however, because this type of highly advanced test with non-stationary processes has scarcely been used as yet (at least in the fatigue field) and so there are practically no results available. Obvious reasons for this include not only the restricted technical possibilities for loading systems but also restrictive aspects of the present philosophy of testing, within which one still is unable to forget sinusoidal spectra.

Similarly as for stationary stochastic processes, non-stationary stochastic processes can also be characterized by their mean values, variances, probability densities and power spectral densities (autocorrelation functions), or in other words, by their time-dependent moments of the first (mean value and probability density) and second (variance, power spectral density, autocorrelation function) order. The decision as to which moments should be reproduced is not merely a mathematical problem but again is a question of the testing philosophy which one accepts. Whereas in the case of stationary stochastic processes the mathematical theory has reached a stage at which both the probability density function and power spectral density function can be reproduced simultaneously, the theory of non-stationary processes has not reached that stage as yet (with the exception of the case of a normal process). This is why we have to deal separately with the simulation of the

0022-460X/79/020293+07 $02.00/0

2083

Jet noise at schools near Los Angeles International Airport

Samuel R. Lane and William C. Meecham

[illegible]

INTRODUCTION

[illegible]

I. AIRCRAFT NOISE AND OPERATIONS SURVEY

[illegible]

#12

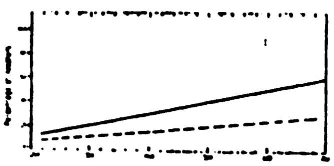


Figure 8. Percentages of teachers reporting effects on pupils. ——, "Loss of concentration of pupils"; – – –, noisier pupils.

the four functions used. The highest is 0.37 for the power function. The percentage of teachers who stated the former is higher than the percentage who stated the latter. The higher percentage of the former may be due to the disruption of verbal communication which results in the "pause" of teachers during lessons and the "disruption of the continuity of teaching" (Figures 6 and 7). The low percentage of "noisier pupils" may imply that even the pupils find it hard to compete with aircraft noise.

5.5. OTHER RESPONSES

The results of other responses of the teachers are shown in Figure 9. The correlation coefficients are in Table 3. The above coefficients are slightly higher than the ones of the other three non-linear functions. Besides the results of the "startle", which are slightly lower, the results of "feel more tired", "feel tense and edgy", "headache" and "affect health" are roughly the same, about 5% at 50 NNI and 10% at 65 NNI.

The results of "feel more tired" of Crook and Langdon [6] are also shown in Figure 9. They are compared with the combined ones of "very" and "moderate". Similar to the results discussed above, the results of Crook and Langdon [6] are higher than the ones of the present survey at Noise and Number Index values equal to and greater than 40 but lower at values less than 40. The reasons discussed before may also be applied here.

The daily losses of teaching due to aircraft noise, as estimated by the teachers, are shown in Figure 10. The regression is based on the scale used, which represents the time

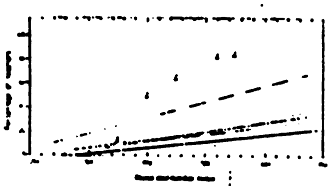


Figure 9. Percentages of teachers reporting other responses. ——, "Startle"; ——, "feel more tired" ("very"); ——, "feel tense and edgy"; ——, "headache"; ——, "affect health"; ——, "feel more tired"; Crook and Langdon [6].

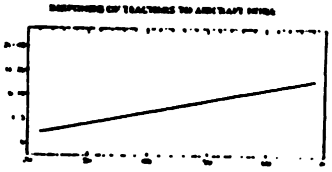


Figure 10. Variation of time loss with Noise and Number Index.

loss rather than the actual time. The results give a loss of 1 to 5 minutes at 50 NNI, increasing to 6 to 10 minutes at 65 NNI.

For the results of the question "whom affected most" by aircraft noise no linear regression is found with the Noise and Number Index. However, the summarized results of all the teachers are tabulated in Table 4, in which 6.9% of the teachers stated that they suffered most, 11.9% stated the pupils and 81.2% stated both. These results compared with the corresponding 38%, 1% and 57% of Crook and Langdon [6].

The acclimatization of all the teachers to aircraft noise is shown in Table 5. 48% of the teachers have become used to the aircraft noise while 17.2% are more bothered now. 25.3% are about the same.

The linear regressions of the acclimatization results with the Noise and Number Index are shown in Figure 11 and the corresponding correlation coefficients are also tabulated in Table 5. As shown in Figure 11, although the percentage of teachers who "have become used to aircraft noise", is fairly constant with the Noise and Number Index, more teachers are "more bothered now" at higher values of Noise and Number Index. The latter may be mainly responsible for the decrease in the percentage of teachers who stated "about the same" with the increase in the Noise and Number Index.

"Consideration to transfer" by the teacher is also included in Figure 11 and the coefficient obtained is 0.16. Only a total of 3.5% of all the teachers chose "consider to transfer".

TABLE 4

The percentage of teachers who stated the person affected most by aircraft noise

Teacher	6.9
Pupil	11.9
Both	81.2

TABLE 5

The percentage of teachers with self-rating on acclimatization to aircraft noise and the correlation coefficients with the Noise and Number Index

	More bothered now	Have become used to them	About the same	Plan to leave the school
Percentage	17.2	48.0	25.3	9.5
Coefficient	0.44	0.01	0.17	

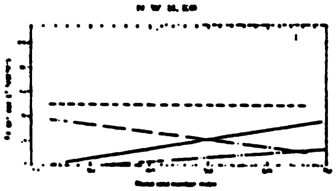


Figure 11. Acclimatization of teachers. ——, "More bothered now"; – – –, "have become used to"; ——, the same; ——, consider to transfer".

Compared with the coefficients obtained with the non-linear functions, the highest coefficient of the "more bothered now" is 0.55 for the power function. The linear one of "the same" is the best, while the ones of "have become used to" for the four functions are basically the same. The best one of "consideration to transfer" is 0.47 for the exponential function.

6. COMMENT

The present study has shown that the schools near and around the Kai Tak Airport are under very severe aircraft noise conditions. Nearly all the schools investigated have a mean peak aircraft noise level above 70 dB(A), which is the indoor level established by Crook and Langdon [6] as causing appreciable discomfort to teachers in schools around Heathrow. Indeed, some schools have a mean peak aircraft noise level of more than 100 dB(A) with the maximum at 106 dB(A).

The subjective responses of teachers obtained in these schools indicate good correlation of annoyance ratings of the teachers with the Noise and Number Index observed in the school period. The effect of traffic noise on the mean aircraft noise annoyance responses has been looked into by means of three categories of traffic noise annoyance ratings. There is a tendency that at high levels of Noise and Number Index, higher aircraft noise annoyance is found at high traffic noise annoyance. The reverse, of lower aircraft noise annoyance at high traffic noise annoyance, is true for low levels of Noise and Number Index.

The speech interference and teaching interference due to aircraft noise are found to be the most severe disruptions experienced by the teachers. They seem to be inter-related. In overcoming the speech interference by aircraft noise, the teachers are prepared to raise their voices in order to be heard. However, they seem to be not so willing to shout. The reason may be due to the effort involved. In this respect, they adopt "pause" as the means to overcome the disruption on the verbal communication by aircraft noise. Because of the frequent pauses during lessons, the teachers find their teaching disrupted. The high percentage of teachers who stated that there was disruption of continuity of their lessons suggests that this is the main cause of disruption in teaching; This again is mainly due to the frequent pauses adopted. Furthermore, this may also be the reason for the loss of concentration of pupils.

The effects of aircraft noise on the responses and activities of the teachers are not as severe as the interference on speech and teaching.

The effects of aircraft noise on pupils are based on the estimations of the teachers investigated. The present study does not include the subjective responses of the pupils, the disruption of aircraft noise on learning, performance and other activities of pupils. More information is needed in order that the effects of such high aircraft noise levels on pupils can be better understood.

ACKNOWLEDGMENTS

The work reported here was the result of co-operation between the Educational Research Establishment, Education Department, Hong Kong Government and the Department of Mechanical Engineering, University of Hong Kong.

The author wishes to thank Mr H. J. Head, Dr J. Chan and the staff of the Educational Research Establishment who collected the data on subjective responses and part of the acoustic measurements. The valuable suggestions and contributions of Mr Head and Dr Chan are greatly appreciated. The author also wishes to thank Mr S. Y. Chan of the Department of Mechanical Engineering, who helped with analysis of the data collected. In addition, the author wishes to thank Dr R. A. Perry, Urban Service Department, in helping to obtain part of the acoustic results. The arrangement made by Mr W. I. Ho, Urban Service Department, was necessary for the completion of the acoustic measurements. Thanks are also due to Mr H. K. Tsang, Computer Centre, University of Hong Kong, in helping to process the data.

Lastly but not least, the author wishes to thank the principals and teachers in the schools who kindly co-operated in the survey.

REFERENCES

1. Command 2056 1963 *Noise. Final Report of the Committee on the Problem of Noise.* London: Her Majesty's Stationery Office.
2. Anon. 1971 *Second Survey of Aircraft Noise Annoyance Around London (Heathrow) Airport.* London: Her Majesty's Stationery Office.
3. R. Rylander, S. Sörensen and A. Kajland 1972 *Journal of Sound and Vibration* 24, 419–444. Annoyance reactions from aircraft noise exposure.
4. R. Rylander, S. Sörensen, A. Alexandre and Ph. Gilbert 1974 *Journal of Sound and Vibration* 36, 15–21. Determinants for aircraft noise annoyance: a comparison between French and Scandinavian data.
5. D. W. Robinson 1970 *National Physical Laboratory Current Paper No.* 1112. An outline guide to criteria for the limitation of urban noise. London: Her Majesty's Stationery Office.
6. M. A. Crook and F. J. Langdon 1974 *Journal of Sound and Vibration* 34, 221–232. The effects of aircraft noise in schools around London Airport.
7. J. W. Sargent 1978 *Institute of Acoustics Lecture April 1978.* External noise and schools.
8. K. W. J. Topley 1972 *Hong Kong Population and Housing Census 1971, Main Report.* Hong Kong: Hong Kong Government.
9. N. W. M. Ko 1975 *Journal of Sound and Vibration* 38, 512–516. Aircraft noise in a high-rise city.
10. N. W. M. Ko, A. S. H. Kwan and W. T. Chan 1976 *Journal of the Hong Kong Institution of Engineers* 4, 27–34. Noise pollution in Hong Kong.
11. N. W. M. Ko 1976 *Journal of Sound and Vibration* 47, 590–600. Indoor traffic noise in a high-rise city.
12. N. W. M. Ko, A. S. H. Kwan and W. T. Chan 1976 *Journal of Sound and Vibration* 49, 575–591. Further investigations in the responses of humans to noise.
13. I. D. Griffiths and F. J. Langdon 1968 *Journal of Sound and Vibration* 8, 16–32. Subjective response to road traffic noise.

14. C. G. [illegible] 1971 Journal of Sound and Vibration 19, 473–476. A social survey into annoyance caused by the interaction of aircraft noise and traffic noise.
15. Y. Ando, Y. Nakane and J. Egawa 1975 Journal of Sound and Vibration 43, 683–691. Effects of aircraft noise on the mental work of pupils.
16. D. E. Bishop 1966 Journal of the Acoustical Society of America 40, 108–122. Judgments of the relative and absolute acceptability of aircraft noise.
17. A. R. [illegible] 1974 Journal of the Acoustical Society of America 56, 329–331. Measured variations in aircraft noise near Adelaide Airport.
18. [illegible] Statistics for Experimenters. New York: Pergamon Press.

