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SEATTLE - TACOMA INTERNATIONAL AIRPORT

DATA PACKAGE NO. 6

AIRPORT CAPACITY ENHANCEMENT PLAN UPDATE

AUG 1 1994

August 1994

Prepared by
Federal Aviation Administration
Technical Center
Atlantic City, New Jersey

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16. Abstract

This interim report contains technical data pertaining to the Seattle-Tacoma International Airport Capacity Enchancement Design Team Study.

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List of Exhibits

I. 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.

EXHIBIT 1
SEATTLE-TACOMA AIRPORT LAYOUT

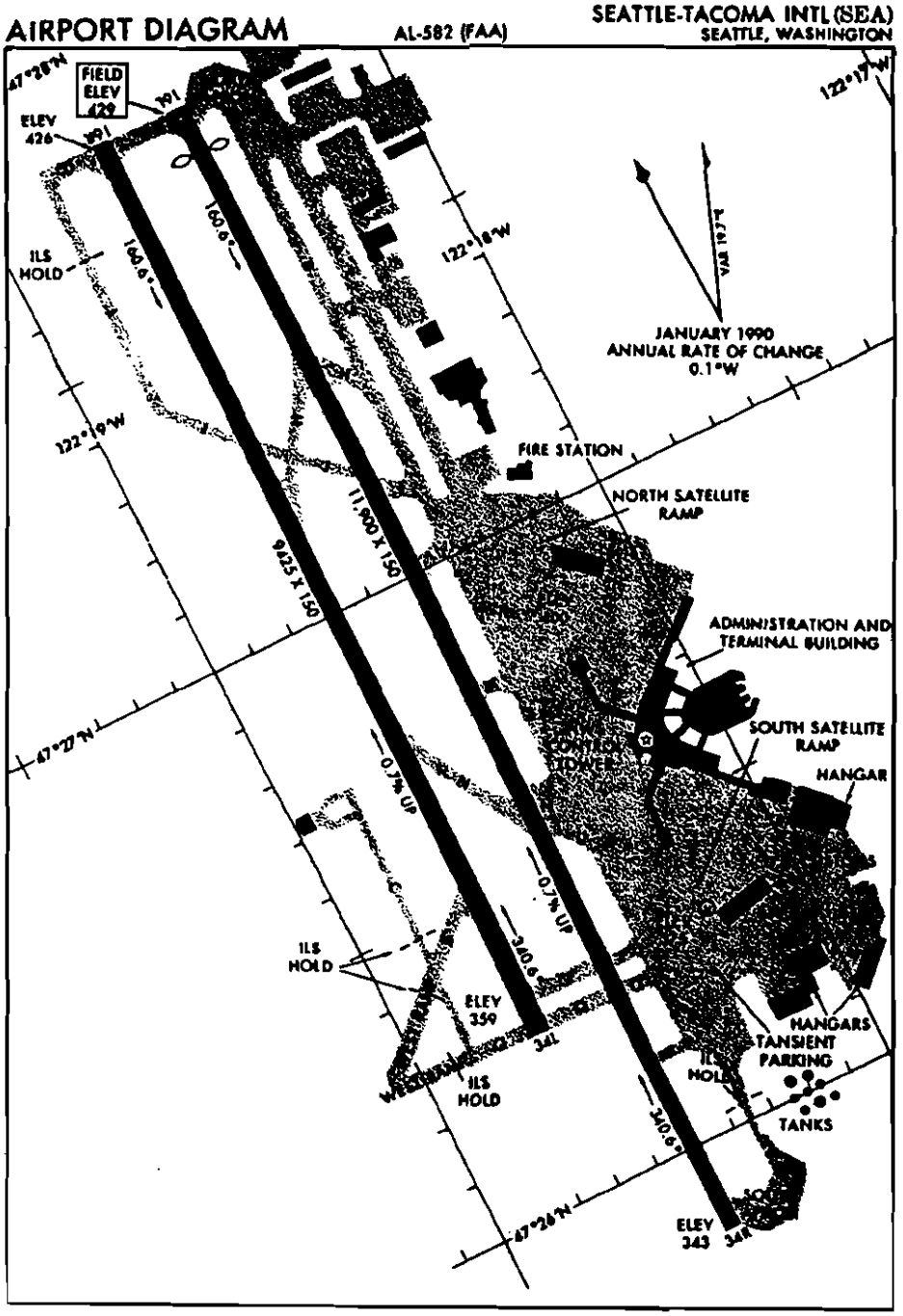


EXHIBIT 2
POTENTIAL IMPROVEMENTS[f]

Airfield Improvements

1. Basecase 2000.
   - High speed exits on Runway 16R/34L
   - Southside cargo 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 Radar Monitor. 16R departures cross Runway 16L at threshold.

6a. Same as experiment 6, but 16R departures cross 16L using taxiway 'J'.

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' 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 2.0 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.

[f] Improvements will be modeled with and without interaction with Boeing Field as appropriate.

* Each 500' stagger reduces required runway separation by 100'

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 recomputed to reflect the approach speeds agreed to for this study. A recomparison of the 78-8A VFR separations and separations computed from data collection recomputed 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, recomputed 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.

Exhibit 18 is a link/node diagram for the "Do Nothing" SIMMOD simulations. Similar link/node structure will be built for all those improvement that include new runways or taxiways.

Exhibits 19 through 22 are diagrams of the departure and arrival airspace routes to be used in the SIMMOD simulations.

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 7340.1E 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.

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)		

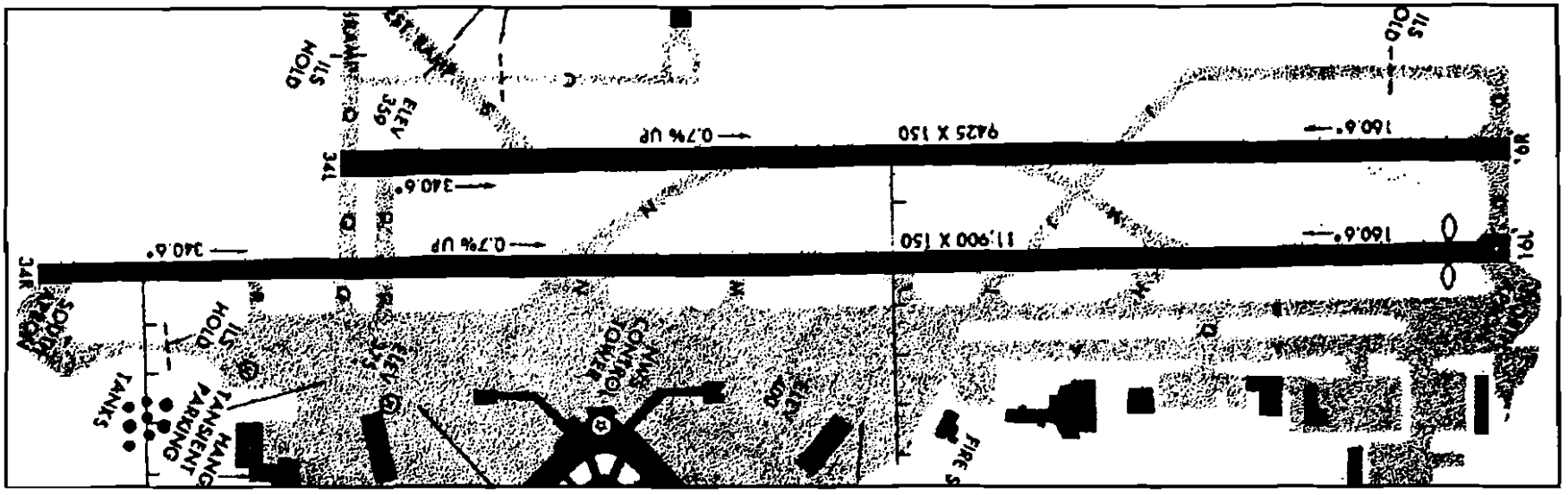
Class 3 - Large Twin-engine Propeller Aircraft

DH80	DeHavilland DASH-8	BA31	British Aerospace Jetstream 31
BE30	Beech Super King Air 300	C650	Cessna III
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		

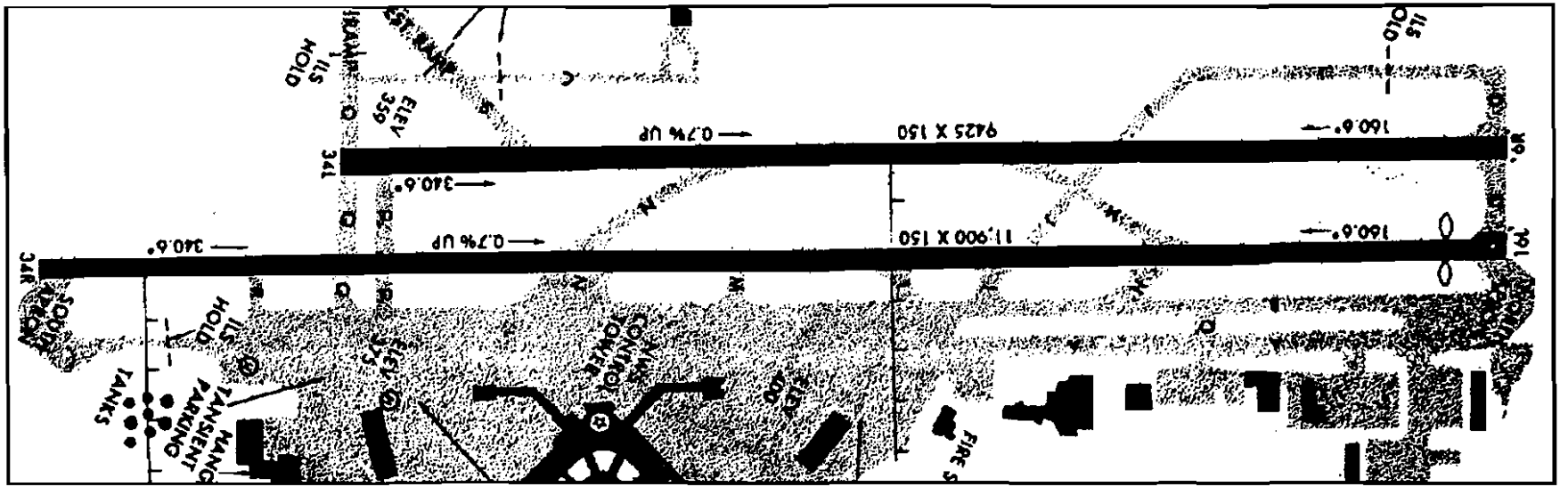
EXHIBIT 5
RUNWAY 16L EXIT UTILIZATION*



	H	J	L	M	N	P
16L	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

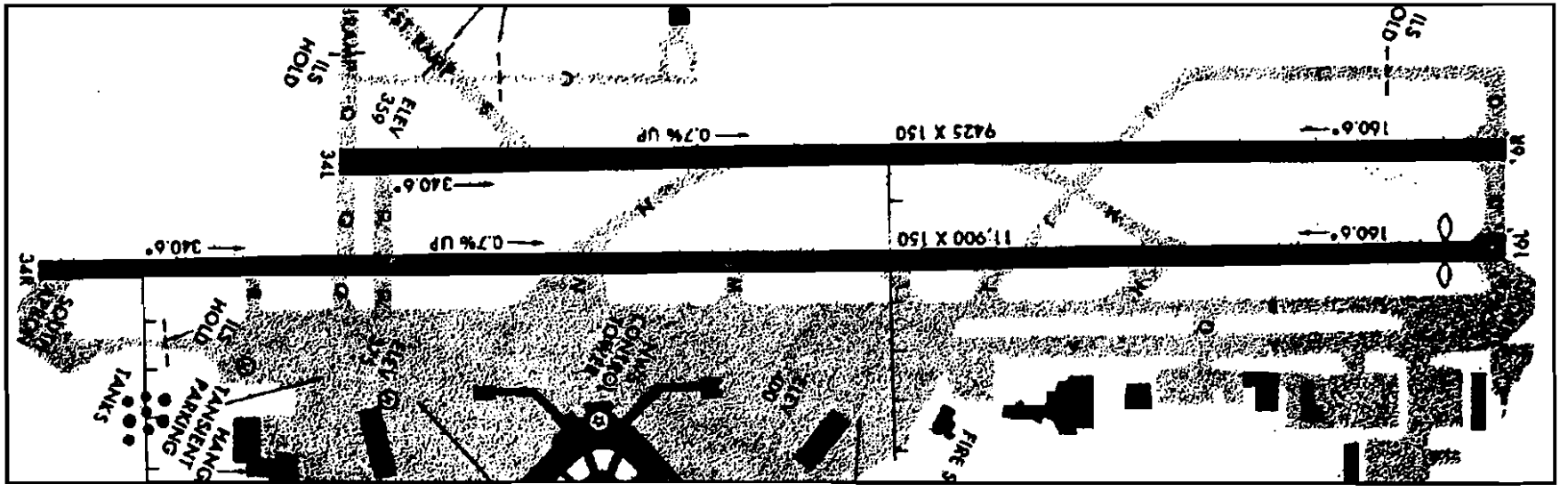
EXHIBIT 6
RUNWAY 16R EXIT UTILIZATION*



16R	J	H	N	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

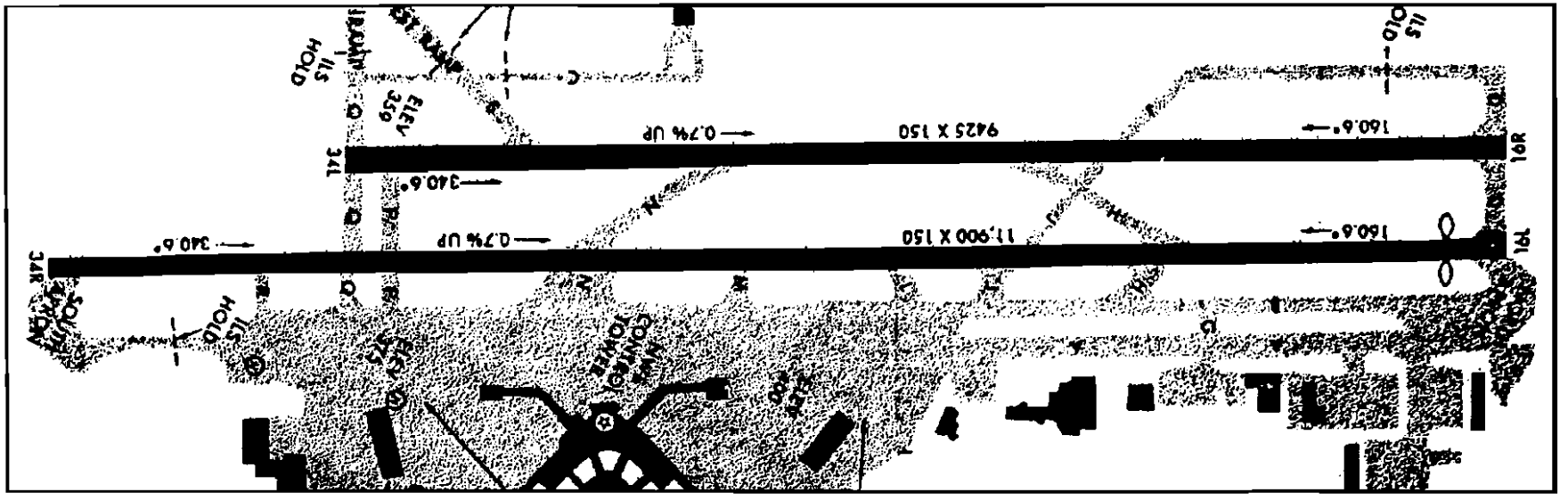
EXHIBIT 7
RUNWAY 34L EXIT UTILIZATION*



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 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[5]

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	5.03
	2 (C)	3.38	3.21	2.97	3.39
	3 (B)	3.38	3.21	2.97	3.39
	4 (A)	3.38	3.21	2.97	2.65

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)	0.83	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)				
	2 (C)		BASED ON ROT FROM SEA FIELD DATA MAY 1992		
	3 (B)				
	4 (A)				

DATA COLLECTION

Observed Spacings at Threshold

20th percentile of spacings ≤ 3 minutes)

A/A (NM)		TRAIL A/C 1 (D)	2 (C)	3 (B)	4 (A)
LEAD A/C	1 (D)	--	3.58 (30)	--	--
	2 (C)	3.44 (25)	3.19 (207)	3.14 (118)	2.11 (21)
	3 (B)	3.70 (20)	2.92 (113)	2.74 (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)	--	1.94 (35)	1.91 (38)	--
	4 (A)	--	--	--	--

AVG ARR RWY OCCUPANCY TIMES OF LEAD A/C	1	2	3	4
(MIN)	(D)	(C)	(B)	(A)
	1.13	0.86	0.81	0.90

[5] 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	5.16	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)				
	2 (C)	BASED ON ROT FROM SEA FIELD DATA MAY 1992			
	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	§		
VFR2	Single Arrival stream with Additional A/C under ceiling	[2500'-4999']	> 3 sm			
IFR1	Single approach stream	[800'-2499']	> 2 sm			
IFR2	One appr. stream-protect glideslope area	N/A	[1800'- 2 sm]			
IFR3	Same as IFR2 - NO arr to the north	N/A	[600'-1799']			
IFR4	Low visibility plan-One runway	N/A	< 600'			

§ Source: Numbers to be supplied by the Design Team.