Journal of Sound and Vibration (1979) 62(2), 293–299

SIMULATION OF A NON-STATIONARY STOCHASTIC PROCESS WITH RESPECT TO ITS PROBABILITY DENSITY FUNCTION

J. Cačko and M. Bílý

Institute of Machine Mechanics of the Slovak Academy of Sciences, 809 31 Bratislava, Czechoslovakia

(Received 15 February 1978, and in revised form 22 August 1978)

Various relationships are developed for simulation of a non-stationary stochastic process. They are based on modelling of its time-dependent amplitude probability density, expressed analytically. Although the approach presented has a general application, its main purpose is to reproduce an environmental loading process and use it as the on-line input of computer controlled loading machines.

1. INTRODUCTION

In a recent paper [1] the simulation of environmental loading processes has been described from the point of view of the resulting fatigue life. It was emphasized that computer controlled loading systems are used not only to generate ordinates of random processes and realize them on the actuator but also to read and compute certain characteristics, to output data and to make decisions. The simulation (or computation of each process ordinate) must be, therefore, as quick as possible.

In section 5 of that paper [1] problems that one meets when simulating non-stationary processes were briefly mentioned. They arise mainly from the fact that there is no adequate methodology which allows a general and at the same time sufficiently fast simulation of all types of non-stationarities.

Following the work reported in the previous paper [1], the theoretical approach to the simulation of non-stationary processes has been elaborated more deeply, and this has resulted in derivation of the formulas to be presented in what follows here. Their practical application is limited, however, because this type of highly advanced test with non-stationary processes has scarcely been used as yet (at least in the fatigue field) and so there are practically no results available. Obvious reasons for this include not only the restricted technical possibilities for loading systems but also restrictive aspects of the present philosophy of testing, within which one still is unable to forget sinusoidal spectra.

Similarly as for stationary stochastic processes, non-stationary stochastic processes can also be characterized by their mean values, variances, probability densities and power spectral densities (autocorrelation functions), or in other words, by their time-dependent moments of the first (mean value and probability density) and second (variance, power spectral density, autocorrelation function) order. The decision as to which moments should be reproduced is not merely a mathematical problem but again is a question of the testing philosophy which one accepts. Whereas in the case of stationary stochastic processes the mathematical theory has reached a stage at which both the probability density function and power spectral density function can be reproduced simultaneously, the theory of non-stationary processes has not reached that stage as yet (with the exception of the case of a normal process). This is why we have to deal separately with the simulation of the

2083

Jet noise at schools near Los Angeles International Airport

Samuel R. Lane and William C. Meecham

University of California, Los Angeles, California [illegible]

(Received [illegible]; accepted [illegible])

[illegible]

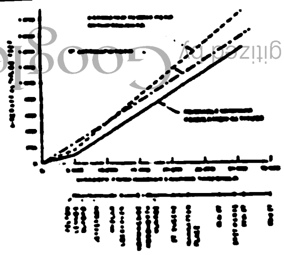
INTRODUCTION

[illegible]

I. AIRCRAFT NOISE AND OPERATIONS SURVEY

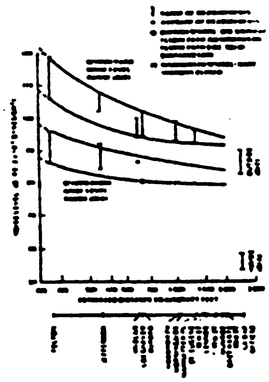
[illegible]

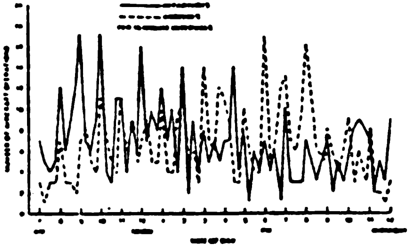
#12



II. EFFECTS OF JET NOISE ON SCHOOL CHILDREN

707 or DC-8	727	DC-9	747	1011	DC-10
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]			
[illegible]	[illegible]	[illegible]			





III. CONCLUSIONS AND RECOMMENDATIONS

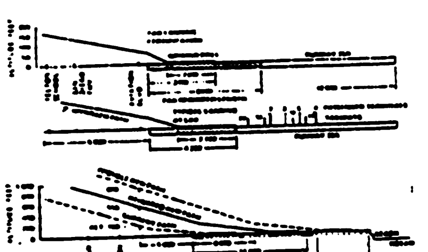


FIG. 4. Possible runway alteration for noise reduction for LAX.

Physiological, Motivational, and Cognitive Effects of Aircraft Noise on Children

Moving From the Laboratory to the Field

#14

SHELDON COHEN University of Oregon
GARY W. EVANS University of California, Irvine
DAVID S. KRANTZ Uniformed Services University of the Health Sciences
DANIEL STOKOLS University of California, Irvine

ABSTRACT: A combination of laboratory and field methodologies is suggested as a strategy to increase the influence of psychological research in the formation of public policy. A naturalistic study of the effects of aircraft noise on elementary school children is presented as evidence for the effects of community noise on behavior and as an example of a study that examines the generality of laboratory effects in a naturalistic setting. The study is concerned with the impact of noise on attentional strategies, feelings of personal control, and physiological processes related to health. In general, the results are consistent with laboratory studies on physiological response to noise and on uncontrollable noise as a factor in helplessness. Children from noisy schools have higher blood pressure than those from matched control (quiet) schools. Noise-school children are also more likely to fail on a cognitive task and are more likely to give up before the time to complete the task has elapsed. The development of attentional strategies predicted from laboratory and previous field research was, on the whole, not found. The implications of the study both for the understanding of the relationship between noise and behavior and for the influencing of public policy are discussed.

Science's contribution to social policy decisions regarding noise pollution has been primarily limited to the documentation of the impact of high-intensity sound on hearing. Acceptable noise standards used in both national and local statutes are based on research that assesses magnitude of hearing loss at varying intensities and durations of sound. Yet during the last ten years it has become clear that noise can alter nonauditory systems as well as auditory ones. Thus laboratory research has established effects of noise on cognitive, motivational, and general physiological processes. For example, noise is associated with alterations in task performance (cf. Broadbent, 1978; Loeb, 1979), decreased sensitivity to others (e.g., S. Cohen & Lezak, 1977; Mathews & Canon, 1975), and elevation of a number of nonspecific physiological responses (cf. Glass & Singer, 1972; Kryter, 1970). Exposure to noise that is unpredictable and uncontrollable (cannot be escaped or avoided) can also reduce one's perception of control over the environment (e.g., Glass & Singer, 1972; Krantz, Glass, & Snyder, 1974). This loss of control is often accompanied by a depression of mood and a decrease in one's motivation to initiate new responses (Seligman, 1975).

One argument against serious consideration of this evidence when making policy decisions is that it is largely derived from laboratory studies. Since laboratory subjects typically experience a single short period of exposure to high-intensity sound and are aware that their exposure is only temporary, the applicability of these findings to experiences of chronic noise exposure is questionable. Because of a lack of well-controlled studies of persons routinely living and working under noise, we are unable to say with any certainty if similar effects occur in individuals exposed to noise for prolonged periods.

Our own lack of confidence in the generality of the effects of noise that occurs in laboratory settings translates into a lack of influence in the policy-making process. Legislation restricting noise levels in industrial and community settings usually imposes a heavy economic burden on those responsible for the noise. To convince policymakers that such burdens are justified, there must be substantive evidence that community and/or industrial noise deleteriously affects health and behavior.

Naturalistic studies of the effects of noise that occurs in home, school, or office seem like the obvious alternative to investigations carried out in laboratory settings. However, such studies are correlational. Subjects are not randomly assigned to noisy or quiet settings, and the settings often vary on dimensions other than noise exposure. These problems can be substantially reduced by carefully matching the noise and quiet samples on important dimensions and by statistically controlling for other possible confounds. It is always possible, however, that some unknown factor covaries with exposure to the noise setting and actually causes the effects that the investigator associates with noise. Thus, in isolation, naturalistic studies also provide insufficient evidence for a link between community noise and measures of health and behavior.

It is clear that neither laboratory nor naturalistic studies can in themselves provide what either scientists or politicians would consider convincing evidence for noise-induced effects. What is necessary is an interplay between laboratory and field methodologies. This interplay can take at least two forms. On the one hand, an effect can first be established as reliable within laboratory settings where causal links can be inferred. Then, the robustness of this relationship can be established in a number of naturalistic settings. On the other hand, by first conducting field research, it is possible to isolate important dimensions of a particular problem. At that point, laboratory studies may be useful to rule out plausible alternate explanations often inherent in naturalistic research. Laboratory and field approaches are often pursued to the exclusion of one another, but only by combining these two strategies can we begin to understand the impact of environmental variables in naturalistic settings. Moreover, only when evidence from the laboratory and field converge can a credible scientific case be presented in order to influence public policy.

This emphasis on the interplay between laboratory and the field is consistent with Campbell and Stanley's (1966) discussion of the inevitable trade-off between well-controlled experimental settings (internal validity) and our ability to generalize across persons and settings (external validity). The laboratory provides the opportunity for an internally valid investigation, but the generality of laboratory findings is severely restricted. Naturalistic studies provide the opportunity to generalize findings to a greater range of persons and settings but often lack the strict control of the laboratory.

The study presented in this article examines the effects of aircraft noise on children. It is particularly concerned with exploring the generality of laboratory work on noise-induced shifts in attentional strategies, feelings of personal control, and nonauditory physiological responses related to health. Our purpose in reporting this study is twofold. First, it is presented as evidence for relationships (or lack of relationships) between aircraft noise exposure and a number of cognitive, motivational, and physiological measures. The article includes short discussions of laboratory and field research in each of the areas of concern. Second, it is presented as an example of a study designed to examine the generality of laboratory findings in a naturalistic setting. In this regard, the study employs an individual testing procedure in a field setting. It uses a matched-group design and attempts to control statistically for a number of possible alternative explanations for the relationship between community noise and the various dependent variables.

Overview of the Study

The subjects were children attending the four noisiest elementary schools in the air corridor of Los Angeles International Airport. Peak noise level-readings in these schools are as high as 95 dB (A), and the schools are located in an air corridor that has over 300 overflights a day, approximately one flight every 2.5 minutes during school hours (Lane & Meecham, 1974). Thr

The research reported in this article was supported by grants from the National Science Foundation (BNS 77-08576 and SOC 75-09224), the National Institute of Environmental Health Sciences (1 RO1 ES01764-01 DBR), the Society for the Psychological Study of Social Issues, and the University of Oregon Biomedical Fund.

The authors are indebted to Sheryl Kelly, Laurie Poore, Jerry Lukas, Rich Haller, and Nick Garshnek; to the administrative staffs of the Los Angeles, Lennox, and Inglewood (California) School Districts; to the staff, teachers, children, and parents of the participating schools; to the California Assessment Program; and to the California Department of Health. We also wish to thank Michael Posner and Myron Rothbart for their comments on an earlier draft.

Requests for reprints should be sent to Sheldon Cohen, Department of Psychology, University of Oregon, Eugene, Oregon 97403.

Vol. 35, No. 3, 231–243

2085

...mental schools for grade level, for ethnic and ...distribution of children, for percentage of ...ren whose families were receiving assistance ...the Aid to Families with Dependent Chil... program, and for the occupations and educa... levels of parents. Thus we were able to com... samples of children attending noise schools ... quiet schools who were relatively similar in ... of age, social class, and race. A statistical ...que described later allowed additional con... over these factors.