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

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: ?

EXHIBIT 18
AIRFIELD BASELINE LINK/NODE DIAGRAM

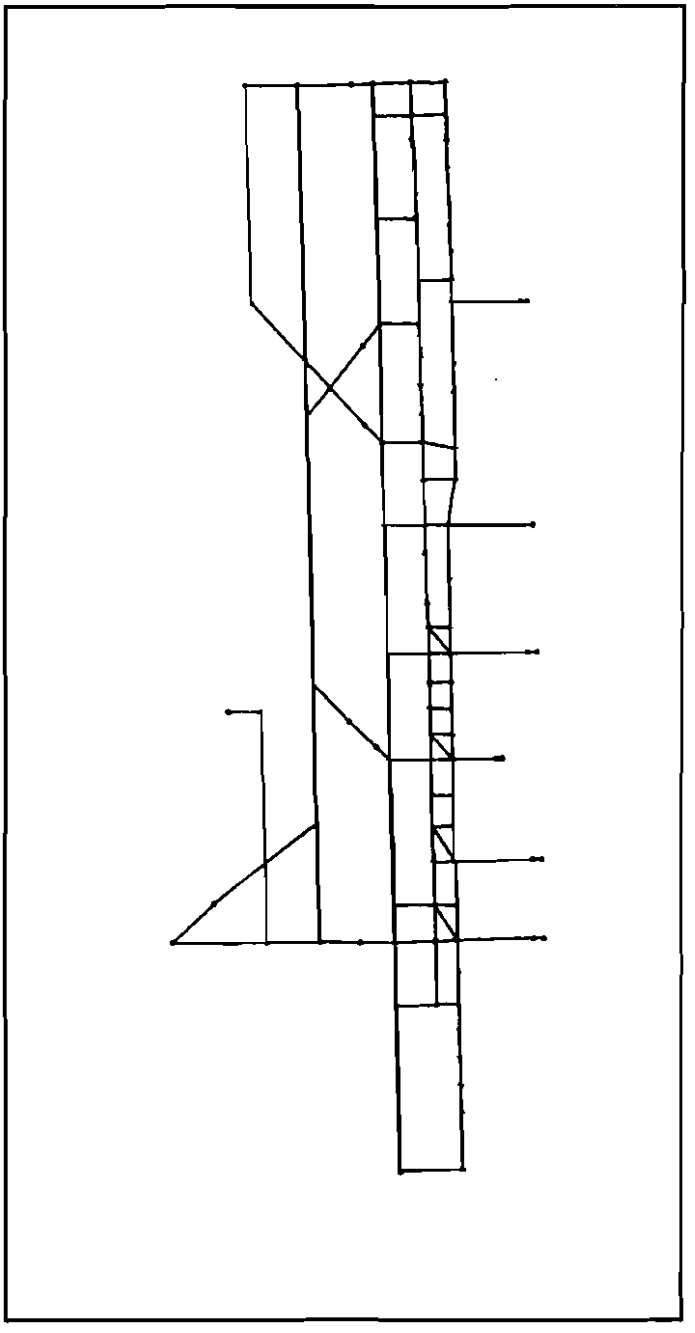


EXHIBIT 19
NORTH FLOW DEPARTURE AIRSPACE ROUTES

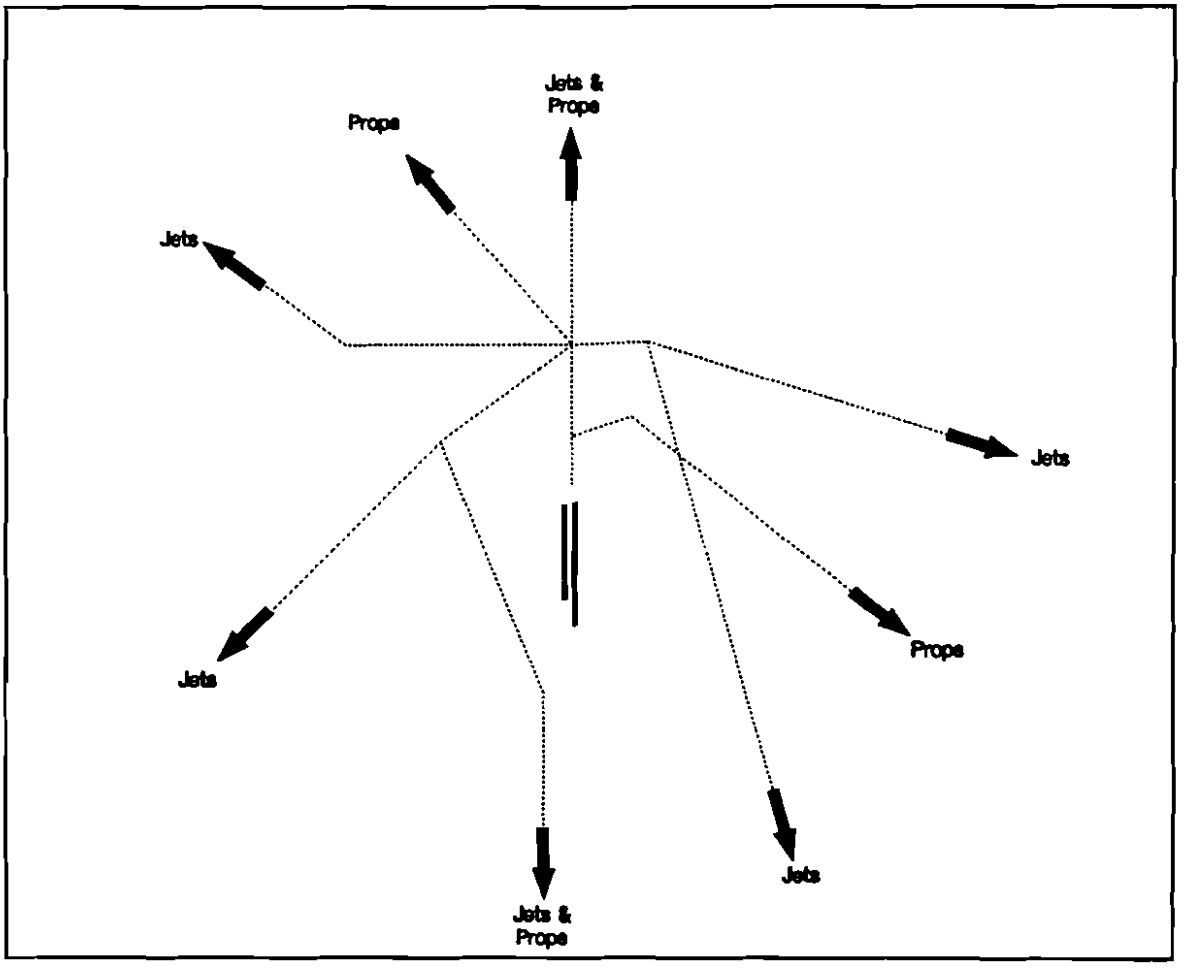


EXHIBIT 20
NORTH FLOW ARRIVAL AIRSPACE ROUTES

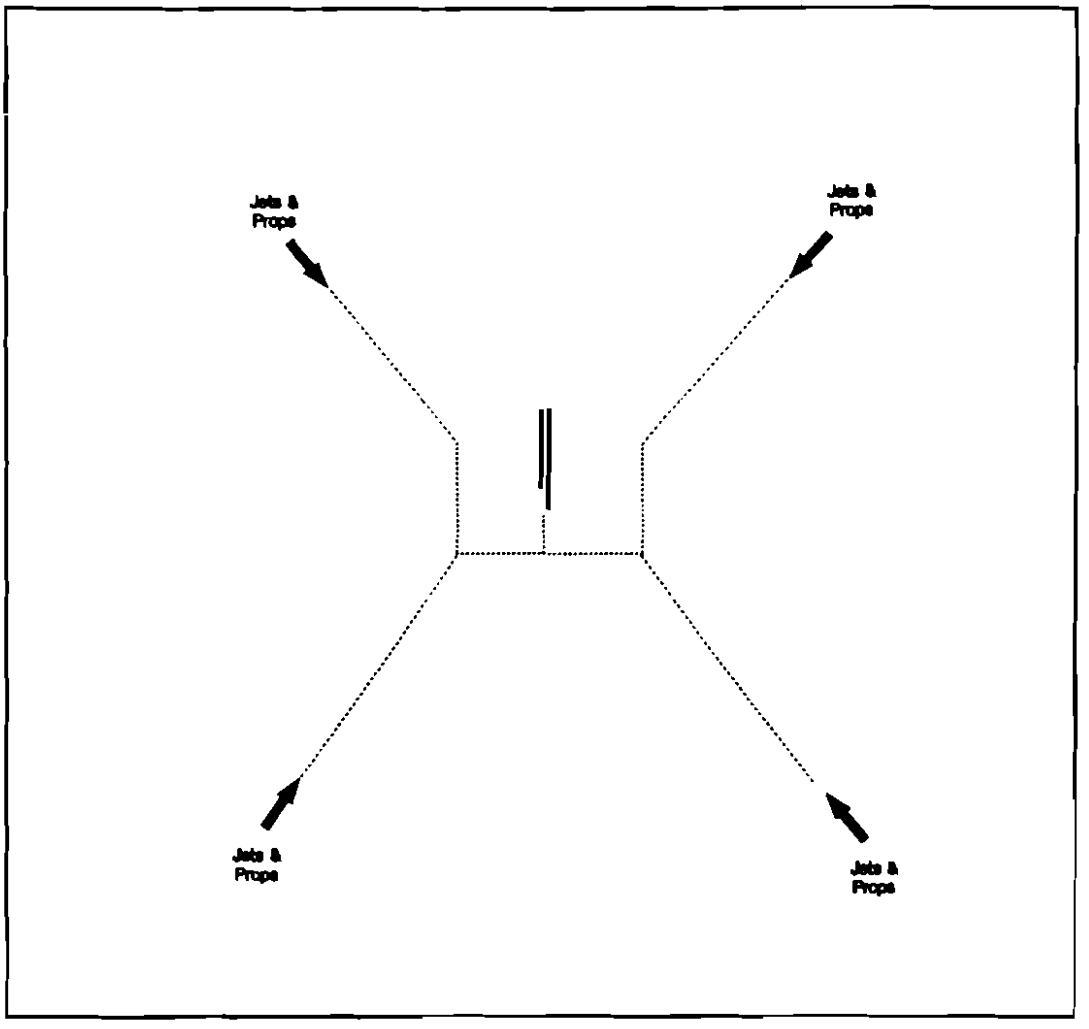


EXHIBIT 21
SOUTH FLOW DEPARTURE AIRSPACE ROUTES

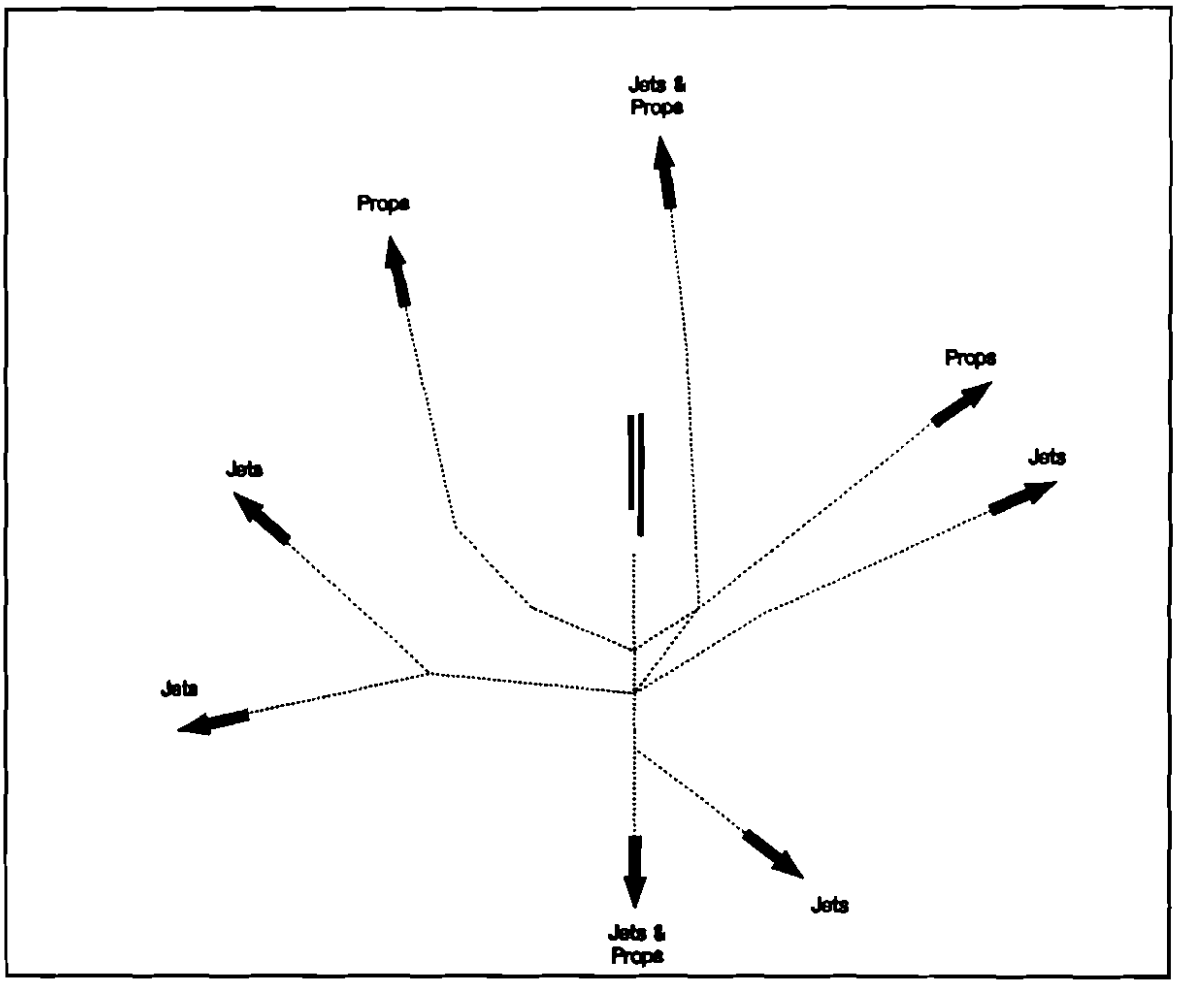
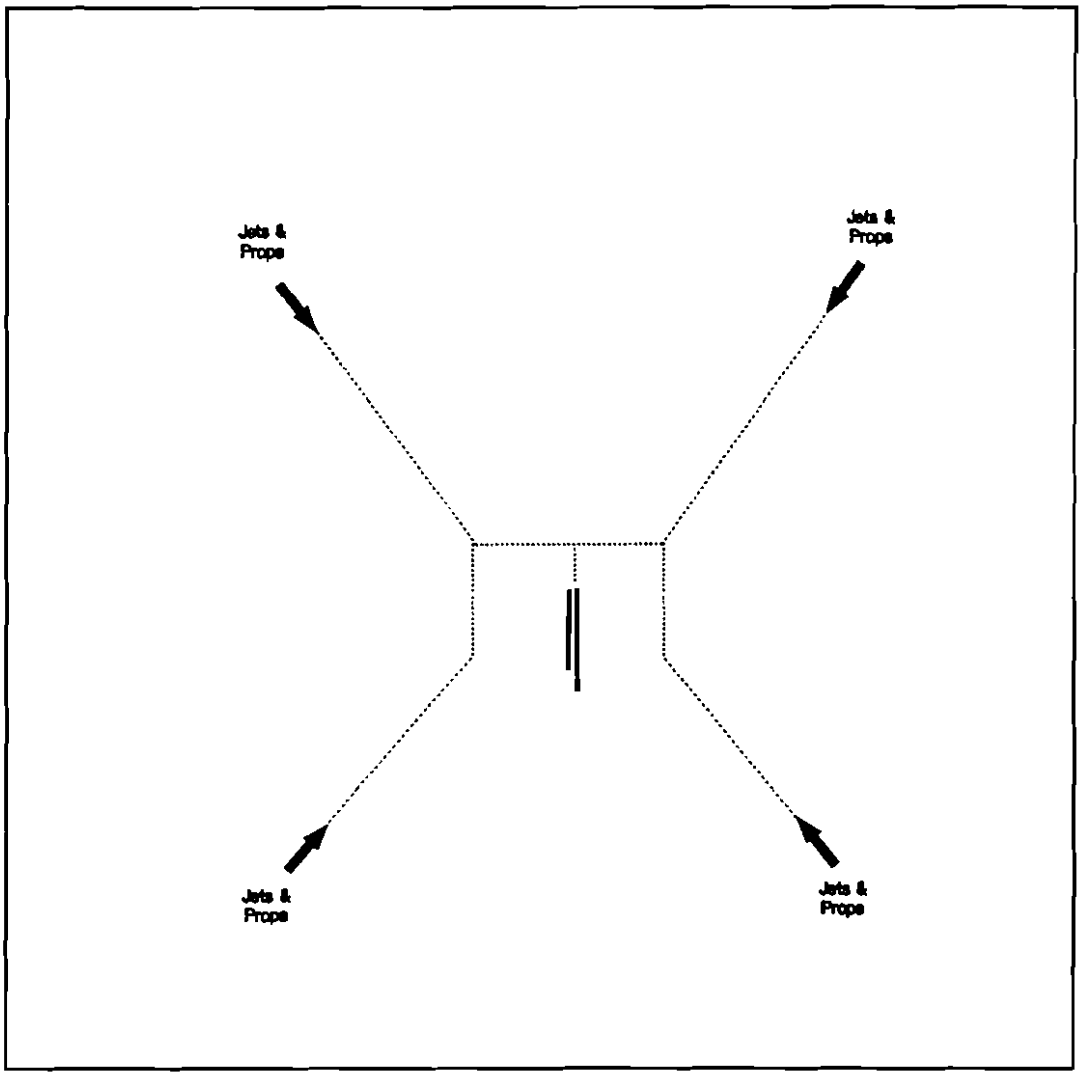


EXHIBIT 22
SOUTH FLOW ARRIVAL AIRSPACE ROUTES



III. Summary of SIMMOD Output

Exhibits 23 through 26 are summaries of the SIMMOD experiments rerun using the new VFR and IFR separations. These exhibits allow a comparison of the "Do Nothing" to each of the improvements for each demand schedule and weather condition. A single sheet detailed summary for each experiment is contained in Appendix B.

Exhibit 23 - VFR1 SIMMOD Summary

South - VFR1		Baseline					Future 1					Future 2				
		Arrivals		Departures			Arrivals		Departures			Arrivals		Departures		
Improvement	Exp. #	Travel Time	Delay	Travel Time	Delay	Savings	Travel Time	Delay	Travel Time	Delay	Savings	Travel Time	Delay	Travel Time	Delay	Savings
Do Nothing	00	8,049	656	7,543	614		11,154	1,225	9,247	1,627						
Basecase 2000	01															
Class 3&4 R/W w/ 1500' Sep.	02															
Class 3&4 R/W w/ 2500' Sep.	03															
Full Use R/W w/ 2500' Seps. Arrivals on 16L and 16X	04															
Full Use R/W w/ 2500' Sep. Arrivals on 16R and 16X	05															
Full Use R/W w/ 3300' Sep. (PRM & Dep. cross @ T/H)	06															
Full Use R/W w/ 3300' Sep. (PRM & Dep cross @ "J")	06a															
Full Use R/W w/ 3300' Sep. (No PRM)	07															
Modified Full Use R/W (No Heavy A/C on 16X)	08															
Offset Procedures	09															
Wake Vortex Detection System	10															
CAT I Appr. w/ 3 RVRs	11															
CAT II Approaches	12															
CAT III Approaches	13															
Staggered R/Ws for Reduced Wake Turbulence Sep.	14															
Simultaneous Converging Instrument Appr. SEA & BFI	15															
Reduce IFR In-Trail to 2.0 nm	16															
Reduce IFR In-Trail to 2.5 nm	17															
FMS & GPS Approaches	18															
All Commercial Flights Operate @ 300' RVR	19															
Demand Management	20															

Exhibit 24 - VFR2 SIMMOD Summary

South - VFR2		Baseline					Future 1					Future 2				
Improvement	Exp. #	Arrivals		Departures		Savings	Arrivals		Departures		Savings	Arrivals		Departures		Savings
		Travel Time	Delay	Travel Time	Delay		Travel Time	Delay	Travel Time	Delay		Travel Time	Delay	Travel Time	Delay	
Do Nothing	00	8,113	2,415	7,597	744		11,226	33,988	9,312	1,498						
Basecase 2000	01															
Class 3&4 R/W w/ 1500' Sep.	02						11,173	33,359	9,222	800	1,380					
Class 3&4 R/W w/ 2500' Sep.	03															
Full Use R/W w/ 2500' Seps. Arrivals on 16L and 16X	04															
Full Use R/W w/ 2500' Sep. Arrivals on 16R and 16X	05															
Full Use R/W w/ 3300' Sep. (PRM & Dep. cross @ T/H)	06						11,534	2,940	9,210	1,024	31,227					
Full Use R/W w/ 3300' Sep. (PRM & Dep cross @ "J")	06a															
Full Use R/W w/ 3300' Sep. (No PRM)	07															
Modified Full Use R/W (No Heavy A/C on 16X)	08															
Offset Procedures	09															
Wake Vortex Detection System	10															
CAT I Appr. w/ 3 RVRs	11															
CAT II Approaches	12															
CAT III Approaches	13															
Staggered R/Ws for Reduced Wake Turbulence Sep.	14															
Simultaneous Converging Instrument Appr. SEA & BFI	15															
Reduce IFR In-Trail to 2.0 nm	16															
Reduce IFR In-Trail to 2.5 nm	17															
FMS & GPS Approaches	18															
All Commercial Flights Operate @ 300' RVR	19															
Demand Menegement	20															

Exhibit 25 - IFR1 SIMMOD Summary

South - IFR1		Baseline					Future 1					Future 2				
		Arrivals		Departures			Arrivals		Departures			Arrivals		Departures		
Improvement	Exp. #	Travel Time	Delay	Travel Time	Delay	Savings	Travel Time	Delay	Travel Time	Delay	Savings	Travel Time	Delay	Travel Time	Delay	Savings
Do Nothing	00	9,142	11,918	7,582	2,735		11,270	65,600	9,299	7,443						
Basecase 2000	01															
Class 3&4 R/W w/ 1500' Sep.	02															
Class 3&4 R/W w/ 2500' Sep.	03															
Full Use R/W w/ 2500' Seps. Arrivals on 16L and 16X	04															
Full Use R/W w/ 2500' Sep. Arrivals on 16R and 16X	05															
Full Use R/W w/ 3300' Sep. (PRM & Dep. cross @ T/H)	06						11,409	2,695	8,491	7,827	62,190					
Full Use R/W w/ 3300' Sep. (PRM & Dep cross @ "J")	06a															
Full Use R/W w/ 3300' Sep. (No PRM)	07															
Modified Full Use R/W (No Heavy A/C on 16X)	08															
Offset Procedures	09															
Weke Vortex Detection System	10															
CAT I Appr. w/ 3 RVRs	11															
CAT II Approaches	12															
CAT III Approaches	13															
Staggered R/Ws for Reduced Weke Turbulence Sep.	14															
Simultaneous Converging Instrument Appr. SEA & BFI	15															
Reduce IFR In-Trail to 2.0 nm	16															
Reduce IFR In-Trail to 2.5 nm	17															
FMS & GPS Approaches	18															
All Commercial Flights Operate @ 300' RVR	19															
Demand Management	20															

Exhibit 26 - IFR4 SIMMOD Summary

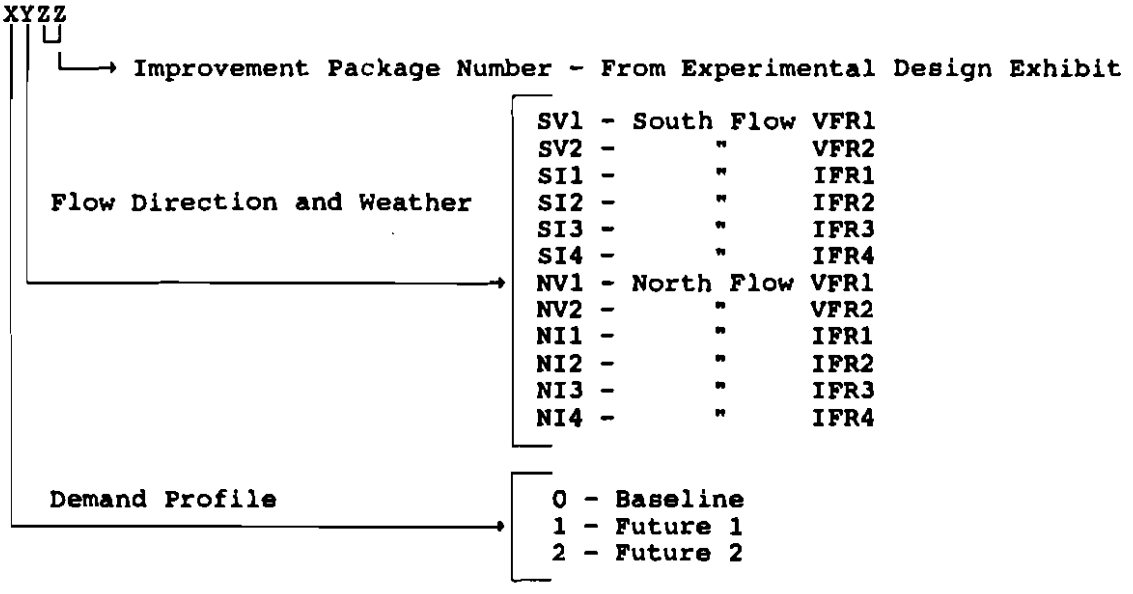
South - IFR4		Baseline					Future 1					Future 2				
Improvement	Exp. #	Arrivals		Departures		Savings	Arrivals		Departures		Savings	Arrivals		Departures		Savings
		Travel Time	Delay	Travel Time	Delay		Travel Time	Delay	Travel Time	Delay		Travel Time	Delay	Travel Time	Delay	
Do Nothing	00	9,147	24,040	7,774	29,354		11,270	88,006	9,530	90,131						
Basecase 2000	01															
Class 3&4 R/W w/ 1500' Sep.	02															
Class 3&4 R/W w/ 2500' Sep.	03															
Full Use R/W w/ 2500' Seps. Arrivals on 16L and 16X	04															
Full Use R/W w/ 2500' Sep. Arrivals on 16R and 16X	05															
Full Use R/W w/ 3300' Sep. (PRM & Dep. cross @ T/H)	06						12,237	88,032	9,210	834	88,825					
Full Use R/W w/ 3300' Sep. (PRM & Dep cross @ "J")	06a															
Full Use R/W w/ 3300' Sep. (No PRM)	07															
Modified Full Use R/W (No Heavy A/C on 16X)	08															
Offset Procedurss	09															
Wake Vortex Detection System	10															
CAT I Appr. w/ 3 RVRs	11															
CAT II Approaches	12															
CAT III Approaches	13															
Staggered R/Ws for Reduced Weke Turbulence Sep.	14															
Simultaneous Converging Instrument Appr. SEA & BFI	15															
Reduce IFR In-Trail to 2.0 nm	16															
Reduce IFR In-Trsil to 2.5 nm	17															
FMS & GPS Approaches	18															
All Commercial Flights Operate @ 300' RVR	19															
Demand Management	20															

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. Exhibits 27 through 29 are Experimental Designs for the Baseline, Future 1 and Future 2 demand, respectively.

Each experiment is assigned a number. The numbering scheme used for the SEA-TAC Capacity Design Team Update is :



Design Team Schedule

Exhibit 30 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 27 - EXPERIMENTAL DESIGN BASELINE DEMAND

Exp. Number	Improvement	South Flow (16s)						North Flow (34s)					
		VFR1	VFR2	IFR1	IFR2	IFR3	IFR4	VFR1	VFR2	IFR1	IFR2	IFR3	IFR4
(00)	Do Nothing	OSV100	OSV200	OSI100	-	-	OSI400						
(01)	Basecase 2000												
(02)	CAT 3&4 Runway w/ 1500' Separation [1]												
(03)	CAT 3&4 Runway w/ 2500' Separation												
(04)	Full Use R/W w/ 2500' Separation Arrivals on 16L and 16X												
(05)	Full Use R/W w/ 2500' Separation Arrivals on 16R and 16X												
(06)	Full Use R/W w/ 3300' Sep. (Arr 16L) (PRM & departures cross at threshold)												
(06a)	Full Use R/W w/ 3300' Sep. (Arr 16L) (PRM & dep. cross at taxiway 'J'												
	Full Use R/W w/ 3300' Sep. (Arr 16R) (Without PRM)	--	--					--	--				
(08)	Modified Full Use R/W with 3300' Sep. NO heavy aircraft on 16X (with PRM)												
(09)	Offset Procedures	--						--					
(10)	Wake Vor. Detection & Avoidance System												
(11)	CAT I Approaches with 3 RVRs	--	--					--	--				
(12)	CAT II Approaches	--	--	--				--	--	--			
(13)	CAT III Approaches	--	--	--	--	--		--	--	--	--	--	
(14)	Steggered Runways for Reduced Wake Vortex Separetions												
(15)	Simultaneous Converging Instrument Approeches to SEA & BFI w/ CRDA												
(16)	Reduce IFR In-Trail Spacing to 2.0 nm	--	--					--	--				
(17)	Reduce IFR In-Trail Spacing to 2.5 nm	--	--					--	--				
(18)	FMS and GPS Approaches	--	--										
(19)	All Commercial Flights Cepable of Operating at 300' RVR	--	--	--	--	--		--	--	--	--	--	
(20)	Demand Management Strategies												

[1] Separation between 16L/34R and 16X/34X

EXHIBIT 28 - EXPERIMENTAL DESIGN FUTURE 1 DEMAND

Exp. Number	Improvement	South Flow (16s)						North Flow (34s)					
		VFR1	VFR2	IFR1	IFR2	IFR3	IFR4	VFR1	VFR2	IFR1	IFR2	IFR3	IFR4
(00)	Do Nothing	1SV100	1SV200	1SI100	-	-	1SI400						
(01)	Basecase 2000												
(02)	CAT 3&4 Runway w/ 1500' Separation [1]	-	1SV202	-	-	-	-						
(03)	CAT 3&4 Runway w/ 2500' Separation												
(04)	Full Use R/W w/ 2500' Separation Arrivals on 16L snd 16X												
(05)	Full Use R/W w/ 2500' Separation Arrivals on 16R and 16X												
(06)	Full Use R/W w/ 3300' Sep. (Arr 16L) (PRM & departures cross at threshold)	-	1SV206	1SI106	-	-	1SI406						
(06a)	Full Use R/W w/ 3300' Sep. (Arr 16L) (PRM & dep. cross at taxiway 'J'												
(07)	Full Use R/W w/ 3300' Sep. (Arr 16R) (without PRM)	--	--					--	--				
(08)	Modified Full Use R/W with 3300' Sep. NO heavy aircraft on 16X (with PRM)												
(09)	Offset Procedures	--						--					
(10)	Wake Vor. Detection & Avoidance System												
(11)	CAT I Approaches with 3 RVRs	--	--					--	--				
(12)	CAT II Approaches	--	--	--				--	--	--			
(13)	CAT III Approaches	--	--	--	--	--		--	--	--	--	--	
(14)	Staggered Runways for Reduced Wake Vortex Separations												
(15)	Simultaneous Converging Instrument Approaches to SEA & BFI w/ CRDA												
(16)	Reduce IFR In-Trail Spacing to 2.0 nm	--	--					--	--				
(17)	Reduce IFR In-Trail Spacing to 2.5 nm	--	--					--	--				
(18)	FMS and GPS Approaches	--	--										
(19)	All Commercial Flights Capable of Operating at 300' RVR	--	--	--	--	--		--	--	--	--	--	
(20)	Demand Management Strategies												

[1] Separation between 16L/34R and 16X/34X

EXHIBIT 29 - EXPERIMENTAL DESIGN FUTURE 2 DEMAND

Exp. Number	Improvement	South Flow (16s)						North Flow (34s)					
		VFR1	VFR2	IFR1	IFR2	IFR3	IFR4	VFR1	VFR2	IFR1	IFR2	IFR3	IFR4
(00)	Do Nothing												
(01)	Basecase 2000												
(02)	CAT 3&4 Runway w/ 1500' Separation [1]												
(03)	CAT 3&4 Runway w/ 2500' Separation												
(04)	Full Use R/W w/ 2500' Separation Arrivals on 16L and 16X												
(05)	Full Use R/W w/ 2500' Separation Arrivals on 16R and 16X												
(06)	Full Use R/W w/ 3300' Sep. (Arr 16L) (PRM & departures cross at threshold)												
(06a)	Full Use R/W w/ 3300' Sep. (Arr 16L) (PRM & dep. cross at taxiway 'J'												
(07)	Full Use R/W w/ 3300' Sep. (Arr 16R) (without PRM)	--	--					--	--				
(08)	Modified Full Use R/W with 3300' Sep. NO heavy aircraft on 16X (with PRM)												
(09)	Offset Procedures	--						--					
(10)	Wake Vor. Detection & Avoidance System												
(11)	CAT I Approaches with 3 RVRs	--	--					--	--				
(12)	CAT II Approaches	--	--	--				--	--	--			
(13)	CAT III Approaches	--	--	--	--	--		--	--	--	--	--	
(14)	Staggered Runways for Reduced Wake Vortex Separations												
(15)	Simultaneous Converging Instrument Approaches to SEA & BFI w/ CRDA												
(16)	Reduce IFR In-Trail Spacing to 2.0 nm	--	--					--	--				
(17)	Reduce IFR In-Trail Spacing to 2.5 nm	--	--					--	--				
(18)	FMS and GPS Approaches	--	--										
(19)	All Commercial Flights Capable of Operating at 300' RVR	--	--	--	--	--		--	--	--	--	--	
(20)	Demand Management Strategies												