...study focused on effects occurring outside of ...exposure (i.e., aftereffects). Thus all tasks ...questionnaires (except the achievement test ... gathered from school files) were adminis... in a quiet setting—a noise-insulated trailer ... directly outside the school. These data ...collected during two 45-minute sessions on ...tive days. Three cognitive tasks were ...ministered during the test periods. One was ... to assess feelings of personal control and ...others to determine whether the children em... some common attentional coping strategies. ...questionnaire concerned with responses to noise ... two blood pressure measures were also given ... the testing sessions. A parent question... dealing with parent response to noise, ...mother's and father's level of education, and the ...number of children in the family was sent home ... each child. Scores on standardized reading ... math tests and data on absenteeism were col... from school files.

...The study included children from all noise-im... third- and fourth-grade classrooms in each ...school as well as children from an equal ...number of classrooms in quiet schools. To ensure ... performance differences between children from ...schools and those from quiet schools could ... attributed to noise-induced losses in hearing ...sensitivity, an audiometric pure-tone threshold ...screening was administered to each child. Children ... screened at 25 dB for select speech fre...quencies (500, 1000, 2000, and 4000 Hz). Chil... failing to detect 25 dB tones at any one of ... frequencies in either ear were not included in ...study. Six percent of the noise-school children ... percent of the quiet-school children failed the ...screening. A total of 262 subjects (142 from ... schools and 120 from quiet schools) re...mained in the study. Individual analyses, how...ever, sometimes contain fewer subjects because of missing data.

Data compiled from the parent questionnaire allowed us to determine the degree of similarity of the prematched noise and quiet samples. Analyses of variance ... ated that there were no differences between the samples on the various social class factors. The mean number of children per family was 3.54 in the noise sample and 3.88 in the quiet sample. Levels of parent education were also equivalent, falling between some high school (scaled as 3) and high school graduate (scaled as 4). The mean level of education for fathers was 3.75 for noise-school children and 3.41 for quiet-school children, and for mothers, 3.64 and 3.35, respectively. The racial distributions, however, differed significantly, $\chi^2(3) = 10.5$, $p < .01$, with the noise group containing more blacks (32% vs. 18%) and the quiet group more Chicanos (50% vs. 33%). Noise and quiet samples had nearly equal percentages of whites (32% and 29%, respectively) and of unidentifiable or mixed-race children (3% in each sample).

The two samples also differed on mobility, with children in the quiet sample having lived in their homes longer (a mean of 49.6 months vs. 41.4 months) and attended their schools for longer periods (a mean of 43.2 months vs. 36.0 months) than noise children, $F(1, 270) = 4.8$, $p < .03$, and $F(1, 270) = 12.9$, $p < .001$, respectively. Length of school enrollment was not related to father's education, mother's education, or the number of children in the family. Moreover, the noise and quiet samples were relatively equal on these various social class factors across all durations of exposure. This finding suggests that the decision to continue living in the noise-impacted area was not determined by the parents' socioeconomic status. There were, however, more blacks and whites in the noise group with less than 2 years' exposure than there were in the equivalent quiet group, $\chi^2(4) = 12.04$, $p < .02$. There were no differences in racial distribution for other exposure durations.

Statistical Controls

A regression technique was used to compensate for differences between the noise and quiet samples on racial distribution and mobility (J. Cohen, 1968). In general, the regression analysis allows one to determine the relation between two variables while

controlling (covarying or partialing out) for one or more other variables. For example, one can look at the relation between noise level and blood pressure after functionally equating the noise and quiet groups on mobility and race. All data analyses reported in this article include controls for the number of children in the child's family, the grade in school, the number of months enrolled in school (years in residence for the parent questionnaire), and race.[3] These control factors were forced into the regression first, followed by noise and then the Noise × Months Enrolled in School interaction. The interaction indicates whether length of exposure affected the various criterion measures. Additional controls were used in the analyses of blood pressure, school achievement, and selective inattention. The use of these controls is described in appropriate sections. This conservative analysis looks at the effects of noise and the interaction between noise and length of enrollment after functionally equating the noise and quiet groups on grade, race, social class, and mobility, as well as on any additional control factors employed in a particular analysis.

The various measures were analyzed in predetermined multivariate clusters created on the basis of theoretical consideration.[4] This form of analysis helps to decrease the high probability of chance findings that occur when a large number of analyses are necessary (cf. Bock, 1975).

Noise Measures

Interior sound levels (without children) were measured inside each classroom with Tracoustics (SLM 52A) sound level meters. Sound levels were monitored for a 1-hour period in the morning and a 1-hour period in the afternoon. Peak sound levels in terms of dB (A) were recorded for both morning and afternoon sessions. The overall mean peak for classrooms in noise schools was 74 dB and in quiet schools 56 dB. The highest reading in a noise-school classroom was 95 dB, while the highest reading in a quiet school was 55 dB.

The questionnaire administered to each child assessed his or her perception of classroom and home noise levels. The parent questionnaire also included questions on perception of home noise level as well as queries on how long the child had been enrolled in the present school and how long he or she had lived at their present address. Data on school enrollment were also available from school files. Noise contours (compiled by the Los Angeles International Airport) provided approximations of the sound levels outside the homes of noise-school children.

The multivariate F for the effects of noise on the children's noise questionnaire was significant, $F(\ldots, 249) = 3.10$, $p < .002$, thus allowing interpretation of the univariate regressions. Children in noise schools reported that their classrooms were noisier, $F(1, 254) = 5.49$, $p < .02$, and that airplanes bothered them more in the classroom, $F(1, 25\ldots) = 14.74$, $p < .001$, than children in quiet schools did. They did not, however, report having more trouble hearing their teacher.

In regard to home noise, children from air-corridor schools were more bothered by airplane noise than their quiet-school counterparts were, $F(\ldots, 254) = 15.75$, $p < .001$. However, noise- and quiet-school children did not differ in ratings of home noise. Neither the multivariate F nor any univariate regression indicated any significant effects for the Noise × Months in School interaction on the children's questionnaire.

The multivariate F for the effects of noise on the parents' noise questionnaire was also significant, $F(2, 221) = 124.2$, $p < .001$. Parents of children from the air-corridor schools indicated both that there were higher levels of noise in the home, $F(1, 232) = 37.33$, $p < .001$, and that they were bothered more by noise, $F(1, 232) = 240\ldots$, $p < .001$, than the parents of children attending quiet schools indicated. The home noise levels reported by the parents of noise-school children increased with the number of years they had lived in their present residence, $F(1, 220) = 3.11$, $p < .08$. This effect must be interpreted carefully, however, since both the univariate and multivariate Fs were only marginally significant.

Effects of Noise

PHYSIOLOGICAL RESPONSE AND HEALTH

Aside from temporary and permanent effects on hearing, previous research provides little con...

---

[3] Parent education was excluded as a control because data on this factor were not available for a number of children. As mentioned earlier, the noise and quiet samples were closely matched on education. Race was a dummy variable coded (see Overall & Klett, 1972).

[4] There were separate clusters for general health, blood pressure, helplessness, child questionnaire, and parent questionnaire. The selective inattention analyses were run as univariates, since each analysis required a unique control factor.

2086

...is well established, however, that short-term exposure to relatively high sound levels in laboratory settings can alter physiological processes. Physiological changes produced by noise consist of nonspecific responses typically associated with stress reactions, including increases in electrodermal activity, catecholamine secretions, vasoconstriction of peripheral blood vessels, and diastolic and systolic blood pressure. Because such changes, if extreme, are often considered potentially hazardous to health, many feel that pathogenic effects of prolonged noise exposure are likely. Laboratory evidence that some components of the physiological response to noise do not habituate (Jansen, 1969) adds fuel to this argument, but is difficult to interpret in light of evidence from other laboratories indicating complete habituation (Glass & Singer, 1972).

A number of studies of workers in noisy industries have indicated health problems for those exposed to intense noise levels. Included are respiratory problems, such as sore throat, and allergic, musculoskeletal, circulatory, neurological, cardiovascular, and digestive disorders (e.g., Anticaglia & Cohen, 1974; A. Cohen, 1973). However, all of the industrial noise studies are subject to serious criticism because of their failure to control for other adverse workplace or job factors, for example, task demands and risks, that often covary with the noisiness of the job (cf. S. Cohen et al., 1979; Kryter, 1970). It is also important to note that several industrial surveys have failed to find a relation between noise and ill health (e.g., Finkle & Poppen, 1948; Glorig, 1971).

There are no existing controlled studies on the impact of noise on nonauditory health in children (Mills, 1975). Recent theoretical work, however, argues that children (along with the old, individuals in institutions, and persons suffering from other sources of stress) may be particularly susceptible to noise-induced illness because they lack the ability to temporarily escape their noisy environments (S. Cohen et al., 1979). It is suggested that this inability to escape at will can cause both an increase in overall duration of noise exposure and an increase in feelings of helplessness. This effect is important, since feelings of helplessness have been implicated as possible causal factors in illness (Seligman, 1975).

and diastolic) was taken on an SR-2 Physiometrics automated blood pressure recorder.[3] To accustom the children to the blood pressure measurement technique, an initial measurement was made at the beginning of the first day of testing. A short explanation of the technique and the concept of blood pressure was given at this time, and questions were solicited and answered. This initial measurement was not recorded. Each child's blood pressure was measured again on the first day and once more on the second day. The blood pressure data are based on the mean systolic and diastolic pressures for these two measurements. The graphic output of the machine was coded after the study was completed, with coders blind to experimental condition. Each child's height and weight were also measured. Absenteeism was used as an indirect measure of health, since absence from school is often attributable to illness. These data were available from school files.

Health measures were separated into two multivariate clusters: general health measures and blood pressure. This procedure was necessary because two of the general health measures—height and ponderosity (weight/height³)—were required as controls for the blood pressure analyses (cf. Voors et al., 1976). (The ponderosity index was chosen as a measure of obesity because of its high correlation with body fat.) The multivariate F for the effects of noise on the general health cluster was significant, $F(3, 235) = 8.04$, $p < .001$. Although noise-school children were shorter and weighed less than quiet-school children, neither of these differences reached significance, $F(1, 237) = 1.77$, $p < .15$, and $F(1, 237) = 1.07$, $p < .30$, respectively. Surprisingly, noise-school children attended school a higher percentage of the time (97.5% vs. 94.2%) than their quiet-school counterparts did, $F(1, 237) = 21.80$, $p < .001$.