[1] Separation between 16L/34R and 16X/34X

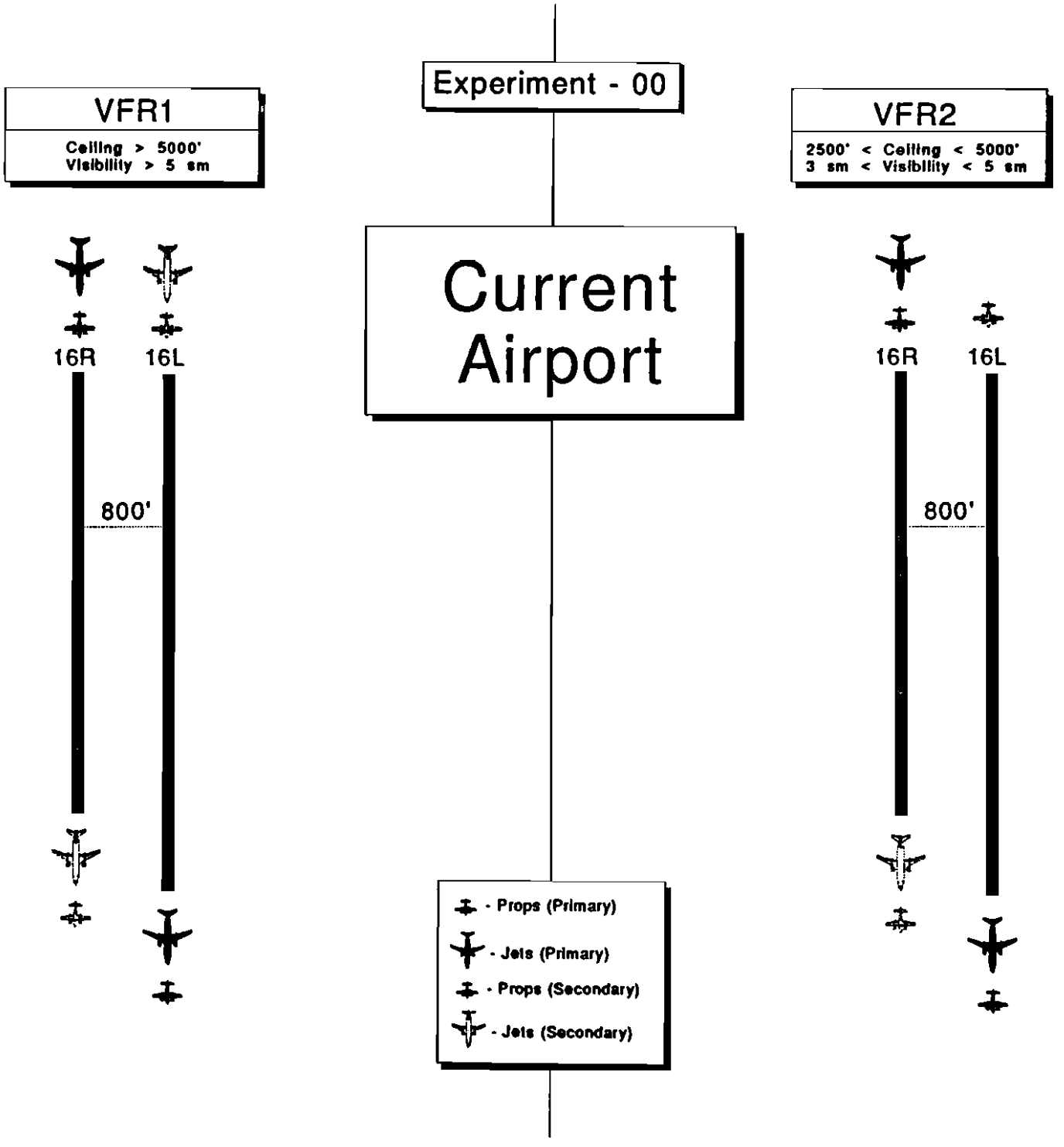
EXHIBIT 30
DESIGN TEAM SCHEDULE

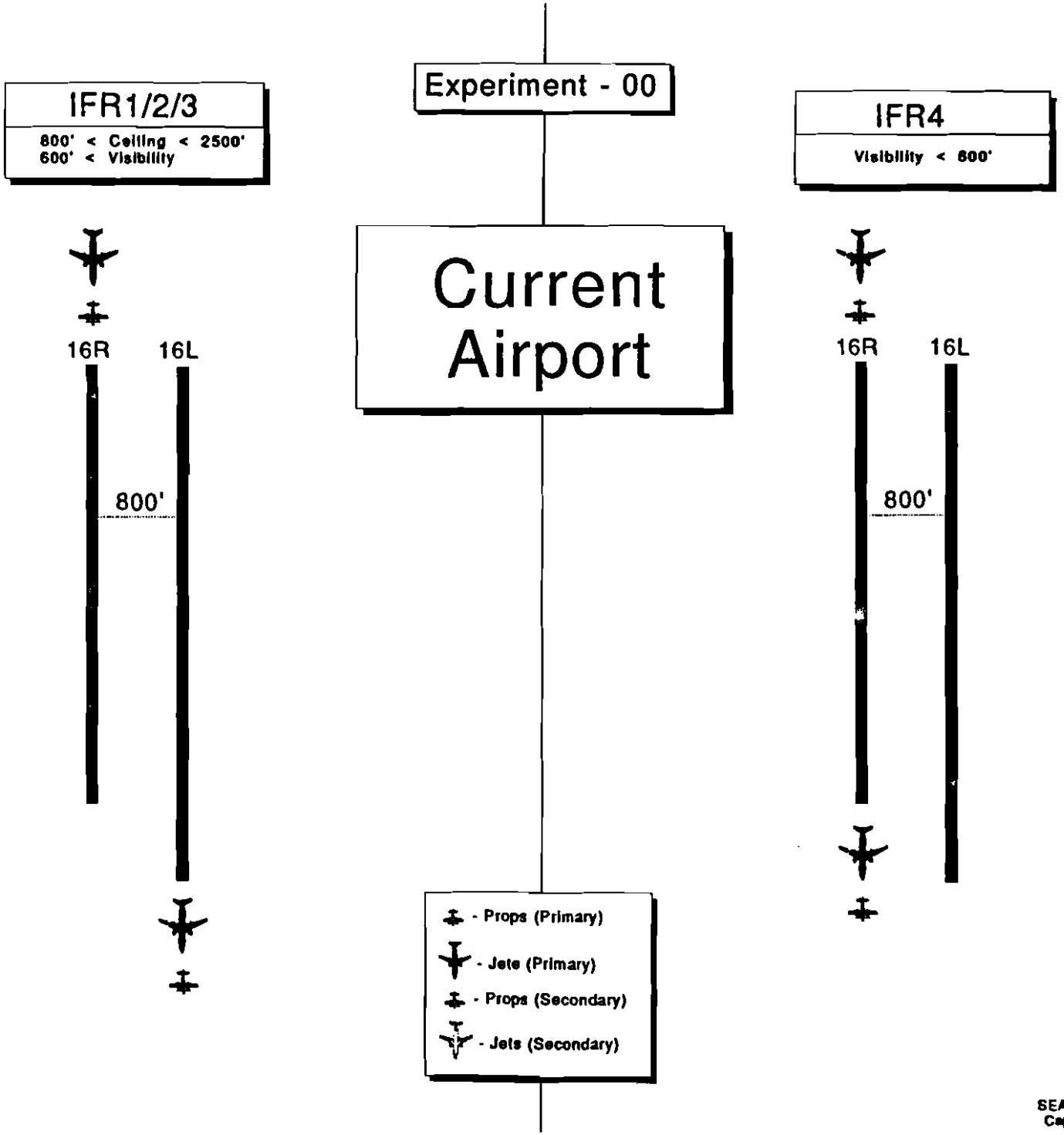
Meeting*	Target Date*	Purpose	Participants/ Responsibility
	10/25/93	On-site data collection. Establish parameters for analytical analysis.	FAATC
1	10/27/93	Kickoff Meeting. Review: Technical Plan, potential improvements, and data requirements.	Entire Design Team
2	12/ 1/93	Discuss: model inputs, assumptions, 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	--- Tentative ---	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'
16R
16L
800'
- Props (Primary)
- Jets (Primary)
- Props (Secondary)
- Jets (Secondary)



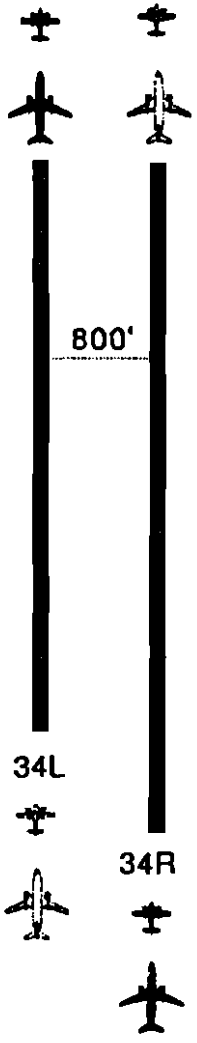
EXP_00.GED

SEA-TAC International Airport
Capacity Design Team Study

Experiment - 00

VFR1

Ceiling > 5000'
Visibility > 5 sm

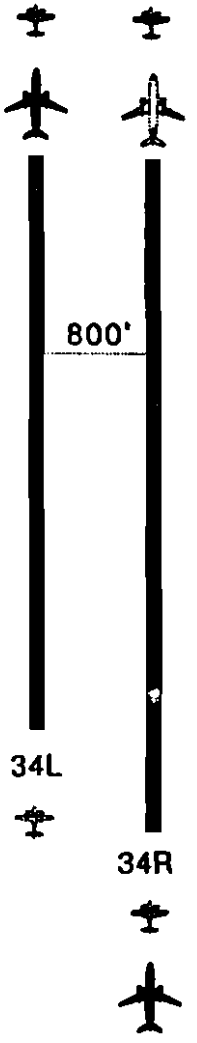


Current Airport

- Props (Primary)
- Jets (Primary)
- Props (Secondary)
- Jets (Secondary)

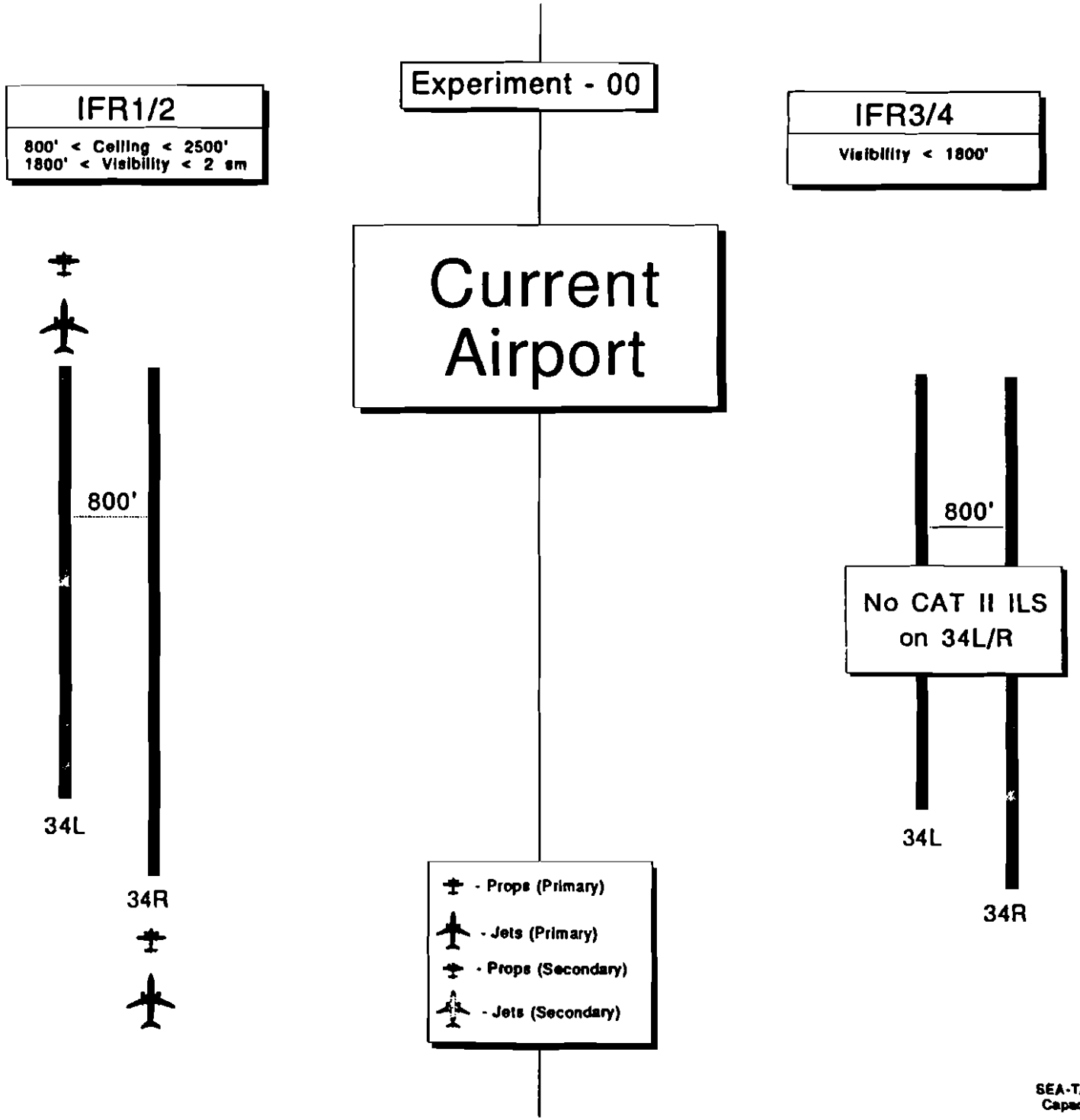
VFR2

2500' < Ceiling < 5000'
3 sm < Visibility < 5 sm



EXP_00.GED

SEA-TAC International Airport
Capacity Design Team Study



EXP_00.GED

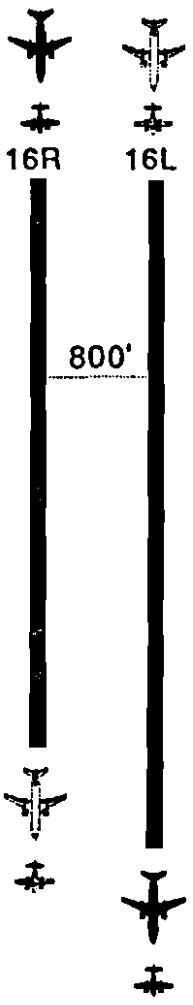
SEA-TAC International Airport
Capacity Design Team Study

Experiment - 01

Base Case 2000

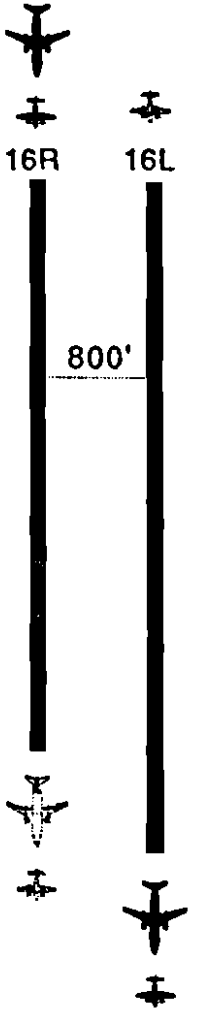
VFR1

Ceiling > 5000'
Visibility > 5 sm



VFR2

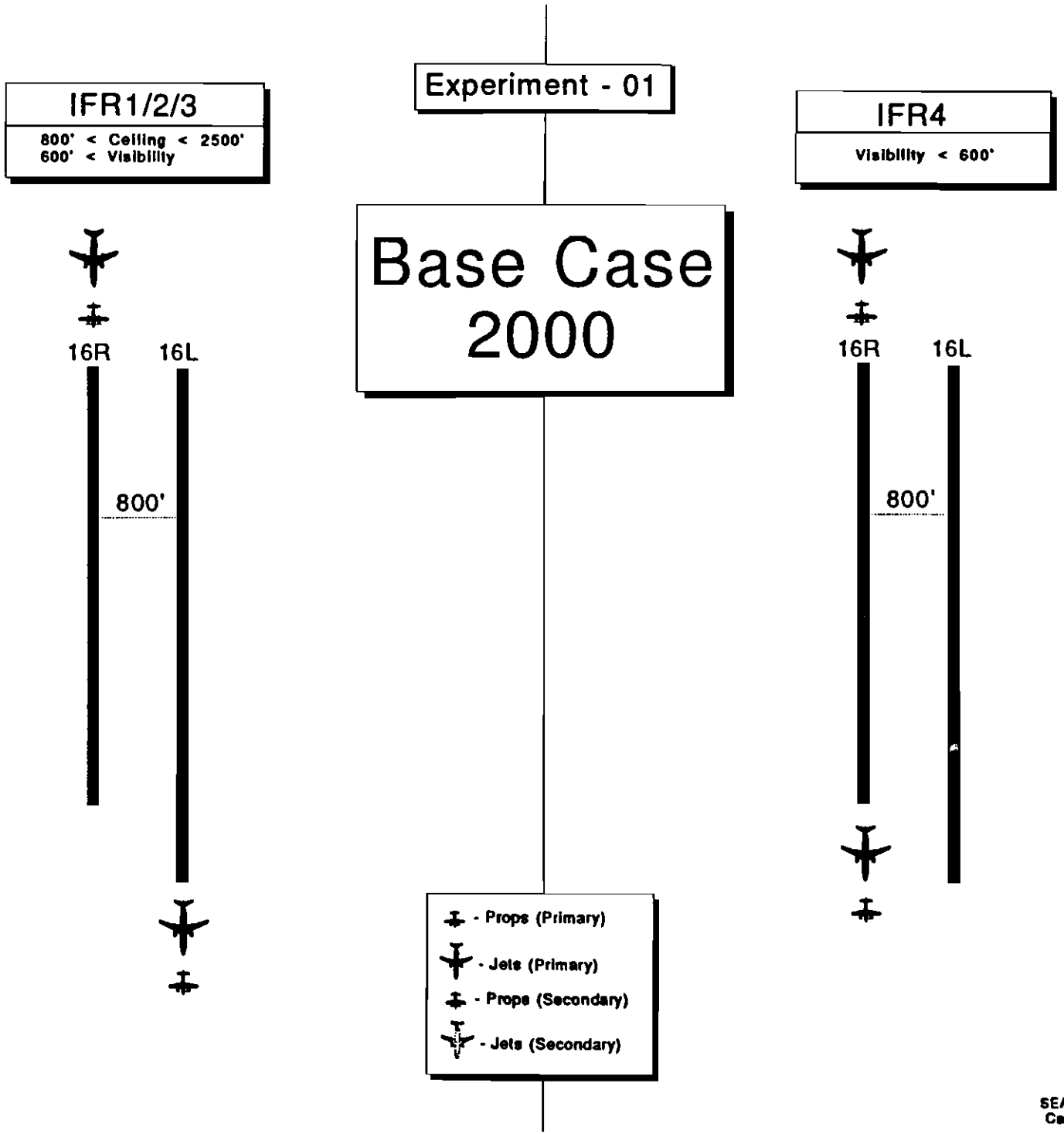
2500' < Ceiling < 5000'
3 sm < Visibility < 5 sm



- Props (Primary)
- Jets (Primary)
- Props (Secondary)
- Jets (Secondary)

EXP_01.GED

SEA-TAC International Airport
Capacity Design Team Study

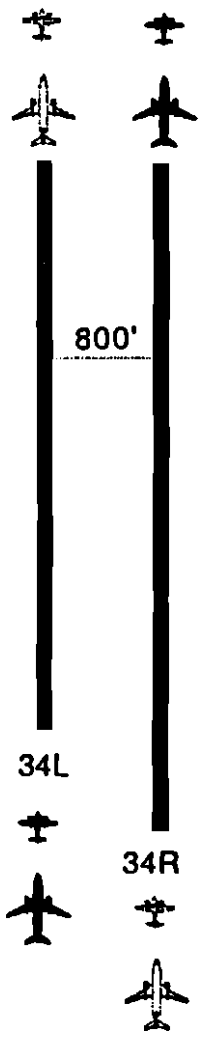

Experiment - 01
IFR1/2/3
800' < Ceiling < 2500'
600' < Visibility
IFR4
Visibility < 600'
Base Case
2000
16R
16L
800'
16R
16L
800'
- Props (Primary)
- Jets (Primary)
- Props (Secondary)
- Jets (Secondary)

Experiment - 01

Base Case 2000

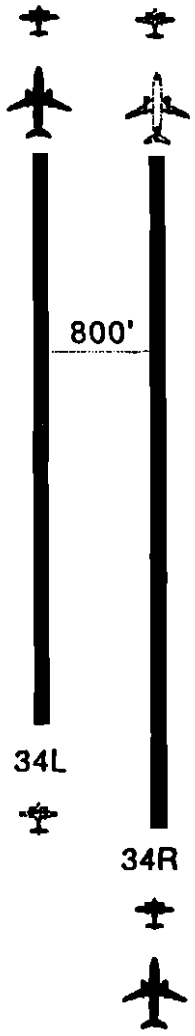
VFR1

Ceiling > 5000'
Visibility > 5 sm



VFR2

2500' < Ceiling < 5000'
3 sm < Visibility < 5 sm



- Props (Primary)
- Jets (Primary)
- Props (Secondary)
- Jets (Secondary)

EXP_01.GED

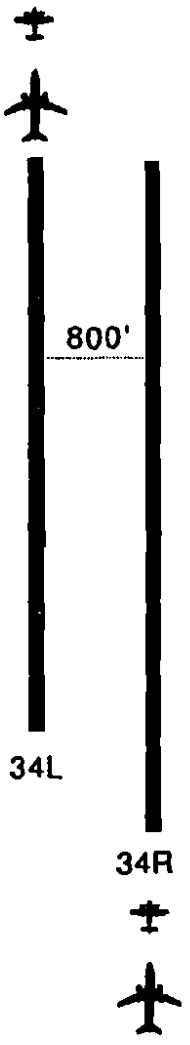
SEA-TAC International Airport
Capacity Design Team Study

Experiment - 01

Base Case 2000

IFR1/2

800' < Ceiling < 2500'
1800' < Visibility < 2 sm



IFR3/4

Visibility < 1800'

- Props (Primary)
- Jets (Primary)
- Props (Secondary)
- Jets (Secondary)

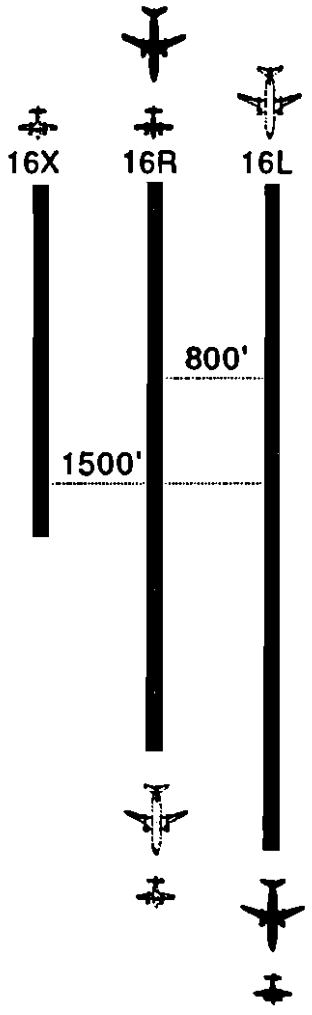
EXP_01.GED

SEA-TAC International Airport
Capacity Design Team Study

Experiment - 02

VFR1

Ceiling > 5000'
Visibility > 5 sm

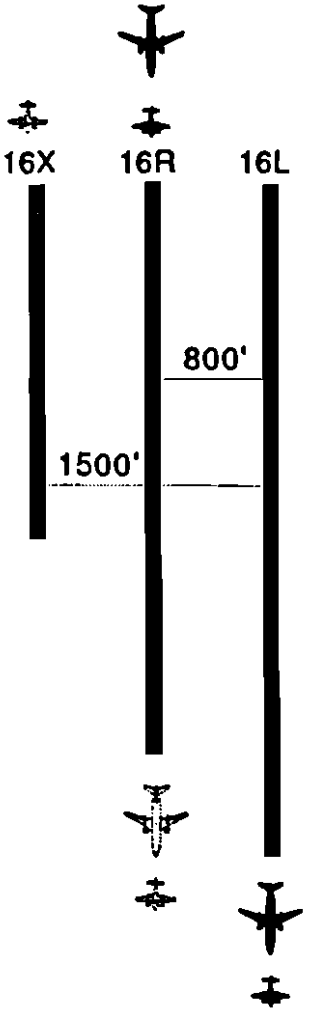


New Class 3 & 4 Runway w/ 1500' Separation

- Props (Primary)
- Jets (Primary)
- Props (Secondary)
- Jets (Secondary)

VFR2

2500' < Ceiling < 5000'
3 sm < Visibility < 5 sm



EXP_02.GED

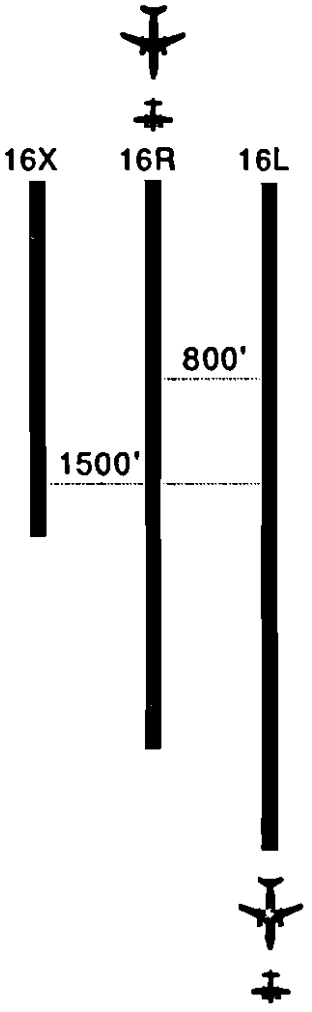
SEA-TAC International Airport
Capacity Design Team Study

Experiment - 02

New Class 3 & 4 Runway w/ 1500' Separation

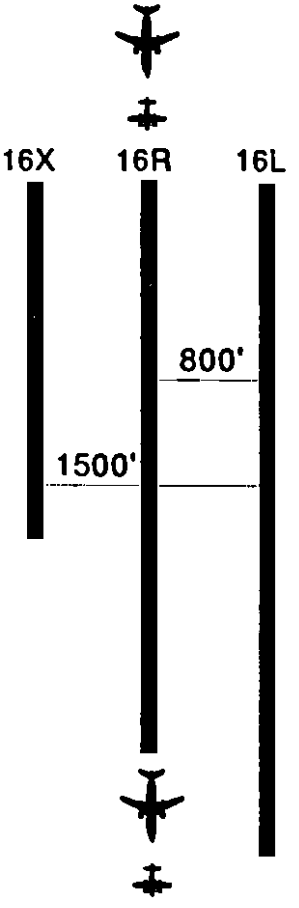
IFR1/2/3

800' < Ceiling < 2500'
800' < Visibility



IFR4

Visibility < 500'



- Props (Primary)
- Jets (Primary)
- Props (Secondary)
- Jets (Secondary)

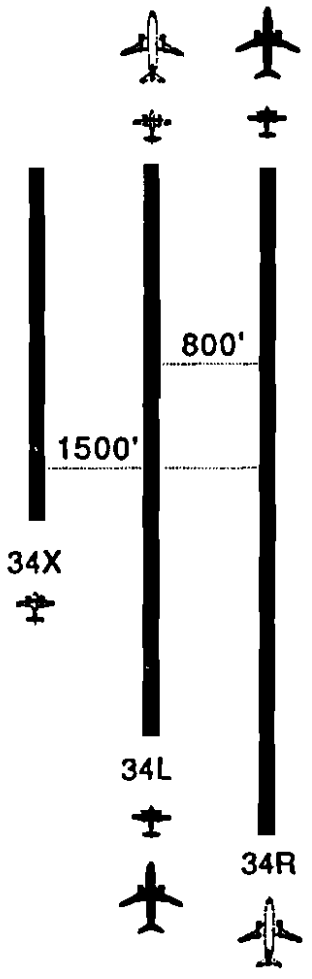
EXP_02.GED

SEA-TAC International Airport
Capacity Design Team Study

Experiment - 02

VFR1

Ceiling > 5000'
Visibility > 5 sm

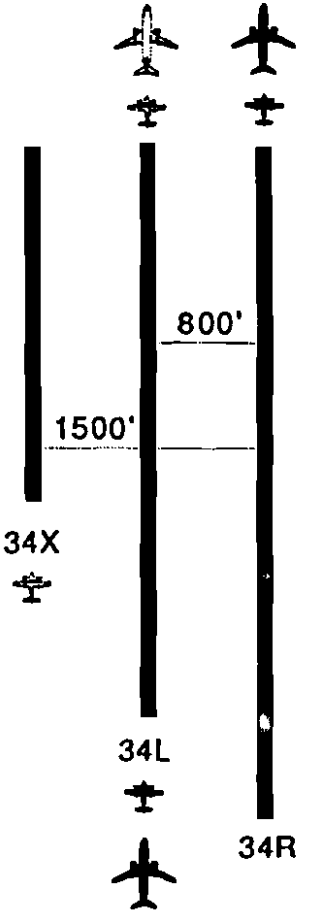


New Class 3 & 4 Runway w/ 1500' Separation

- Props (Primary)
- Jets (Primary)
- Props (Secondary)
- Jets (Secondary)

VFR2

2500' < Ceiling < 5000'
3 sm < Visibility < 5 sm



EXP_02.GED

SEA-TAC International Airport
Capacity Design Team Study

Experiment - 02

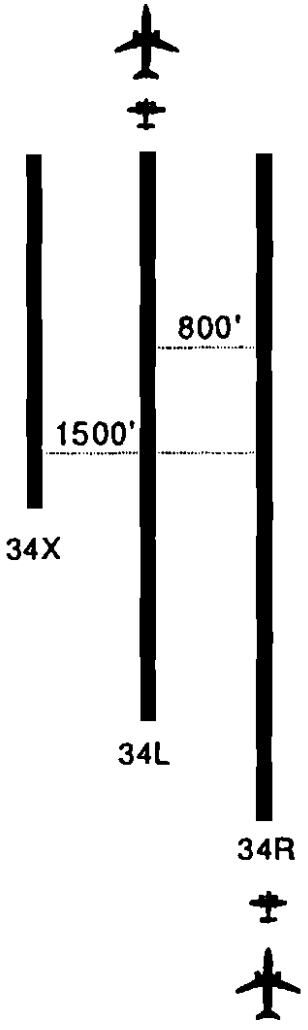
IFR1/2

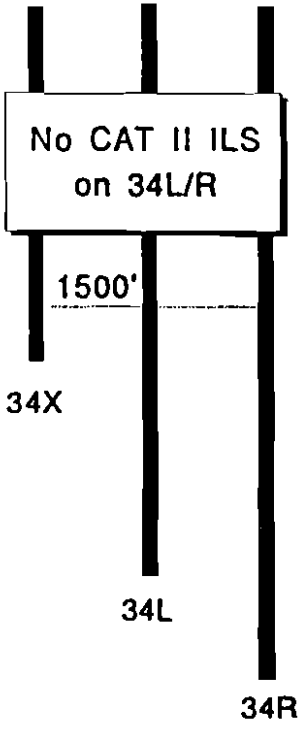
800' < Ceiling < 2500'
1800' < Visibility < 2 sm

IFR3/4

Visibility < 1800'

New Class 3 & 4 Runway w/ 1500' Separation





- Props (Primary)
- Jets (Primary)
- Props (Secondary)
- Jets (Secondary)

EXP_02.GED

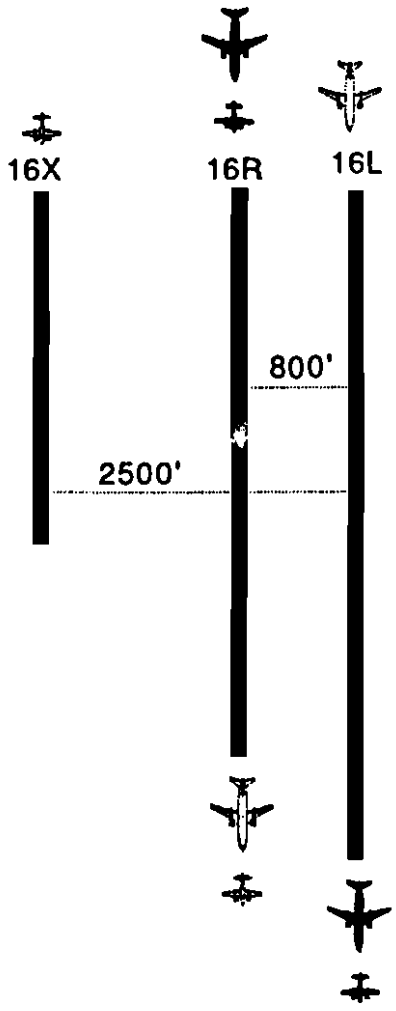
SEA-TAC International Airport
Capacity Design Team Study