The multivariate F for the effects of noise on systolic and diastolic blood pressure was significant, $F(2, 244) = 2.98$, $p < .05$. As is apparent from Figure 1, children from noise schools had higher blood pressure than their quiet-school counterparts did, with $F(1, 245) = 4.61$, $p < .03$, for

[3] This instrument is an electronic infrasonic device that records on a rotating paper disc. Measurements were taken with a rubber cuff entirely encircling the upper arm. The reliability of this device for blood pressure measurement in children has been established in previous work (e.g., Voors, Foster, Frerichs, Weber, & Berenson, 1976).

systolic pressure and $F(1, 245) = 4.36$, $p < .03$, for diastolic pressure.[4] Unadjusted means for systolic pressure were 89.68 mm for the noise group and 86.77 mm for the quiet group. Diastolic means were 47.34 mm for the noise group and 45.15 mm for the quiet group. A marginal interaction, $F(1, 244) = 3.30$, $p < .07$, between noise and months in school suggests that systolic pressure differences between noise and quiet groups are greatest during the first few years of school enrollment: differences after this point remain constant. Figure 1 reflects a similar pattern for diastolic pressure. This interaction does not, however, reach even marginal statistical significance.[5]

HELPLESSNESS

Both laboratory and community noise research suggests the possibility that high-intensity noise exposure induces *feelings* of helplessness. According to Seligman (1975), a psychological state of helplessness frequently results when we continually encounter events (especially aversive ones) that we can do nothing about. The state of helplessness includes a perception of lessened control over

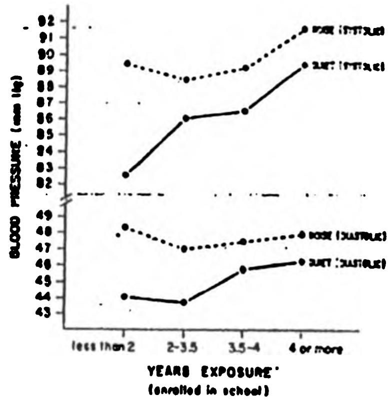


Figure 1. Systolic and diastolic blood pressure as a function of school noise level and duration of exposure. (Each period on the years-exposure coordinate on the figure represents approximately one quarter of the sample. For example, 25% of the sample had been enrolled in the present school less than 2 years.)

one's outcomes, a depression of mood, and a decrease in one's motivation to initiate new responses. Extreme effects of helplessness include fear, anxiety, depression, disease, and even death.

A number of researchers have induced helplessness effects in the laboratory by exposing subjects to uncontrollable bursts of noise (Hiroto, 1974; Krantz et al., 1974). Moreover, survey data reporting high levels of annoyance but low levels of complaints from noise-impacted populations have similarly been interpreted as reflecting a helplessness-like state (Herridge, 1974). This finding, however, is subject to a number of alternative explanations, and thus the helplessness interpretation is only suggestive.

Performance on a cognitive task preceded by success or failure experience was used in the present study to examine the effect of noise on response to failure and on persistence on a difficult task. Response to failure is a standard index of susceptibility to helplessness. Thus, if noise-school children were more susceptible to helplessness, they would show greater effects of a failure experience than their quiet-school counterparts would. A lack of persistence (or a "giving-up" syndrome) is considered a direct manifestation of the helpless state.

Each child was given a treatment puzzle to assemble after the tester demonstrated the task with another puzzle. All puzzles were based on the same nine pieces and required the child to fit them in a template of a familiar shape. One half...

[4] Both the noise-school and quiet-school children had lower mean blood pressures than children of similar age tested in recent studies (e.g., Voors et al., 1976). It is important to note, however, that it is difficult to compare absolute blood pressure levels across studies, since blood pressure is strongly influenced by environmental and genetic characteristics of the population being studied, the conditions under which measurement occurs, and the measurement device.

[5] To investigate whether elevations in blood pressure occurred equally across races, separate regressions were calculated for whites, blacks, and Chicanos. Since the number of subjects in each of these regressions was small, only very substantial mean differences will reach statistically significant levels. Blacks and Chicanos attending noise schools had higher systolic ($p < .05$ for blacks, .23 for Chicanos) and diastolic ($p < .25$ for blacks, .10 for Chicanos) pressure than their quiet-school counterparts did. For whites, there were no main effects of noise, but an interaction between noise and length of enrollment indicated that an initial inflation of pressure for noise-school children disappeared as length of enrollment increased ($p < .01$ for both systolic and diastolic). These race differences will be pursued in a later paper.

2087

...if received a soluble (success) puzzle. The ...zzle was a ... insoluble puzzle ...ample. E... allowed to work ... treatment puzzle for 2.5 minutes. After time was up on the first puzzle, the child was given a second, moderately difficult puzzle to solve. The second (test) puzzle was the same—a square—for all (success and failure) children. The child was allowed 4 minutes to solve the second puzzle. Whether or not the puzzle was solved, time to solution and the child's persisting or giving up before the 4 minutes had elapsed were used as measures of helplessness. We expected that children from noisy schools would be more susceptible to a failure (helplessness) manipulation than children from quiet schools would be, and thus would be less likely to solve the puzzle, slower to find the solution, and more likely to give up on the second puzzle following an insoluble (failure) treatment. Moreover, children from noisy schools, irrespective of their success–failure condition, were expected to give up more often than quiet-school children.

A large proportion (34%) of the children assigned to the success condition, and thus receiving a soluble treatment puzzle, failed to solve the treatment puzzle within the 2.5 minutes allowed. Since the puzzles were considered quite simple and had been pilot tested on children of the same age group, this result was quite unexpected. Although the fact that a number of children self-selected themselves into a failure condition makes interpretation of success–failure effects impossible, comparisons between the children from noise schools and those from quiet schools, irrespective of (controlling for) their pretreatment, are still valid.

Except for the first analysis, which includes only those children who worked on soluble treatment puzzles (success condition), the following analyses also include factors for success–failure (those who solved and those who did not solve the success treatment puzzle are treated as separate groups) and the interaction between success–failure and noise. The control factors were forced into the regression first, followed by success–failure (dummy coded), noise, and the Noise × Success and Noise × Months Enrolled interactions. Because of the difficulty in interpreting success–failure effects, they are not discussed. Moreover, since there were no significant interactions between

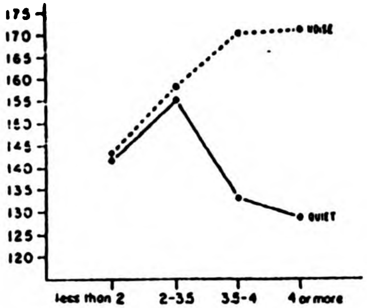


Figure 2. Performance on the second (test) puzzle as a function of school noise level and duration of exposure. (Each period on the years-exposure coordinate on the figure represents approximately one quarter of the sample. For example, 25% of the sample had been enrolled in the present school less than 2 years.)

success–failure and school noise level, the reported results are limited to the overall effects of noise.

First, an examination of only those who were assigned to the success treatment condition indicates that children from noise schools were more likely to fail to solve the treatment puzzle (41% failed) than children from quiet schools were (23% failed). This effect, however, was only marginally significant, $F(1, 131) = 3.62$, $p < .07$. Second, there were similar effects of noise on the second puzzle, which occurred irrespective of whether the child received a success (solved or not) or failure treatment. As was the case with the first puzzle, noise-school children were more likely to fail the second puzzle (53% failed) than quiet-school children were (36% failed), $F(1, 246) = 3.99$, $p < .09$, and were more likely to give up, $F(1, 246) = 11.15$, $p < .001$, than their quiet-school counterparts were, multivariate $F(3, 244) = 4.59$, $p < .004$. As is apparent from Figure 2, a marginal interaction between noise and months enrolled in school, $F(1, 243) = 3.27$, $p < .07$, suggests that the longer a child had attended a noise school, the slower he or she was in solving the puzzle. However, the multivariate F for this interaction was not significant.

Although the preceding analyses indicate that children from noise schools are generally less capable of performing a cognitive task (at least puzzle solving) than children from quiet schools are, they provide only suggestive evidence that noise-school children feel or act as if they have less control over their outcomes. The strongest hint that failure on these puzzles on the part of noise-school children is related to helplessness is found in the data indicating that noise-school children were more likely to give up before their allotted time had elapsed than their quiet counterparts were. It is possible, however, that a constant proportion of children who failed on the second puzzle gave up. It would follow that the amount of giving up in the noise condition was inflated by the fact that there was a greater pool of failures. This interpretation suggests that increased giving up under the noise condition cannot necessarily be viewed as a sign of helplessness. A final analysis addresses this point. This analysis, which includes only those children who failed the second puzzle, indicates that the failures of noise-school children were associated with giving up (31% of those who failed gave up) more often than the failures of quiet-school children were (7% of those who failed gave up), $F(1, 103) = 5.55$, $p < .025$. Thus, even though all of these children failed to solve the puzzle, noise-school children were less likely to persist than their quiet-school counterparts were.

ATTENTIONAL PROCESSES DURING NOISE

Human performance studies report that noise often results in a restriction (or focusing) in one's breadth of attention (Broadbent, 1971; Hockey, 1970). Cues irrelevant to task performance are dropped out first, and then, if attention is further restricted, relevant task cues are eliminated. Performance improves under noise when discarded cues are those that are distracting or competing with primary task cues. Performance is adversely affected, however, when a task requires a wide breadth of attention and when focusing results in the neglect of relevant as well as irrelevant cues. Similarly, focusing can have a negative impact on interpersonal behavior when subtle social cues (e.g., another's look of distress) are dropped out, but can improve the quality of an interaction when the discarded cues are merely distracting (S. Cohen & Lezak, 1977).

There is suggestive evidence that an attentional focusing strategy will persist even after noise is terminated. A number of studies have shown post-noise effects on performance and interpersonal behavior (e.g., Donnerstein & Wilson, 1976; Glass & Singer, 1972). These aftereffects of noise are consistent with what one would expect to occur when one uses a focusing strategy (S. Cohen, 1978). As yet, however, there is no direct evidence that attentional focusing occurs following exposure to noise in either the laboratory or the field.[6]

Selective inattention. A strategy that is similar (and possibly identical) to attentional focusing has been proposed by Deutsch (1964) to account for the effect of community noise on the verbal abilities of children. Deutsch suggests that children reared in noisy environments become inattentive to acoustic cues. That is, they tune out their acoustic environment. (This could be viewed as their focusing their attention on other aspects of their environment.) Children who tune out their noisy environments are not likely to distinguish between speech-relevant and speech-irrelevant sounds. Thus, they lack experience with appropriate speech cues and generally show an inability to recognize relevant sounds and their referents. The inability to discriminate sound is presumed to account, in part, for subsequent problems in learning to read. Although recent research suggests that children living and attending school in noisy neighborhoods are poorer at making auditory discriminations and in reading (Bronzaft & McCarthy, 1975; S. Cohen, Glass, & Singer, 1973), there is no direct evidence for the selective inattention mechanism. An alternative explanation is that noise masks parent and teacher speech, similarly resulting in a lack of experience with appropriate speech cues and, as a consequence, in reading deficits.

The present study attempts to assess the relation between environmental noise level and the selective inattention strategy in order (a) to determine the generality of noise-induced shifts in attention that occur in laboratory settings and (b) to test Deutsch's (1964) hypothesis. In line with

[6] The only study on the impact of chronic noise exposure on attentional focusing resulted in rather ambiguous findings, with children from noisy homes (as reported by parents) exhibiting general performance deficits but not focusing strategy (Heft, 1979). A replication of the incidental memory task used in the Heft study was administered in the present study. Errors in administering the task, however, made the data uninterpretable.

2088

...imination and reading achievement is also assessed.

Because children who are relatively inattentive to acoustic cues should be less affected by an auditory distractor, distractibility was used as a measure of selective inattention. Under both ambient and distracting conditions, the subjects performed a task consisting of crossing out the e's in a two-page passage from a sixth-grade reader. They were instructed to move from left to right and from top to bottom of the page, as if they were reading, and to go as fast as they could without missing any e's. Each subject worked on a short practice paragraph and then on the task for 2 minutes. Two versions (different samples of prose) were used.

In the distraction condition, the child worked on one of the versions of the task while a tape recording of a male voice read a story at a moderate volume. In the no-distraction condition, the alternative form of the task was completed under ambient sound conditions. The distraction and no-distraction tasks were administered on different testing days. Both the order of alternative versions of the task and the experimental conditions were counterbalanced. The criterion measure was performance (percentage of e's found) on the distraction task after the scores were adjusted for no-distraction performance. It was expected that the children from noise schools would be less affected by distraction than the children from quiet schools. Since selective inattention is a strategy that develops over time, it was also predicted that this tuning-out strategy would increase with increased exposure (S. Cohen et al., 1973).