Experiment - 03

New Class 3 & 4 Runway w/ 2500' Separation

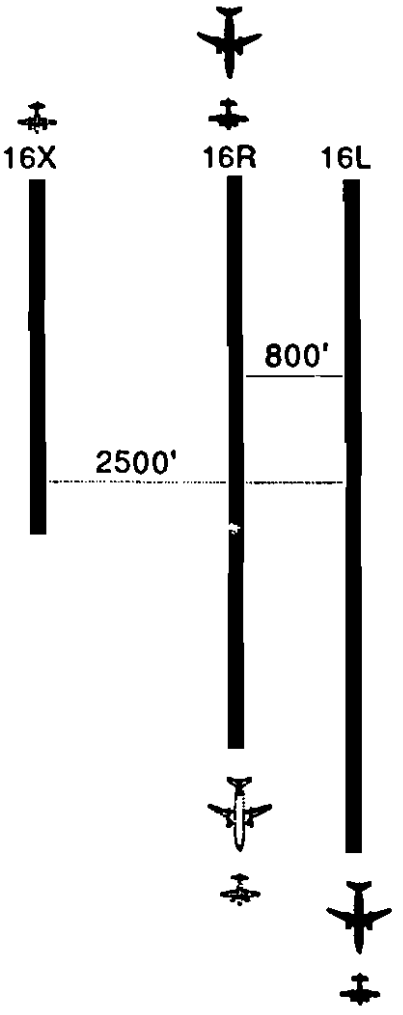
VFR1

Ceiling > 5000'
Visibility > 5 sm



VFR2

2500' < Ceiling < 5000'
3 sm < Visibility < 5 sm



- Props (Primary)
- Jets (Primary)
- Props (Secondary)
- Jets (Secondary)

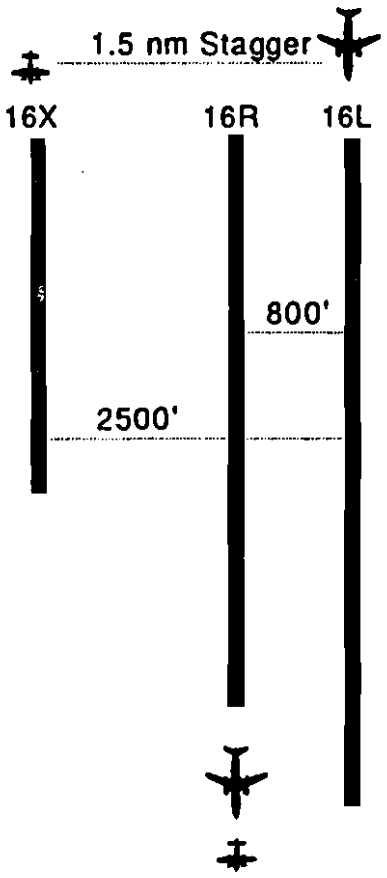
EXP_03.GED

SEA-TAC International Airport
Capacity Design Team Study

Experiment - 03

IFR1/2

800' < Ceiling < 2500'
1800' < Visibility < 2 sm



IFR3/4

See Current Airport

New Class 3 & 4 Runway w/ 2500' Separation

Same As Current Airport

- Props (Primary)
- Jets (Primary)
- Props (Secondary)
- Jets (Secondary)

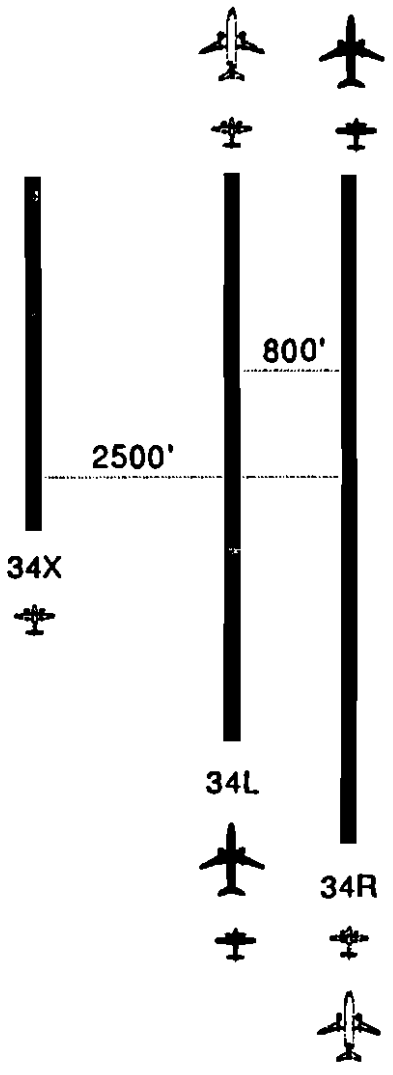
EXP_03.GED

SEA-TAC International Airport
Capacity Design Team Study

Experiment - 03

VFR1

Ceiling > 5000'
Visibility > 5 sm

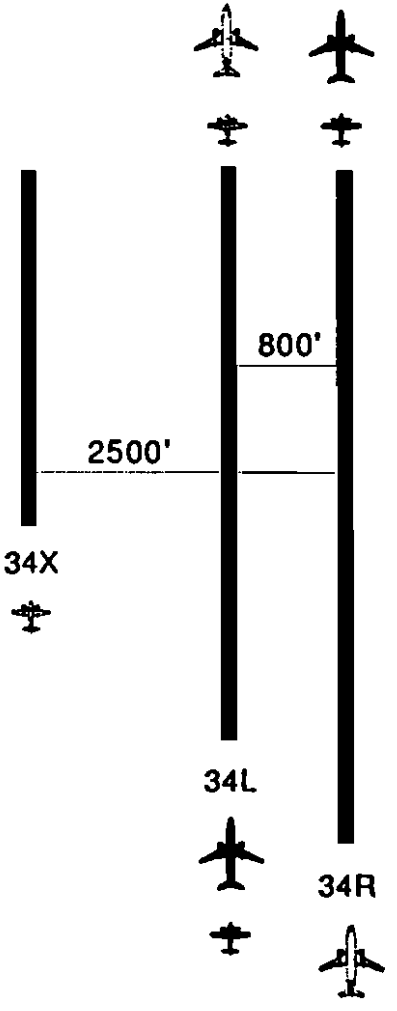


New Class 3 & 4 Runway w/ 2500' Separation

- Props (Primary)
- Jets (Primary)
- Props (Secondary)
- Jets (Secondary)

VFR2

2500' < Ceiling < 5000'
3 sm < Visibility < 5 sm



EXP_03.GEO

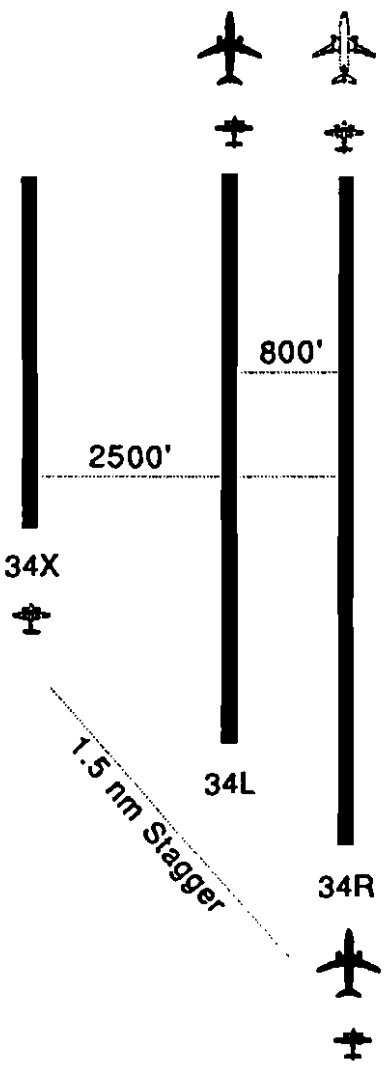
SEA-TAC International Airport
Capacity Design Team Study

Experiment - 03

New Class 3 & 4 Runway w/ 2500' Separation

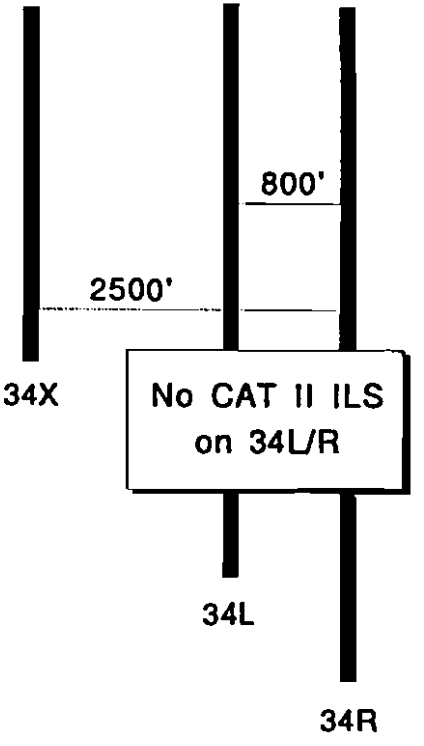
IFR1/2

800' < Ceiling < 2500'
1800' < Visibility < 2 sm



IFR3/4

Visibility < 1800'



- Props (Primary)
- Jets (Primary)
- Props (Secondary)
- Jets (Secondary)

EXP_03.GED

SEA-TAC International Airport
Capacity Design Team Study

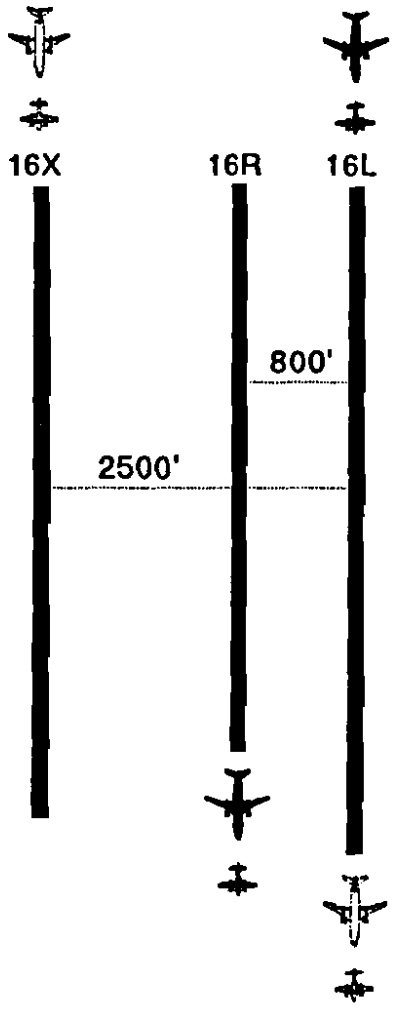
Experiment - 04

New Full Use Runway w/ 2500' Separation

Arrivals 16L/16X

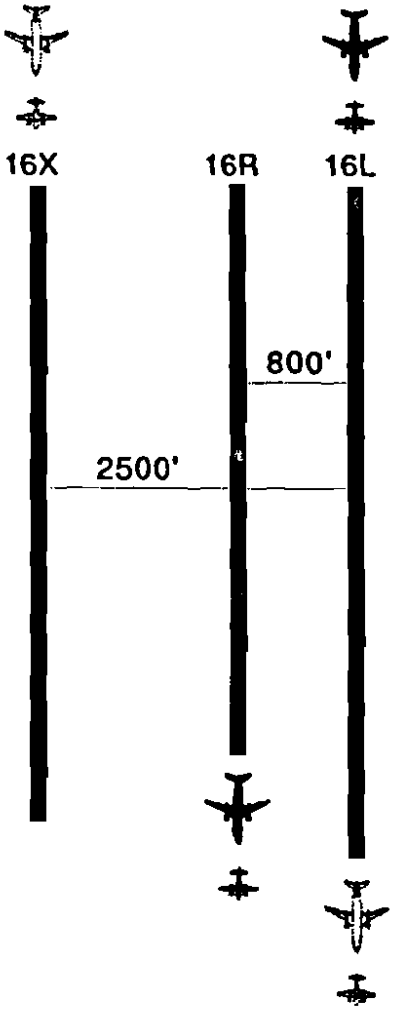
VFR1

Ceiling > 5000'
Visibility > 5 sm



VFR2

2500' < Ceiling < 5000'
3 sm < Visibility < 5 sm



- Props (Primary)
- Jets (Primary)
- Props (Secondary)
- Jets (Secondary)

EXP_04.GED

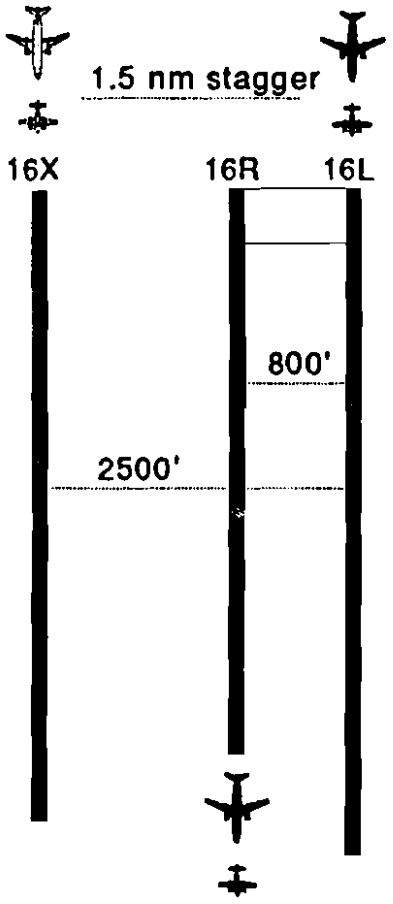
SEA-TAC International Airport
Capacity Design Team Study

Experiment - 04

New Full Use Runway w/ 2500' Separation

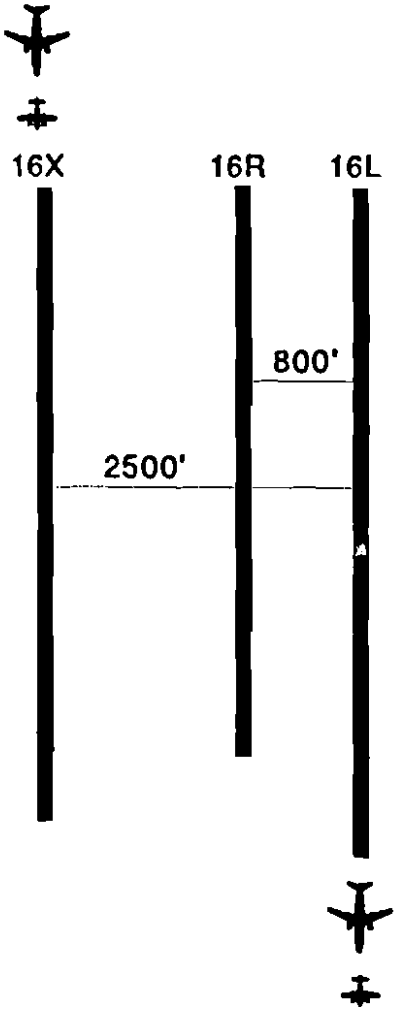
IFR1/2/3

800' < Ceiling < 2500'
600' < Visibility



IFR4

Visibility < 600'



- Props (Primary)
- Jets (Primary)
- Props (Secondary)
- Jets (Secondary)

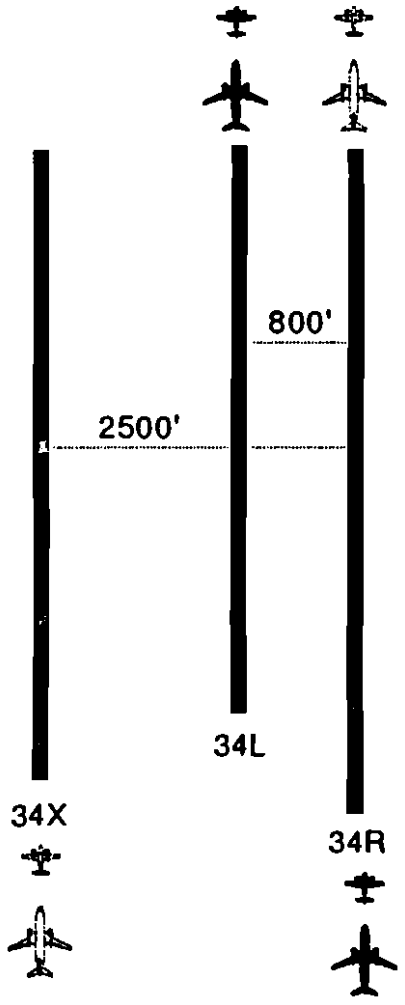
Experiment - 04

New Full Use Runway w/ 2500' Separation

Arrivals 34R/34X

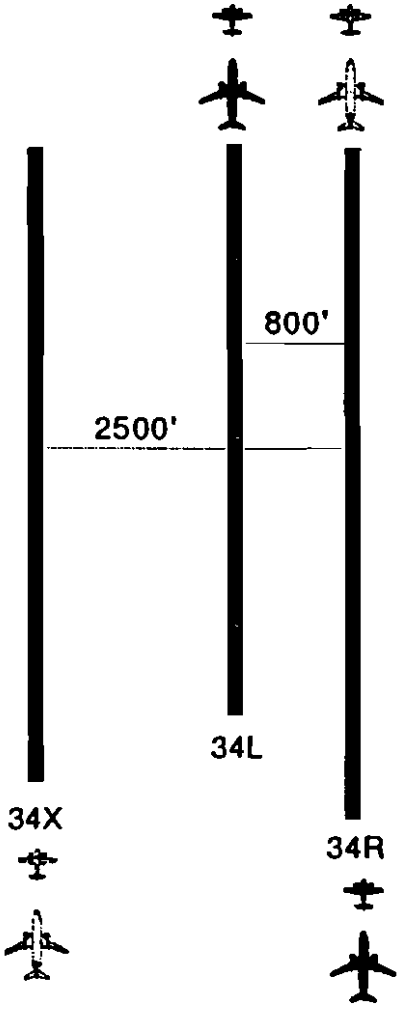
VFR1

Ceiling > 5000'
Visibility > 5 sm



VFR2

2500' < Ceiling < 5000'
3 sm < Visibility < 5 sm



- Props (Primary)
- Jets (Primary)
- Props (Secondary)
- Jets (Secondary)

EXP_04.GED

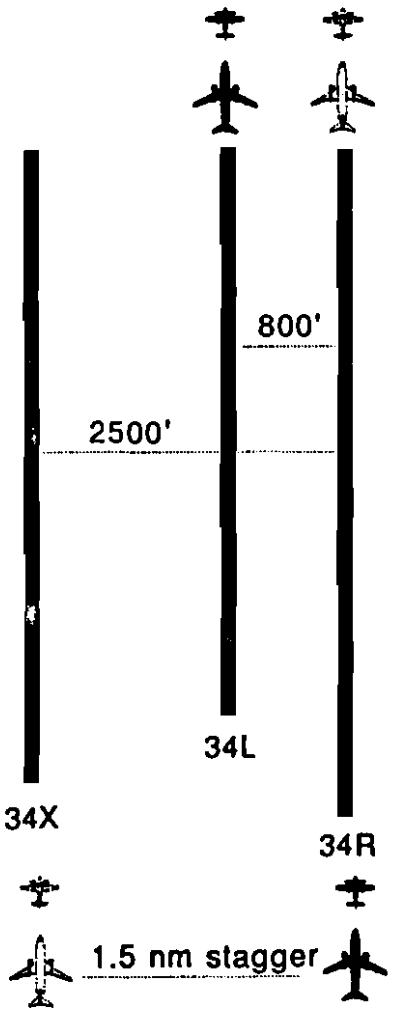
SEA-TAC International Airport
Capacity Design Team Study

Experiment - 04

New Full Use Runway w/ 2500' Separation

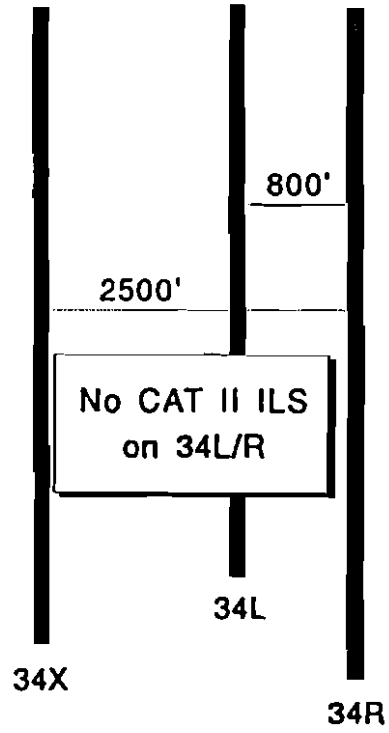
IFR1/2

800' < Ceiling < 2500'
600' < Visibility < 2 sm



IFR3/4

Visibility < 600'



- Props (Primary)
- Jets (Primary)
- Props (Secondary)
- Jets (Secondary)

EXP_04.GED

SEA-TAC International Airport
Capacity Design Team Study

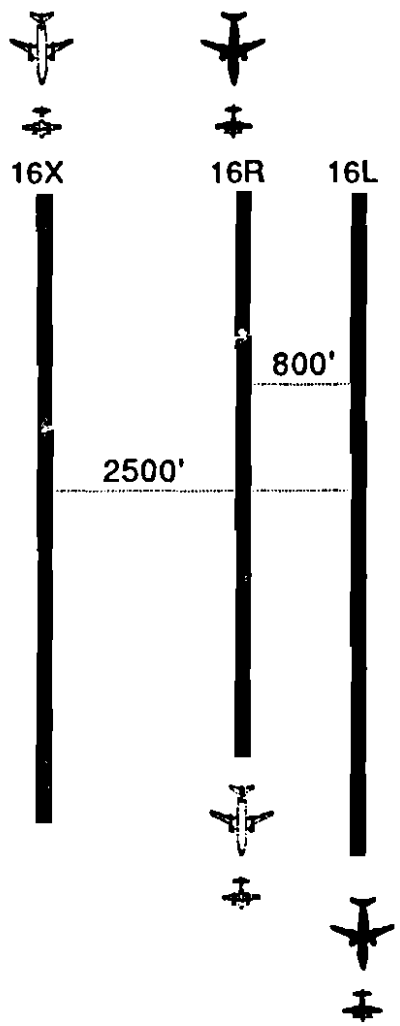
Experiment - 05

New Full Use Runway w/ 2500' Separation

Arrivals 16R/16X

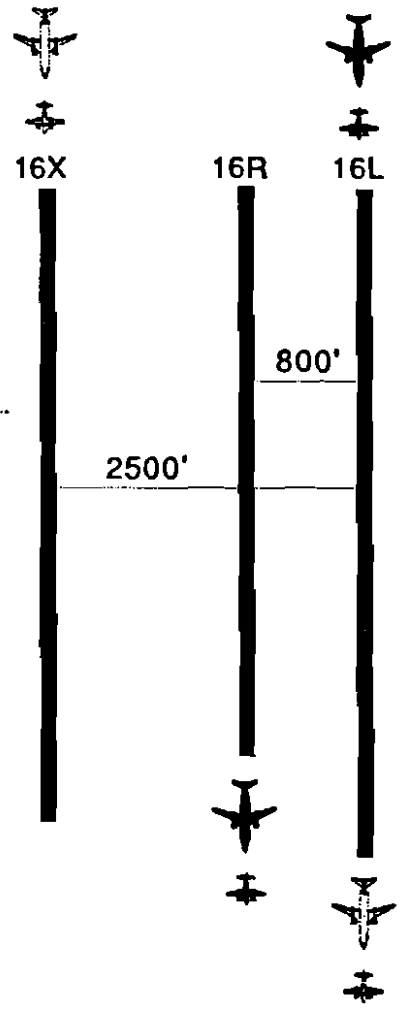
VFR1

Ceiling > 5000'
Visibility > 5 sm



VFR2

2500' < Ceiling < 5000'
3 sm < Visibility < 5 sm



- Props (Primary)
- Jets (Primary)
- Props (Secondary)
- Jets (Secondary)

EXP_05.GEO

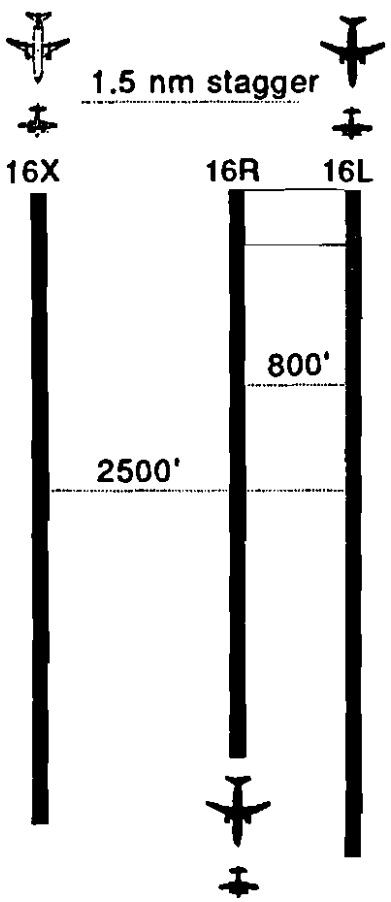
SEA-TAC International Airport
Capacity Design Team Study

Experiment - 05

New Full Use Runway w/ 2500' Separation

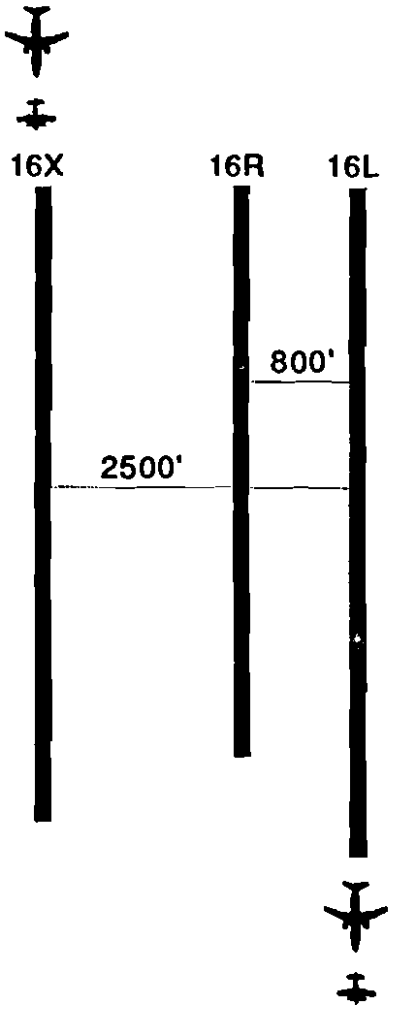
IFR1/2/3

800' < Ceiling < 2500'
600' < Visibility



IFR4

Visibility < 600'



- Props (Primary)
- Jets (Primary)
- Props (Secondary)
- Jets (Secondary)

EXP_05.GED

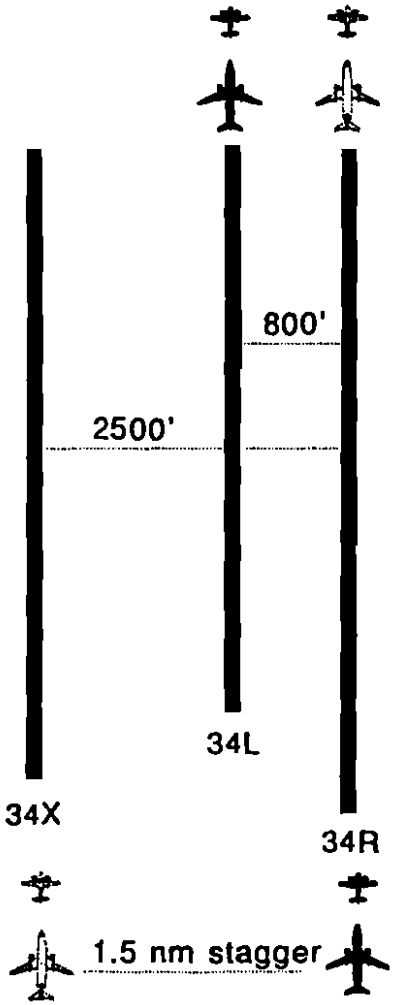
SEA-TAC International Airport
Capacity Design Team Study

Experiment - 05

New Full Use Runway w/ 2500' Separation

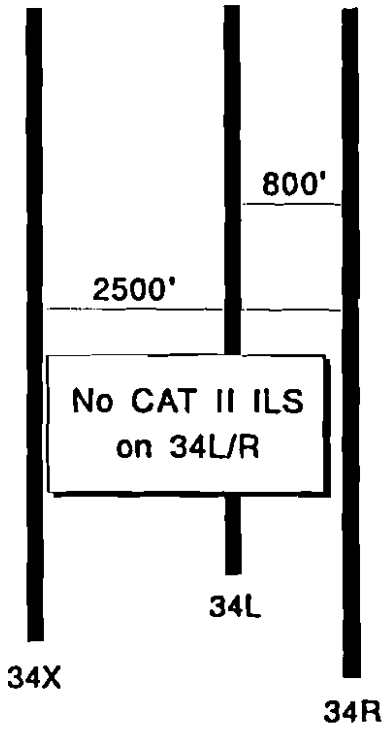
IFR1/2

800' < Ceiling < 2500'
600' < Visibility < 2 sm



IFR3/4

Visibility < 1800'



- Props (Primary)
- Jets (Primary)
- Props (Secondary)
- Jets (Secondary)

EXP_05.GED

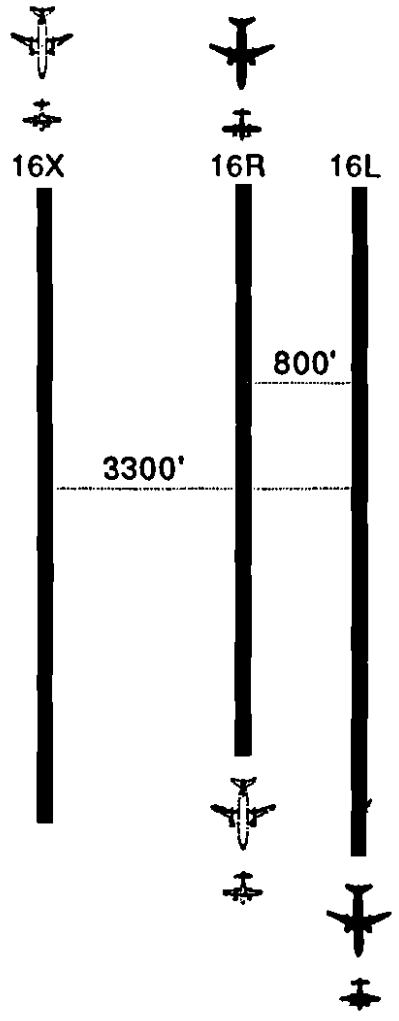
SEA-TAC International Airport
Capacity Design Team Study

Experiment - 06

New Full Use Runway w/ 3300' Separation & PRM

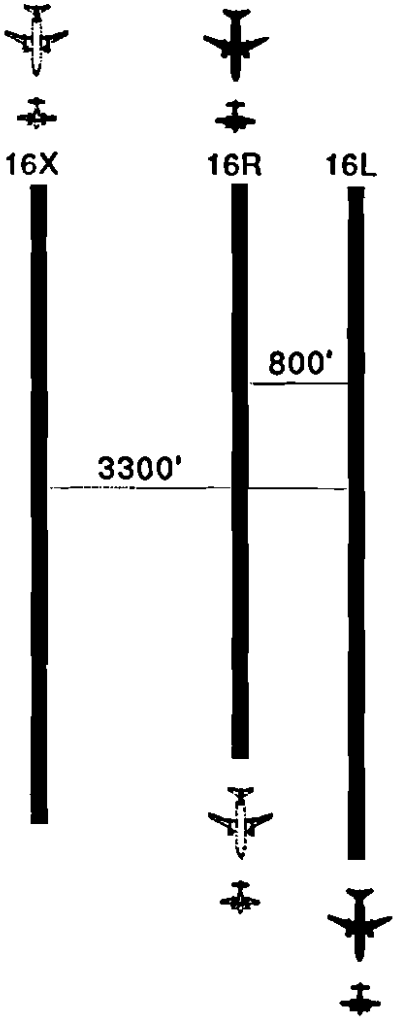
VFR1

Ceiling > 5000'
Visibility > 5 sm



VFR2

2500' < Ceiling < 5000'
3 sm < Visibility < 5 sm



- Props (Primary)
- Jets (Primary)
- Props (Secondary)
- Jets (Secondary)

EXP_06.GED

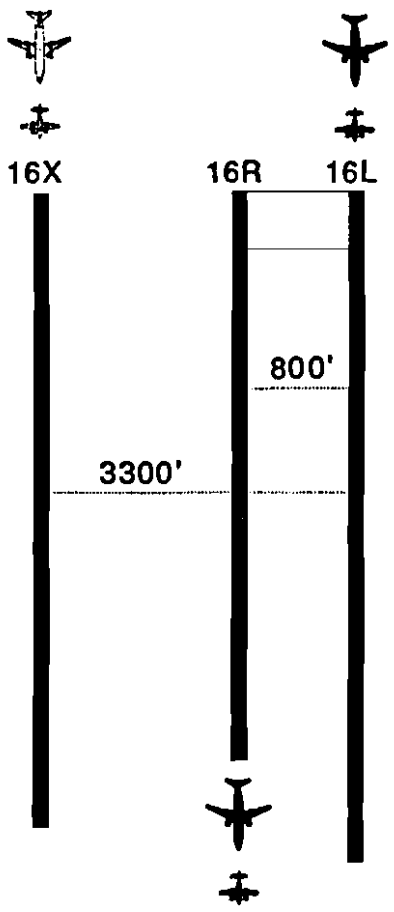
SEA-TAC International Airport
Capacity Design Team Study

Experiment - 06

New Full Use Runway w/ 3300' Separation & PRM

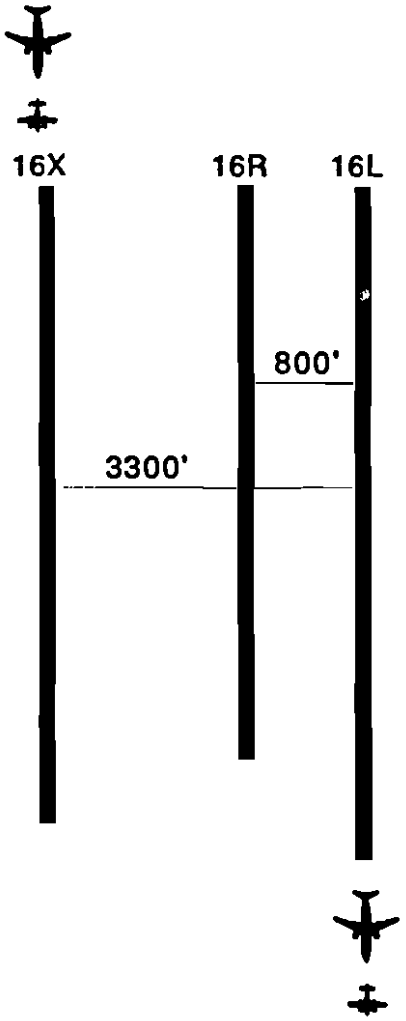
IFR1/2/3

650' < Ceiling < 2500'
600' < Visibility



IFR4

Visibility < 600'