Separate analyses examined the number of lines completed under distraction and the percentage of e's in the completed lines that were found under distraction. No-distraction performance (number of lines in the first analysis and percentage of e's in the second) was added as an additional control variable in order to equate the children on their ability to perform the task under quiet conditions. There were no differences between the noise group and the quiet group (nor was there an interaction) on the number of lines completed under distraction. There was, however, a significant interaction between noise-quiet and months enrolled in school, $F(1, 237) = 5.05$, $p < .03$, for the percentage-of-e's-found measure. As is apparent from Figure 3,

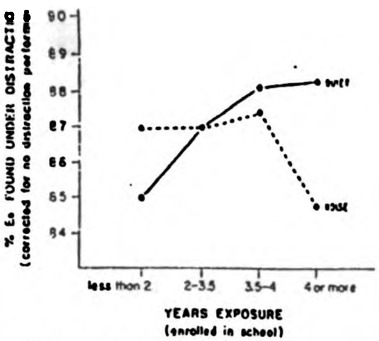


Figure 3. Distractibility as a function of school noise level and duration of exposure. (Each period on the years-exposure coordinate on the figure represents approximately one quarter of the sample. For example, 25% of the sample had been enrolled in the present school less than 2 years.)

the children in noise schools did better than the quiet group on the distraction task during the first 2 years of exposure and did worse after 4 years of exposure. Contrary to earlier evidence, this finding suggests that as the length of noise exposure increases, children are more, rather than less, disturbed by auditory distractors. One possible explanation for this effect is that at first, the children attempt (somewhat successfully) to cope with noise by tuning it out. Later, however, as they find that the strategy is not adequate, they give up. This interpretation is consistent with the helplessness data.

As suggested earlier, reading deficits in children from noisy neighborhoods have been attributed to noise-impacted children's selective filtering out of acoustic cues. Auditory discrimination and reading achievement were assessed in an attempt to replicate previous work and to determine whether there was an association between these measures and the children's attentional strategies. Standardized reading and math tests (administered during the second and third grades by the school system) were gathered from school files, and the Wepman Auditory Discrimination Test (Wepman, Note 1) was administered individually to children in the soundproof van. The Wepman test consists of 40 pairs of words, some of which differ from each other in either initial or final sound, for example,

sick-thick or *map-nap*. The pairs of words are recorded on tape and presented to each child through earphones. The child is instructed to report if the two words in each pair are the same or different. Control word pairs, in which the words are the same, allow for the elimination of children who have problems with same–different judgments or who are not attending to the task.

In order to roughly equate the noise and quiet conditions on the aptitude of the children at the time they entered school, the analyses of school achievement and auditory discrimination scores included an additional control for the mean cognitive abilities of the child's class on entering the first grade. None of the multivariate or univariate analyses were significant for this cluster. Math, reading, and auditory discrimination were all unrelated to both noise and the Noise × Months Enrolled in School interaction.

Further analyses (Pearson correlations) suggest that the children who were better at auditory discriminations were also better on both the reading test, $r(231) = .19$, $p < .05$, and the math test, $r(231) = .15$, $p < .05$. There were, however, no significant relations between these variables and the selective inattention measure. The same analyses, including only noise-school children, and correlations partialing out control variables for both the entire sample and the noise sample yielded similar results. In summary, there is no evidence that aircraft noise affects reading and math skills, or that these skills are related to a selective inattention strategy.

Classroom as the unit of analysis. Since noise would be likely to have an impact on school achievement by affecting behavior in the classroom, a second analysis of the school-achievement cluster was performed with classroom, rather than individual child, as the unit of analysis. This covariance analysis treated the control factors as covariates and months enrolled in school, noise, and classrooms (nested in noise) as independent variables. This analysis is considerably more conservative than the previous analysis because the degrees of freedom in the denominator are based on the number of classrooms (37) rather than on the number of children (262). The results for the school achievement cluster were the same.

The classroom analysis was not used for the other clusters, since those measures were not achievement oriented and thus were presumed not to be classroom mediated. The subjects were also tested individually, not in the classroom. Even using this ultraconservative technique, however, a reanalysis of the other clusters indicates very similar results for the parent-questionnaire, blood-pressure, and helplessness clusters. Differences between the noise group and the quiet group on the child-questionnaire and selective inattention clusters, which were significant in the previous analysis, did not reach statistical significance with classroom used as the unit of analysis.

QUIET HOMES AND NOISY SCHOOLS

To determine whether or not living in a relatively quiet home (at least in terms of aircraft noise) would lessen the impact of school noise, we isolated the children living in the 20 quietest homes in the noise sample, that is, in homes with contour levels of less than 68 in terms of the Community Noise Equivalency Level (CNEL).[7] These children were then compared (using the regression techniques described earlier) with the remainder of the noise sample and with the entire quiet sample.[8] In no case was there a difference between these quiet-home children and the remaining children of the noise sample. In a number of cases, however, even this small group of 20 showed the effects of noise reported earlier. Thus the noise-sample children from quiet homes were less likely to solve the first helplessness task puzzles than the quiet-sample controls were, $F(1, 132) = 3.04$, $p < .10$. The longer a child had attended a noisy school, the less likely he or she was to solve either the first puzzle, $F(1, 130) = 4.06$, $p < .05$, or the second puzzle, $F(1, 240) = 2.07$, $p < .15$. Moreover, children from quiet homes but noisy schools were more likely to fail, $F(1, 244) = 6.20$, $p < .01$, and to give up, $F(1, 244) = 11.95$, $p < .001$, on the second puzzle than children from quiet schools were, multivariate $F(3, 244) = 4.71$, $p < .003$. Further, their failures on the second puzzle were associated with giving up more often than the failures of quiet-school children were, $F(1, 102) = 6.27$,

[7] CNEL is a measure of community noise giving more weight to noise occurring between 1900 and 2200 hours and the most weight to noise occurring between 2200 and 0700 hours (cf. Peterson & Gross, 1972).

[8] Noise was dummy coded. The two contrasts discussed in this section were used to determine the impact of noise. This is a conservative technique of doing the contrasts, since the error term for the entire sample is used in calculating the F.

giving-up syndrome ... $F(1,$ ... blood
$p < .06$, and ... children
... 240) ... $=$
... schools ... $) =$
... $p < .06$. There were no effects, however, on the selective inattention task (crossing out e's under distraction condition), as reported for the entire sample.

These analyses suggest that living in a relatively quiet neighborhood did not lessen the cumulative impact of exposure to noise at school. The reason may be that the noise experienced during school attendance is sufficient to create noise effects.

Air Pollution

A possible alternative explanation for differences between the noise and quiet samples is air pollution levels. Such an alternative is very unlikely. Sulfur dioxide was minimal at all the school sites, never exceeding the California standard (South Coast Air Quality Management District, Note 2; State of California, Note 3). Ozone and nitrogen dioxide standards were exceeded, but maximum levels were slightly higher at the control schools than at the airport schools. The maximum 1-hour rates in any school area for ozone (.21 parts per million) and NO_2 (.60 ppm) were below levels that generally show any effects on human behavior or health (Morrow, 1975; National Academy of Sciences, Note 4). Maximum carbon monoxide was slightly higher in the airport schools (30 vs. 22 ppm), but average values were identical (6 ppm). The differences in maximum values of CO ppm are negligible, and human effects from CO concentrations of less than 40 ppm are extremely rare (National Air Pollution Control Administration, 1970). Note that we have used maximum values in arguing against an air pollution alternative, thus presenting a very conservative counterargument. Average values in all cases were considerably below established standards.

Conclusions

In general, the evidence presented in this article is consistent with laboratory work on physiological response to noise and on uncontrollable noise as a factor in helplessness. Thus children from noisy schools have higher blood pressure and are more likely to give up on a task than children from quieter schools ... work and previous ... not found. Contrary ... years of exposure led to children ... more distractible rather than less. However, a general deficit in task performance on the puzzle task and increased distractibility do seem to support the more general hypothesis that prolonged noise exposure affects cognitive processes.

These data are most interesting, however, because of the tentative answers they provide concerning questions of adaptation to noise over time. One interpretation of the data is that they indicate some habituation of physiological stress response but show no signs of adaptation of cognitive and motivational effects. In fact, in a number of cases, increased length of exposure resulted in an increased negative impact of noise. First, the only evidence for an adaptation effect is provided by the systolic blood pressure data. On that measure, the greatest difference between the noise and quiet groups occurred during the first 2 years of exposure. As length of exposure increased, these differences leveled out but still remained substantial. Perceptions of noise and noise annoyance did not adapt. Thus children from noise schools and their parents reported more noise and being more bothered by noise. Parents, in fact, reported higher levels of noise as their length of residence in the noisy area increased. Neither the cognitive deficits on the helplessness puzzles (which actually increased over time) nor the giving-up syndrome of the children from noise schools lessened with increased length of exposure. Finally, although noise-school children were initially less affected by an auditory distractor, increased length of exposure (beyond 4 years) seemed to result in greater distractibility. Thus the preponderance of evidence suggests a lack of successful adaptation over time. The above interpretation, however, is only tentative. Although length-of-exposure differences may be due to increased exposure to noise, they may also be attributable to some unknown factors that differentiate between children who continue to live in the air corridor and those who move, or to some combination of exposure and these factors.

It should be noted that the failure of the present study to replicate the previously reported relation between community noise and reading ability (Bronzaft & McCarthy, 1975; S. Cohen et al.,

1973) may be attributable to an experimental design insensitive to noise-induced differences in school achievement. In both of the earlier studies, all the students attended the same school. Moreover, in the Cohen et al. study, students from both noisy and quiet apartments were taught in the same classrooms by the same teachers. In the present study, noise-sample children and quiet-sample children attended different schools, were in different classrooms, and had different teachers. It is likely that these factors add substantial error variance to the equation, making the detection of a small effect of noise quite difficult.

Can we conclude that community noise has effects that are similar to noise-induced effects reported in the laboratory literature? The similarity of our results to those reported in laboratory settings is striking. However, we still must be cautious. Replications of these results in other settings and with other populations are required before definitive conclusions are possible. To this end, our own research program includes an ongoing replication of this study, with a population exposed to traffic noise, as well as plans to collect longitudinal data on the children attending airport schools.

What conclusions can we make in regard to public policy? From a policy point of view, these data are valuable but not sufficient. At least 3 million people in this country are exposed to aircraft noise (U.S. Environmental Protection Agency, 1974), and the vast majority of noise-impacted communities have racial and social class compositions more similar to the composition of the present sample than to that of the general population (U.S. Environmental Protection Agency, Note 5). In combination with the laboratory noise literature, these data clearly suggest lending additional weight to the possible impact of aircraft noise on psychological adjustment and on nonauditory aspects of health. Replications of these results, however, would substantially increase their potential influence in the realms of both science and social policy.

REFERENCE NOTES

1. Wepman, J. *Manual of directions: Auditory discrimination test.* Chicago: Author, 1958.
2. South Coast Air Quality Management District. *Summary of air quality in South Coast Air Basin 1977* (ENP 73-1). Los Angeles: Author, 1977.
3. State of California. *California Air Resources Board: Technical Services Division, V. VIII ...* Sacramento, Calif.: Author, 1976.
4. National Academy of Sciences. *Nitrogen oxides.* Washington, D.C.: Author, 1977.
5. U.S. Environmental Protection Agency. *The noise survey ...* Washington, D.C.: Author, 1977.

REFERENCES

Anticaglia, J. R., & Cohen, A. Extra-auditory effects of noise as a health hazard. In P. M. Insel & R. H. Moos (Eds.), *Health and the social environment.* Toronto: Heath, 1974.

Bock, R. D. *Multivariate statistical methods in behavioral research.* New York: McGraw-Hill, 1975.

Broadbent, D. E. *Decision and stress.* New York: Academic Press, 1971.

Broadbent, D. E. The current state of noise research: Reply to Poulton. *Psychological Bulletin,* 1978, ... 1051-1067.

Bronzaft, A. L., & McCarthy, D. P. The effects of elevated train noise on reading ability. *Environment and Behavior,* 1975, *7,* 517-527.

Campbell, D. T., & Stanley, J. C. *Experimental and quasi-experimental designs for research.* Chicago: Rand McNally, 1966.

Cohen, A. Industrial noise and medical, absence, and accident record data on exposed workers. In W. D. Ward (Ed.), *Proceedings of the International Congress on Noise as a Public Health Problem.* Washington, D.C.: U.S. Government Printing Office, 1973.

Cohen, J. Multiple regression as a general data-analytic system. *Psychological Bulletin,* 1968, *70,* 426-443.

Cohen, S. Environmental load and the allocation of attention. In A. Baum, J. E. Singer, & S. Valins (Eds.), *Advances in environmental psychology.* Hillsdale, N.J.: Erlbaum, 1978.

Cohen, S., Glass, D. C., & Phillips, S. Environment and health. In H. E. Freeman, S. Levine, and L. G. Reeder (Eds.), *Handbook of medical sociology.* Englewood Cliffs, N.J.: Prentice-Hall, 1979.

Cohen, S., Glass, D. C., & Singer, J. E. Apartment noise, auditory discrimination, and reading ability in children. *Journal of Experimental Social Psychology,* 1973, ... 407-422.

Cohen, S., & Lezak, A. Noise and inattentiveness to social cues. *Environment and Behavior,* 1977, *9,* 559-572.

Deutsch, C. P. Auditory discrimination and learning: Social factors. *The Merrill-Palmer Quarterly of Behavior and Development,* 1964, *10,* 277-296.

Donnerstein, E., & Wilson, D. W. Effects of noise and perceived control on ongoing and subsequent aggressive behavior. *Journal of Personality and Social Psychology,* 1976, *34,* 774-781.

Finkle, A. L., & Poppen, J. R. Clinical effects of noise and mechanical vibrations of a turbo-jet engine on man. *Journal of Applied Physiology,* 1948, *1,* 183-204.

Glass, D. C., & Singer, J. E. *Urban stress: Experiments on noise and social stressors.* New York: Academic Press, 1972.

Glorig, A. Non-auditory effects of noise exposure. *Sound and Vibration,* 1971, *5,* 28-29.

Heft, H. Background and focal environmental conditions of the home and attention in young children. *Journal of Applied Social Psychology,* 1979, *9,* 47-69.

Herridge, C. F. Aircraft noise and mental health. *Journal of Psychosomatic Research,* 1974, *18,* 239-243.

Hiroto, D. S. Locus of control and learned helplessness. *Journal of Experimental Psychology,* 1974, *102,* ...

2090

... Quarterly Journal of Experimental Psychology, 1970, 22, 28–36.

... G. Effects of noise on physiological state. In W. ... & J. G. Fricke (Ed.), Noise as a public health problem. Washington, D.C.: American Speech and Hearing Association, 1969.

... D. S., Glass, D. C., & Snyder, M. L. Helplessness, ... level, and the coronary prone behavior pattern. Journal of Experimental Social Psychology, 1974, 11, ...300.

... K. D. The effects of noise on man. New York: Academic Press, 1970.

... S. R., & Meecham, W. C. Jet noise at schools near Los Angeles International Airport. Journal of the Acoustical Society of America, 1974, 56, 127–131.

... M. Noise and performance: Do we know more? ... V. Tobias (Ed.), The proceedings of the Third International Congress on Noise as a Public Health Problem. Washington, D.C.: American Speech and Hearing Association, 1979.

... K. E., Jr., & Canon, L. K. Environmental noise as a determinant of helping behavior. Journal of Personality and Social Psychology, 1975, 32, 571–577.

... Journal of the Acoustical Society of America, 1975, 58, 101–119.

Morrow, P. E. An evaluation of recent NO_x toxicity data and an attempt to derive an ambient standard for NO_x by established toxicological procedures. Environmental Research, 1975, 10, 92–112.

National Air Pollution Control Administration. Air quality criteria for carbon monoxide, AP-62. Washington, D.C.: U.S. Government Printing Office, 1970.

Overall, J. E., & Klett, J. Applied multivariate analysis. New York: McGraw-Hill, 1972.

Peterson, A. P. G., & Gross, E. E., Jr. Handbook of noise measurement. Concord, Mass.: General Radio, 1972.

Seligman, M. P. Helplessness: On depression, development, and death. San Francisco: Freeman, 1975.

U.S. Environmental Protection Agency. Levels document 550/9-74-004. Washington, D.C.: U.S. Government Printing Office, 1974.

Voors, A. W., Foster, T. A., Frerichs, R. R., Weber, L. S., & Berenson, G. S. Studies of blood pressure in children, ages 5–14 years, in a total biracial community. Circulation, 1976, 54, 319–327.

APF National Media Awards for 1980

The American Psychological Foundation annually presents National Media Awards to individuals in order to recognize and encourage outstanding, accurate coverage which increases the public's knowledge and understanding of psychology. Awards are made in five categories: (1) television, film, (2) radio, (3) newspaper reporting, (4) magazine writing, and (5) books/monographs. This year the winner in each category will receive $1,000, a citation, and an invitation to attend the APA Annual Convention in Montreal, September 1–5, 1980. The Foundation will pay travel expenses for each winner for three days.

Materials must include references to psychology and/or psychologists and depict the activities, ideas, and findings of individual psychologists or applications of psychological sciences. For example, entries that focus on social issues and mental health must include specific references to psychology and/or psychologists to be eligible. Materials nominated must have been produced or published on or after May 1, 1979, and before May 1, 1980. Nominations may be made by anyone, including the author, producer, etc. Deadline for receipt of entries is May 10, 1980. For entry forms write to Public Information Office, American Psychological Association, 1200 Seventeenth Street, N.W., Washington, D.C. 20036.

**FEDERAL AVIATION ADMINISTRATION
ON DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR
THE PROPOSED MASTER PLAN UPDATE DEVELOPMENT ACTIONS
AT SEATTLE-TACOMA INTERNATIONAL AIRPORT**

**TESTIMONY OF CONGRESSMAN RANDY TATE
AT THE PUBLIC HEARING ON JUNE 1, 1995**

Thank you for allowing me the opportunity to testify this evening.

I would like to begin by thanking the Federal Aviation Administration for holding this hearing and for extending the public comment period on the Draft Environmental Impact Statement (DEIS) from 60 to 90 days. The FAA should also be recognized and given credit for agreeing to hold a second public hearing on this issue that is critical to the future of Western Washington.

Allowing every organization and every individual to participate in this process and offer their opinions is by far the most critical element to developing a community consensus that we should -- or should not -- move forward with this project. All interested parties must have the chance to present their views during this discussion.

In this regard, I would also like to commend the efforts of the Puget Sound Regional Council for having the flexibility and fairness to appoint the Expert Arbitration Panel on Noise and Demand/System Management. I urge the FAA to consider the Expert Panel's recommendations as part of its review of the Port of Seattle's proposed revised master plan. R-2-5

Tonight has been set aside for public comment on the DEIS. Our area's debate is about more than just whether a justifiable need exists for the proposed third runway at the Sea-Tac Airport. It is about whether the proposed expansion of Sea-Tac fits a comprehensive transportation plan that will serve Western Washington's needs now and for the next generation.

We must avoid the temptation to pursue short-term, parochial policies in response to long-term, statewide needs.

Congress has set a goal of balancing our federal budget by the year 2002. One of the most important long-term strategies for balancing the budget is to maximize the return on the taxpayer's dollar -- to spend only on efficient programs.

Transportation planning for Western Washington and, indeed, the whole state must be guided by the same principle -- finding cost-efficient, long-term solutions for our transportation needs in an environment of ever fewer federal dollars. Sound solutions must be found by state and local officials, with the support of the impacted public.

R-12-11
R-12-15

My constituents have brought to my attention their concerns over various parts of the DEIS. It is logical that those matters be properly addressed. Things to be considered include the noise impact on neighborhoods, parks and schools. The effect of airport expansion on existing and planned state and local road projects and the other local public works projects must be taken into account. We must also fully and honestly examine the impact on surface and subsurface water quality, wetlands and floodplains.

Many suburban King and Pierce county residents want the adverse impacts of this project known before the quality of life they currently enjoy is lost. All of these concerns demand thorough analysis before new construction begins.

R-4-7
R-4-9

As far as our region's long-term planning is concerned, we need a thorough, detailed vision. All methods of transportation capacity improvement should be given full and fair consideration, including high speed and commuter rail, commuter and larger airplanes, and airport demand management strategies.

R-4-7
R-4-9

We cannot fail to plan for how our region will move people and freight in the next century. Integrating all of these systems (airports, railroads, highways, and ports), is critical to our responsibly planning for our state's economic growth.

Western Washington is growing explosively for a reason. It is a tremendous place to raise a family and to find high-paying jobs. Working together, we can devise a plan that will satisfy Washington's transportation needs for years to come while preserving our quality of life.

I look forward to working with the FAA on these issues. Again, thank you for giving me this opportunity to share my views tonight.

TRIDEC
TRI-CITY INDUSTRIAL DEVELOPMENT COUNCIL
901 N. Colorado • Kennewick, WA 99336-7686 U.S.A. • (509) 735-1000 • FAX (509) 735-6609 • 1-800-TRI-CITY

TESTIMONY OF THE TRI-CITY INDUSTRIAL DEVELOPMENT COUNCIL TO THE FEDERAL AVIATION ADMINISTRATION AND THE PORT OF SEATTLE CONCERNING THE DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE PROPOSED MASTER PLAN UPDATE OF THE SEATTLE-TACOMA AIRPORT

June 1, 1995
SeaTac Red Lion

Good afternoon. My name is John Lindsay, President and CEO of the Tri-City Industrial Development Council, an economic development organization founded in 1963 and comprised of a membership of nearly 600 industrial and business firms and organizations with an interest in the future of the Tri-Cities economy. The Council, also known as TRIDEC, has been designated as the spokesman for the Tri-Cities business community on economic issues effecting this area. I appreciate the opportunity to appear before you today and provide a slightly different perspective on the issue of the proposed third runway at SeaTac Airport.

For many folks on both the West Side of the state and east of the Cascade Curtain, the issue of the third runway at SeaTac has been viewed as simply a local issue. It has captured the attention of the press principally as a local issue focusing on the construction or expansion of the SeaTac facility and its impact on the surrounding communities and neighborhoods. Likewise, by many in Eastern Washington it has been viewed as a local issue that, at least, at first blush is not of great consequence to many in Eastern Washington. But the unmistakable fact is SeaTac is the state's airport. The construction of the third runway at SeaTac is an indispensable ingredient for the continued economic growth and vitality of most, if not all, of Eastern Washington. Thus, the notion that somehow the proposed third runway expansion at SeaTac is a local community issue to be considered only by the citizens of the communities surrounding the SeaTac facility is myopic at best. Indeed, for Eastern Washington in general and the Tri-Cities in particular, continued access to SeaTac Airport through the availability of a third runway is an imperative. Likewise, we believe it is an imperative for all the other communities in Eastern Washington including Walla Walla, Yakima, Moses Lake, and Wenatchee that rely on commuter access to SeaTac.

It is our understanding that commuter flights from outlying areas into SeaTac constitute nearly 40% of the activity at the airport. Further, it is our understanding that those who would oppose a third runway believe that the pressure on the existing facilities and thus the need for a third runway can be alleviated by removing commuter traffic to outlying facilities such as Paine Field, McChord Field. That is central to our fear for, if we, as Eastern Washington communities, are to maintain our economic viability and air service access, it is simply unacceptable to arbitrarily designate commuter flights as second class passengers and route them to outlying airports with the attendant problems of gaining access to SeaTac for continued travel to national and international destinations.

While there may be many in and about the Central Puget Sound area who seek no growth or development, it is important to note that east of the Cascade Curtain there are many communities including ours who seek balanced development to increase our standard of life and prosperity of our citizens. In our recruitment efforts with various companies seeking to site new plants or expand existing facilities, we are frequently asked by siting consultants whether we have access to an international airport within one hour of our community. At present, we can answer yes. However, without the third runway expansion and with a plan that disperses commuter air traffic to outlying airports, our answer will be no and we will be necessarily eliminated from competition for those facility sitings that means so much to us in the long-term development of our communities.

It is not simply an issue of our citizens seeking to gain access to other destinations through SeaTac; rather it is also an issue of whether travelers, both business and otherwise, from other countries and from throughout the United States can gain convenient access to the Tri-Cities and other Eastern Washington communities. We believe it will be unacceptable for a visitor from a Pacific Rim nation to land at SeaTac and then, without a seamless intermodel transportation system in place, find his or her way to a commuter facility at either McChord or Paine Fields. That result is unacceptable for our international visitors and business folks and it is unacceptable for those who reside in the Tri-Cities and Eastern Washington communities and must go elsewhere. To better understand the potential impact, I urge you to give your attention to the comments of Mr. Guy Cunningham who will appear before you on behalf of the Battelle Pacific Northwest Laboratories located in Richland. The supportive statistics that he will provide with respect to PNL's travel needs offers a compelling reason why the issue of regional access to SeaTac and the need for a third runway is so important.

In closing, we appreciate the opportunity to have presented this perspective to you for the record. We reiterate that the issue of the third runway and SeaTac expansion is not simply a local issue unique to the Central Puget Sound but represents a substantial economic concern on the part of residents and businesses, large and small, from throughout Eastern Washington and more specifically the Tri-Cities.

Air transportation is important to region [illegible]
Is this the best solution?

- **Introduction**
  Mayor of Des Moines
  Member, Puget Sound Air Transportation Committee

- The timing of the public hearings
- The scope of the DEIS
- The underlying assumptions of the DEIS
- The role of the Independent Arbitration Panel

- **The timing of the public hearings are inappropriate** R-1-3

  DEIS is over 1,000 pages yet the only public meetings are scheduled near the beginning of the comment period. While meeting the letter of the law, the short review time makes it virtually impossible for the average citizen to make meaningful comments. This is yet another tactic of the Port of Seattle to limit public input.

  The Cities of Burien, Des Moines, Federal Way, Mercer Island, Normandy Park, and Tukwila and the Highline School District (representing a population of almost 200,000 persons) will be submitting very detailed written comments near the end of the comment period.

- **The DEIS is narrow, superficial, and incomplete**

  The DEIS, at over 1,000 pages, looks like a complete and detailed document. However, closer review makes it apparent that is a narrow, superficial, and incomplete document.

  There is only brief, summary information about the cumulative impacts of other planned development projects in the vicinity. For example: R-4-18 R-5-3

SASA
24th/28th Arterial
South Access Road
SR 509 freeway extension
Des Moines Creek Biotechnology Center
Hotel on airport property
The rumored west side terminal

R-4-18 R-5-3

There is also only a brief summary of relevant alternatives. For example, it is stated that there are no alternative airport sites in the 4-county area. That statement is purely a political decision made by cowardly politicians who continue to want to use south King County as the region's dumping ground for undesirable land uses. The DEIS fails to mention that, when an airline decides delays at SeaTac are great enough, they can move to Paine Field. Since Paine Field was built with federal funds there is nothing Snohomish County can do to stop it.

R-4-2 R-4-4

There is also only a brief summary of the environmental effects of alternative airside options.

- **The DEIS makes many unfounded assumptions**

The DEIS assumes that the number of annual operations at Sea-Tac will increase by more than 100,000 (to 441,600) from 1993 to 2020, whether or not the third runway is built. There is not credible factual basis for this assumption beyond a simple projection of regional population growth.

The DEIS erroneously assumes that the Do-Nothing alternative would have many of the same major environmental effects and benefits as with the "With Project" alternatives. This is more Port of Seattle propaganda, but if taken at face value, why waste a billion dollars on a 3rd runway we don't need?

R-3-7

- **The DEIS completely ignores the role of the Independent Arbitration panels.**

The DEIS completely and purposely ignores the potential effects of decisions to be made and orders to be issued by the Expert Arbitration Panel on Noise and Demand/System Management Issues with respect to the Port of Seattle's authority to proceed with the proposed 3rd runway.

The Port of Seattle may not proceed with the proposed 3rd runway unless so authorized by the PSRC; the PSRC may not amend the Regional Air System Plan (the RASP) unless the conditions on PSRC General Assembly Resolution A-93-03 have been met:

> the Expert Arbitration Panel must find that the Port has scheduled and achieved noise reduction performance objectives based on measurement of real noise impacts; and
>
> the Expert Arbitration Panel must find that demand and system management programs have been pursued and achieved or that they are infeasible.

R-2-5

- **End of remarks. Additional testimony will be given during the remainder of the day by Airport Communities Coalition members. They will cover:**

The purpose & need for a 3rd runway
Analysis of the alternatives to a 3rd runway
The environmental impacts of a 3rd runway
Proposed Mitigation measures
Additional points for consideration

Kat

TALKING POINTS
FOR
SEA-TAC MASTER PLAN UPDATE DRAFT EIS
PUBLIC HEARING

THE ANALYSIS CONTAINED IN THE DRAFT EIS IS SERIOUSLY FLAWED IN AT LEAST THREE WAYS:

R-4-1

1. THE DEIS INACCURATELY DEFINES THE PROBLEM OR NEED AT THE AIRPORT IN A WAY THAT ALMOST ASSURES THE THIRD RUNWAY WILL BE THE CHOSEN SOLUTION.

- The Master Plan DEIS defines the problem as poor weather airfield operating capability, in a way that appears to preclude consideration of any alternative other than the third runway.

R-3-9

- This contradicts the description of purpose and need contained in the prior Flight Plan EIS, which indicated a third runway is needed to attract new capacity to SeaTac. If the real purpose is to provide new capacity, there are numerous alternative ways to accomplish this that should be evaluated, yet;

2. THE DEIS DISMISSES OTHER POTENTIALLY VIABLE ALTERNATIVE WAYS OF ACCOMMODATING GROWTH IN DEMAND FOR AIR TRAVEL, WITHOUT ADEQUATE ANALYSIS OR JUSTIFICATION, AGAIN LEADING TO THE UNSUPPORTED CONCLUSION THAT THE THIRD RUNWAY IS THE ONLY SOLUTION.

R-4-1

- The DEIS provides only a summary of its conclusion that other alternatives will not address air traffic needs, relying on the prior analysis of alternatives contained in the Flight Plan EIS and in PSRC's Major Supplemental Airport (MSA) study.

- But the Flight Plan EIS discussed only general levels of environmental impacts, stating that "specific impacts at airport sites will be examined in detail" in subsequent project-level environmental documents. In essence, the Flight Plan EIS and the Master Plan EIS point at each other as fulfilling the need for a detailed analysis of reasonable alternatives, while each disavows its own responsibility for providing such analysis. The result of this bureaucratic Catch 22 is that a realistic evaluation of alternatives that may cause less environmental damage and less disruption of neighborhoods, has not occurred.

- This significant shortcoming is not cured by deferring to PSRC's Major Supplemental Airport study. The MSA process was terminated prematurely, not on the basis of the technical feasibility of alternative airport sites, but due to the tremendous political pressure brought to bear by communities in the vicinity of the alternative sites.

R-3-7

3. THE DEIS GROSSLY UNDERESTIMATES THE ENVIRONMENTAL AND SOCIAL IMPACTS OF BUILDING A THIRD RUNWAY, BY INCORRECTLY ASSUMING THAT AIR TRAFFIC AT SEA-TAC WILL GROW AT THE SAME RATE, REGARDLESS OF WHETHER THE THIRD RUNWAY IS BUILT OR NOT.

- The DEIS incredibly assumes that the number of operations at SeaTac will increase by more than 100,000 per year whether or not the third runway is built. This defies logic and common sense, and directly contradicts the findings of the prior Flight Plan EIS, which correctly concluded that increasingly lengthy delays at Sea-Tac during poor weather conditions would result in airlines rescheduling and diverting aircraft to other airports, contributing to a decline in the scheduling of new service.

- The DEIS's incorrect assumption that air operations will increase by the same amount with or without the third runway, skews the entire analysis of environmental impacts. This assumption leads directly to the insupportable conclusion that for most impacts of greatest concern to the airport's neighbors (noise, air pollution, auto traffic), there is virtually no difference between the "No-Build" alternative and construction of a third runway.

CONCLUSIONS

The Final EIS should:

R-3-9
R-4-1

1. Clearly define the Port's objectives in adding a third runway, in a manner that allows for a meaningful and objective analysis of alternatives;

2. Provide the kind of detailed analysis of alternatives and their impacts, as promised by the Flight Plan EIS; and

3. Provide realistic projections of future air traffic operations with and without a third runway, to allow a meaningful comparison of impacts on the environment and on our communities.

STATEMENT PRESENTED AT THE PUBLIC HEARING, ON JUNE 1, 1995, ON THE DRAFT EIS FOR THE PROPOSED MASTER PLAN UPDATE FOR SEATAC (3RD RUNWAY), BY MIKE REES REPRESENTING THE MAGNOLIA COMMUNITY CLUB.

My name is Mike Rees, and I am here representing the Magnolia Community Club. Magnolia is a residential community of 19,000 people, 12 to 15 miles N.N.W. of Seatac. At a community forum held last month on concerns and issues of our neighborhood, Aircraft Noise was identified as a concern, and was categorized as a Medium-High priority issue. We have made an initial review of the DEIS, and plan to be forwarding written comments to the FAA by August 3, 1995. In the meantime we have identified three areas of deficiency in the DEIS which we would like to see addressed in the final version.

R-5-2

Comment #1: The DEIS does not address the impact of increased flights on all communities who are currently affected by adverse noise from Seatac operations. In particular Magnolia can expect to experience more noise from overflights as a result of the additional runway, since there are more operations planned and the new runway will be located west of the present two.

Required Action: The FEIS needs to address noise impacts on all communities within a minimum mile radius of Seatac that includes the 55 dBA contours for daytime flights and 45 dBA for nighttime flights. This is estimated as a minimum 20 mile radius. Data should be based on actual flight path experience and not on unrealistic flight paths. Noise monitoring should be undertaken in these communities and the resulting data evaluated in light of the estimated increase in flight activity. Appendix C, Exhibits C-2 through C-7 should be expanded to show the Noise Exposure Levels from take-offs and landings on Runways 34L and 34R overlaid on a map of Seattle. Noise contours should include levels down to the maximum permissible Environmental Noise Levels required by King County and the City of Seattle for residential land use.

R-6-31C

R-4-7

Comment #2: The DEIS does not address reasonable non-action alternatives such as the effect of airlines increasing their passenger load by varying amounts per flight. With the expected introduction of new larger aircraft into the airline inventory, such as the 777 and larger commuter aircraft, the effect of different passenger load factors on the number of required flights could be substantial. For instance, using the DEIS passenger estimates, it would appear that if each airline added just two passengers for each arriving and departing flight, for each year from now through 2020, there would be fewer flights required in 2020 than in 1994, thus negating the need for a third runway.

Required Action: The FEIS should include an analysis that shows the number of extra flights per year that would be required when the airlines increase their passenger load from 1 to 3 passengers per arriving and departing flight, per year, from 1994 to 2020.

R-5-2
R-6-9

Comment #3: The DEIS does not address the effect when actual flight paths deviate from the planned flight paths. Overflights of Magnolia are supposed to occur only on rare occasions; the flight paths in the vicinity of Magnolia during north flow or south flow are supposed to be over Elliott Bay and Puget Sound. Actual data shows substantial deviation over Magnolia during both flows.

Required Action: The FEIS should include an analysis that shows the noise effect of increased flights over Magnolia when deviations to flight paths occur, based on current records of overflights, and ideal flight paths. Projected flight paths should include 95th percentile areas covered by the flight paths. Appendix C, Exhibits C-15 and C-16 (future arrival and departure flight tracks) should include Magnolia and all communities within 20 miles from Seatac.

Thank you for the opportunity to make these comments.

Elizabeth Springer
13325 MACADAM ROAD SOUTH
Tukwila, Washington 98168
242-2835

We are back at the same old stand, seeing the same people defending their homes against the aggression of the airport. The worst part of this scenario is that these people defending their homes and well-being must pay hefty taxes to defend "peace and quiet." Each and every year the Port of Seattle dips into the public purse for more than $30 million dollars. I think that last year it was up to $37 million. What does the Port do for this? Send a one paragraph letter to the county council and request the "levy" for the year and by statute the Council adds their request to your tax bill.

R-18-2

How can this be reduced in amount? or abolished? I was told in Olympia that it can't be abolished because the lobbyists are too strong. 74-76 Port Districts in this state are involved, engaged in buying land, investing, whatever.. No taxes except ours are paid on this activity. Just as there is no control over the building of the 3rd runway. This DEIS is pretense, smoke & mirrors. It is to give the Port Bigwigs fine salaries, and trips to whatever exotic country they wish, and a yearly dip into the public purse. The Port now holds a "SHAREHOLDERS" meeting yearly. At least they held one recently and assure us they will be held yearly. What are the dividends? Jobs said Commissioners Shell. You've heard of the shell game? Firing is what employees of one of the Port's warehouses received several years ago when they were reaching retirement age. They were competent, loyal employees. Port Authorities hunted for someone to blame. Was that why the Dutchman quit? He got out and took "lotsa loot" with him. It was all written in his contract! Now they want us to believe that there is substance to this quasi legal document the DEIS. It is nothing but another money grab by Port Commissioners. They have set up so many groups that it is difficult to place blame. After promising ~~[illegible]~~ the local citizenry that if a 2nd runway would be built another would not be needed. What we're wondering today is where is the 4th Runway going to be? This DEIS does not approach any real issue. The Port Authority lies a lot and will do what it wants even though you repudiate this EIS statement which you should do. Your dollars paid for it and it is for you to decide. This

R-18-2

airport is too small for its purpose - always has been and always will be. A 3rd, 4th, 5th or 6th unway will not solve capacity problems at this airport. But it will allow a few top dogs to retire in comfort and ease. Should the people of King County be pleased that they can afford to pay lush pensions to top management.

We tried to increase representation on the commission especially for those on the Eastside, only to find that Pat Davis was being paid to present an opposing view. She did say to me "people listen to you, I disagree with you but they do listen to you." I say to her today that that the reason I have a listening audience is that I AM RIGHT. This 3rd runway won't work nor will any others. We must STOP THEM NOW. There will be NO THIRD RUNWAY.

To the Commissioners: You are driving us crazy but we will stay and fight and we hope that we will win because WE ARE RIGHT. NO THIRD RUNWAY. Bury this DEIS now. Join with us in the next legislature to abolish the power of the Ports. Take back our government and access to our pocketbook. NO THIRD RUNWAY.

Build a shorter runway on the west side of the airport. Next to the present runway, only below the present runway level. Being below the present runway, it can be a shorter runway for smaller airplanes. Also a terminal underneath the present runway [illegible] space [illegible] and parking [illegible]. Even a rail station can be built [illegible] underground electric rails serving the airport passenger needs. It can be either tunnelled under the present runway or [illegible] the runway [illegible]. Have [illegible] next to Burien. [illegible] below present level runway, [illegible] will save money, time and other needs.

Do you want another airport, an airport at Enumclaw-Auburn area, or on the Puget Sound.

Thank you for your time.

[illegible] So. Sea-Tac [illegible]

R-4-11

DEIS Summary Review

Henry J. Frause
411 S.W. 186th
Normandy Park, WA., 98166-3959

To: Mr. Dennis Ossenkop, FAA

CC: Airport Communities Coalition (ACC) Members:
Wash. State Congressional Delegation--[See page 2.]

Ref.: Landrum and Brown, Inc. DEIS for the Seattle-Tacoma International Airport Master Plan Update.

Subject: Review of DEIS Executive Summary, Chapter 1.

Dear Mr. Ossenkop,

Landrum and Brown, Inc identified the location and demographics of the DEIS for "... Sea-Tac Airport operated by the Port of Seattle ... a municipal corporation of the State of Washington".

R-2-1

They also indicated that two existing runways at Sea-Tac would not be adequate to meet future travel needs. Although the PSRC General Assembly adopted Resolution (No.A-93-03) in April 1993 to amend the Regional Aviation System Plan to conduct site-specific studies, including a DEIS for a Sea-Tac third runway, the Resolution was initially prepared by a Corporation which is not a governmental agency per se. This step, in reality, became a quassi-legislative function; and, as such, superseded and by-passed the Constitutional Process of the State Legislature and took away the Constitutional Rights of the Citizens.

My understanding of Civics does not include the empowerment of a Corporation to act as a legislative body. I'm unable to find evidence where the State Legislature actually participated in the legalities of this Resolution.

As I recall, the original Flight Plan was never signed by any of the framers of that document nor any member of the PSRC; and it still is not signed. Did Landrum and Brown, Inc. ever clarfify this part of the resolution before proceeding with the subject DEIS?

R-5-2

In Chap. 3, under the title of, "Affected Environment", the incorporated city of Normandy Park was omitted. I'm proud of my city; so will you please include Normandy Park along with Des Moines, Tukwila, and Burien?. Thank you. I remain,

Yours truly,

Henry J. Frause
Henry J. Frause

May 30, 1995

DEIS Summary Review

CC: ACC Executive Director, Mr. Bob Olander
ACC Chief Operating Officer, Mr. Ken Reid
Wash. State Congressional Delegation:
Mr. Arun Jhaveri, Burien Mayor
Mr. John Kennelly, Burien City Councilmember
Mr. Fred Strouder, Burien City Manager
Mr. David Miller, Normandy Park Mayor
Mr. Richard Kennedy, Des Moines Mayor
Mr. Greg Prothman, Des Moines City Manager
Des Moines Councilmembers:
Mr. Terry Brazil, Mr. Lew Anderson, and Mr. Dan Sherman.

May 30, 1995

2.

COMMENT SHEET

Public Hearing
June 1, 1995

SEATTLE-TACOMA INTERNATIONAL AIRPORT

Draft Environmental Impact Statement for the Master Plan Update

R-8-25

The [illegible] interchange shown on Alt #3 -- [illegible] @ SH #518 [illegible] the cargo truck traffic from the warehouse [illegible] further [illegible]. Truck traffic [illegible] these [illegible] Way to [illegible]. This improvement should be included in the Alt #1 and #2.

(Please Print) Name: [illegible]

Address: [illegible]

City: [illegible] Zip Code: [illegible]

242-5217

Please return comments by August 3, 1995 to: Mr. Dennis Ossenkop, Federal Aviation Administration, Airports Division, ANM-611, 1601 Lind Ave SW, Renton, Washington 98055-4056 or leave in the box as you leave the meeting.

2100

The Port has a tremendous problem. It must eliminate storm water from a proposed third runway having 98 acres of surface which is impervious to water absorption. To accomplish a major part of this problem it can use an Environmental Impact Statement to disparage the reputation of a water tributary called Walker Creek.

4. Exhibit IV.10-5, Conceptual Layout of Proposed Stormwater

5-31-95

EIS Input:

The Port has a tremendous problem. It must eliminate storm water from a proposed third runway having 98 acres of surface which is impervious to water absorption. To accomplish a major part of this problem it can use an Environmental Impact Statement to disparage the reputation of a water tributary to Miller Creek called Walker Creek. It just happens that the Walker Creek Headwaters are adjacent to the center of the area to be drained.

R-13-24

The Port provides little information about Walker Creek (in fact, all of the Exhibit Drawings showing Walker Creek are erroneous in showing the course of Walker Creek and where it flows into Miller Creek). There are no plans made for the flooding of Walker Creek flat lands.

The Port neglects to say much or anything about Walker Creek Wetlands despite the fact that the largest wetland area on Port property is the headwaters of Walker Creek. (Wetland #43, 30.3 acres, Table IV.11-1.)

Walker Creek was omitted from Miller Creek fish surveys (Item 7, page -M-6-, Appendix M). Table I Appendix P-B states "fish unlikely". Exhibits 5 and 7 list Walkor Creek as "Unclassified Tributary" (Meaning there were no salmonid types of fish). The FACTS are that a recent fish survey by "Trout Unlimited" showed salmon present during the spawning season as far upstream as First Avenue South and fingerling seeding at DesMoines Way South.

Appendix F, "Stream Survey Report for Miller Creek" does not list Walker Creek. It should be obvious that any tributary of a fish bearing stream like Miller Creek would also have the same fish unless there was some barrier to prevent them from coming into the stream. There is no Barrier.

R-13-15

So, it seems the Port has solved its problem of finding and disparaging a course for its waste water. It will dump the waste water into the headwaters of Walker Creek using an incorrect EIS statement as justification.

Exhibit IV.10-5, Conceptual Layout of Proposed Stormwater Management Systems, shows the result of the Port's plan.

R-13-24

The following are 15 Exhibit and Figure Maps which show incorrect confluence locations for Walker and Miller Creeks. The maps are at least 50 years out of date.

1. Exhibit III-2, General Study Area
2. " IV.10-1, Miller and DesMoines Creek Watershed (Point C is far off confluence location.)
3. " IV.10-4, Water Resources (Walker Creek called "Unclassified" meaning no salmonid fish.)

4. Exhibit IV.10-5, Conceptual Layout of Proposed Stormwater Management System (All runway wastewater to Walker Creek except for a small part to Miller Creek.)
5. " IV.10-8, SEATAC Airport
6. " IV.12-1, Floodplains
7. " IV.12-2, "
8. " IV.3-1, Historic
9. " I, Appendix P-B
10. Figure 1, " G
11. " 3, " G
12. " 4, " G
13. " 6, " G
14. " 10, " G
15. " 2, " P-B

R. C. Bolles*

*Land owner on Walker Creek for 29 years, having watched spawning and fed generations of salmonid fish.

~~12.~~