- Props (Primary)
- Jets (Primary)
- Props (Secondary)
- Jets (Secondary)

EXP_06.GED

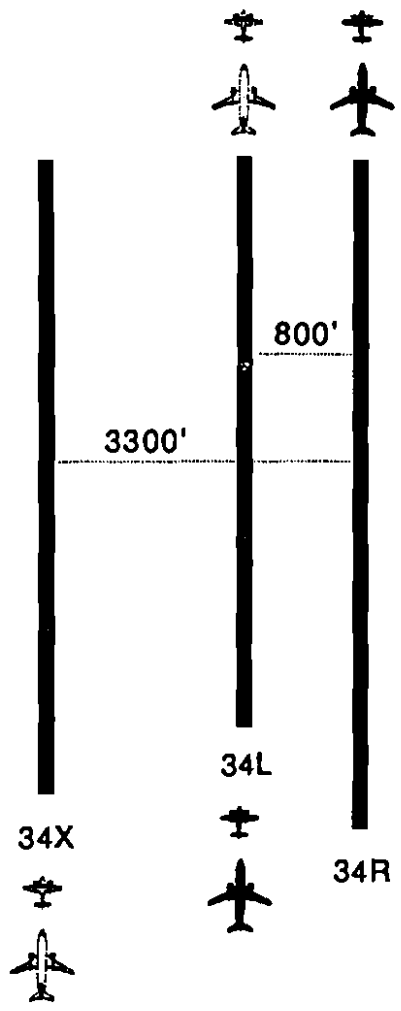
SEA-TAC International Airport
Capacity Design Team Study

Experiment - 06

New Full Use Runway w/ 3300' Separation & PRM

VFR1

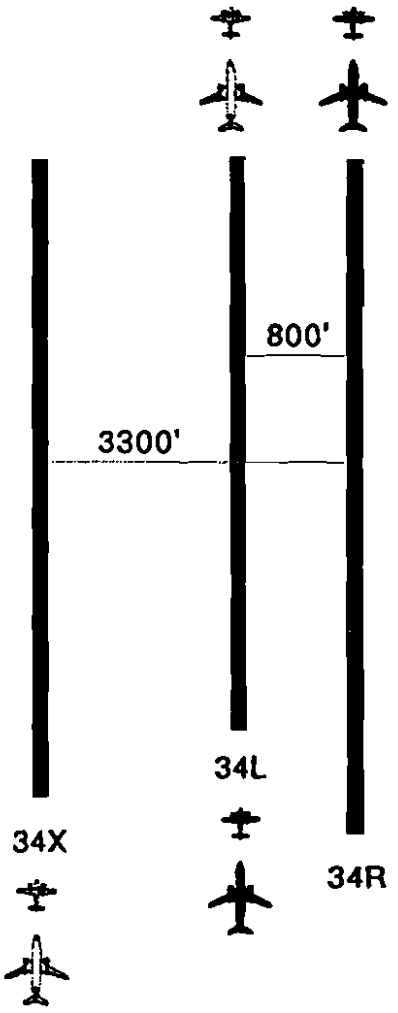
Ceiling > 5000'
Visibility > 5 sm



- Props (Primary)
- Jets (Primary)
- Props (Secondary)
- Jets (Secondary)

VFR2

2500' < Ceiling < 5000'
3 sm < Visibility < 5 sm



EXP_06.GED

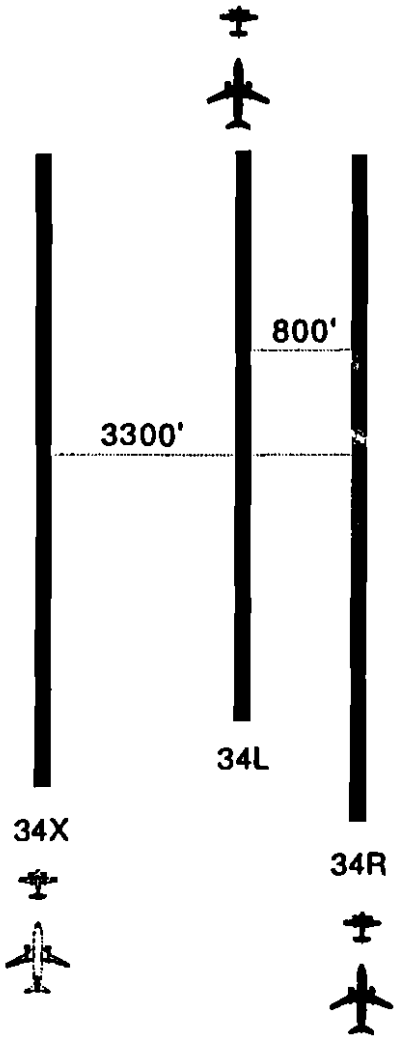
SEA-TAC International Airport
Capacity Design Team Study

Experiment - 06

New Full Use Runway w/ 3300' Separation & PRM

IFR1/2

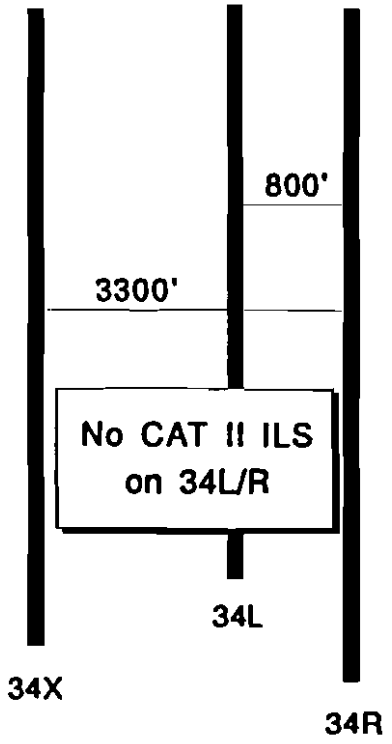
800' < Ceiling < 2500'
1800' < Visibility < 2 sm



- Props (Primary)
- Jets (Primary)
- Props (Secondary)
- Jets (Secondary)

IFR3/4

Visibility < 1800'



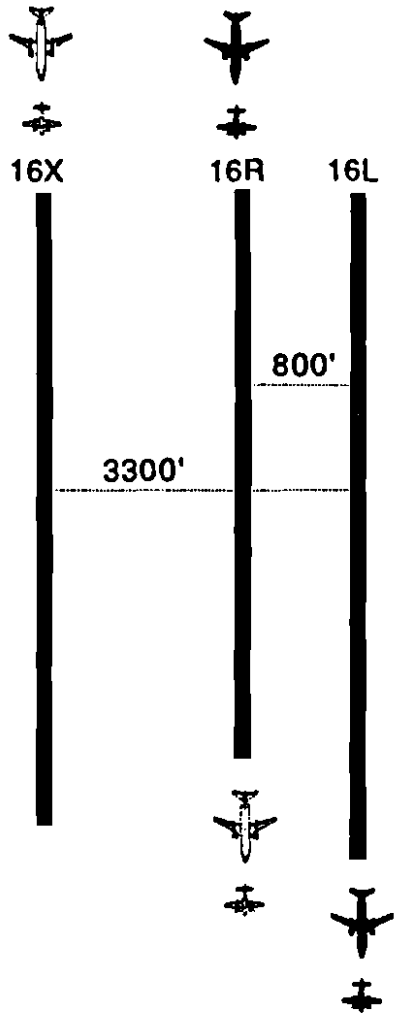
EXP_06.GED

SEA-TAC International Airport
Capacity Design Team Study

Experiment - 07

VFR1

Ceiling > 5000'
Visibility > 5 sm



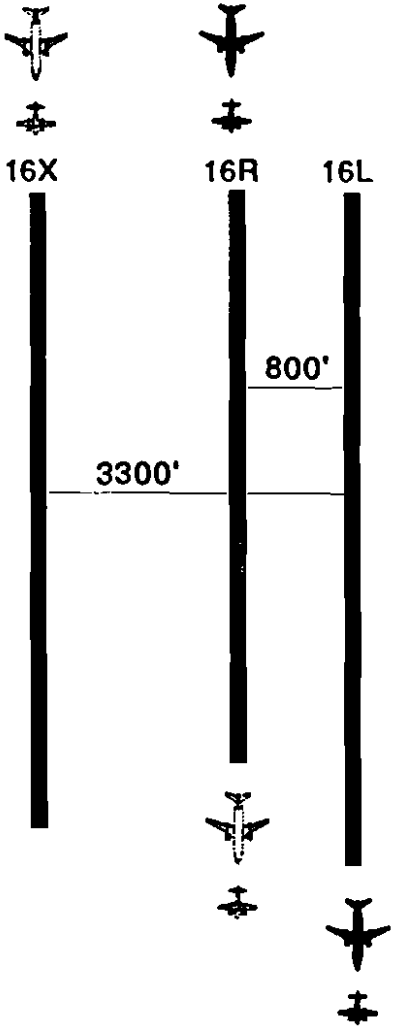
New Full Use Runway w/ 3300' Separation

No PRM

- Props (Primary)
- Jets (Primary)
- Props (Secondary)
- Jets (Secondary)

VFR2

2500' < Ceiling < 5000'
3 sm < Visibility < 5 sm



EXP_07.GED

SEA-TAC International Airport
Capacity Design Team Study

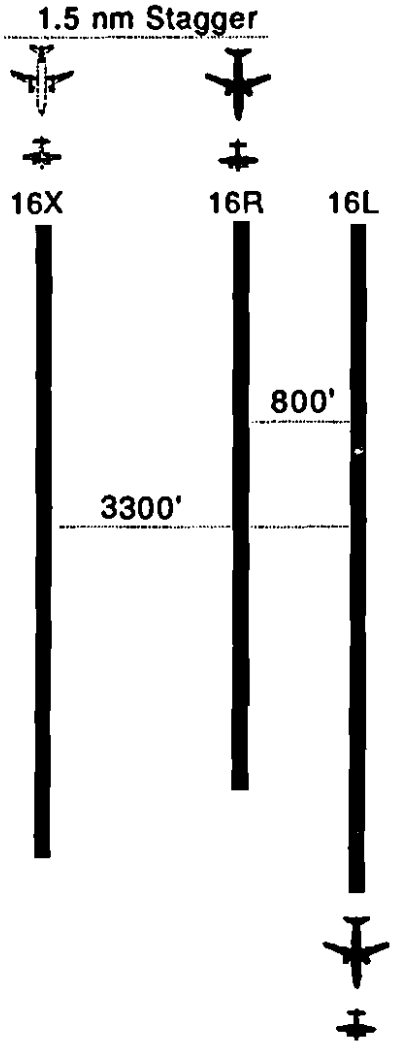
Experiment - 07

New Full Use Runway w/ 3300' Separation

No PRM

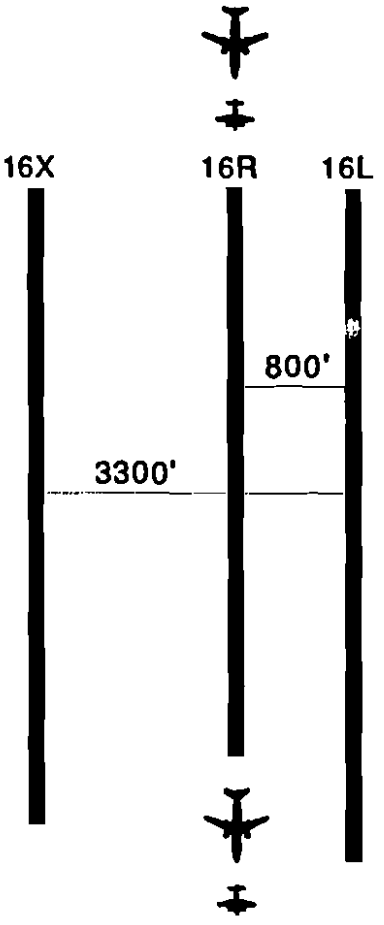
IFR1/2/3

800' < Ceiling < 2500'
600' < Visibility



IFR4

Visibility < 600'



- Props (Primary)
- Jets (Primary)
- Props (Secondary)
- Jets (Secondary)

EXP_07.GED

SEA-TAC International Airport
Capacity Design Team Study

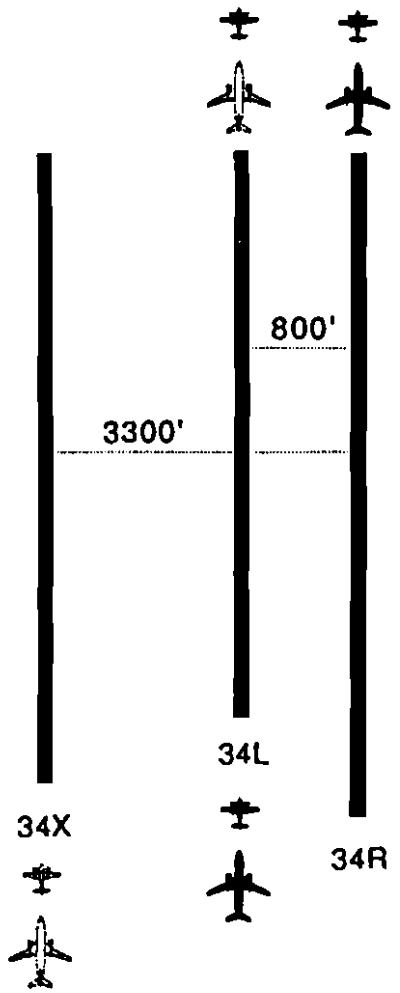
Experiment - 07

New Full Use Runway w/ 3300' Separation

No PRM

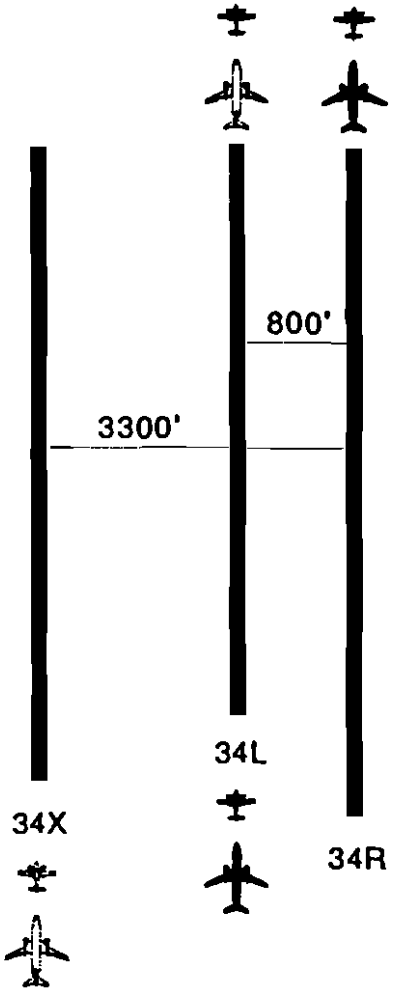
VFR1

Ceiling > 5000'
Visibility > 5 sm



VFR2

2500' < Ceiling < 5000'
3 sm < Visibility < 5 sm



- Props (Primary)
- Jets (Primary)
- Props (Secondary)
- Jets (Secondary)

EXP_07.GED

SEA-TAC International Airport
Capacity Design Team Study

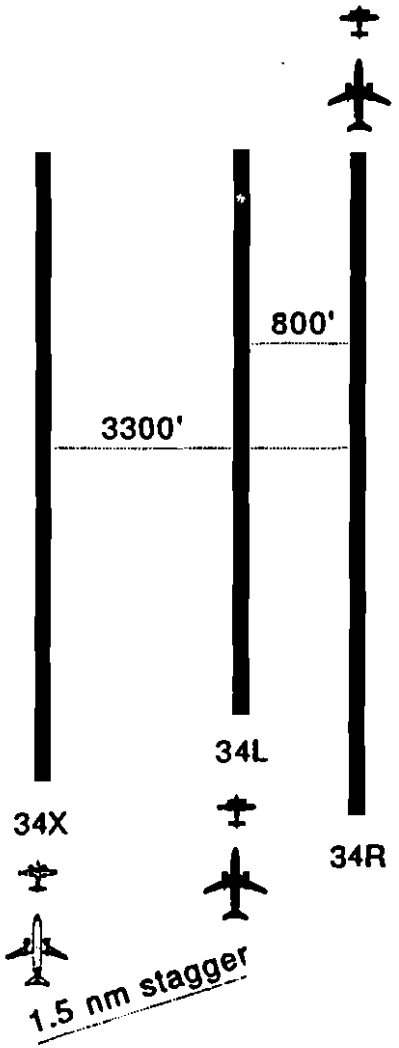
Experiment - 07

New Full Use Runway w/ 3300' Separation

No PRM

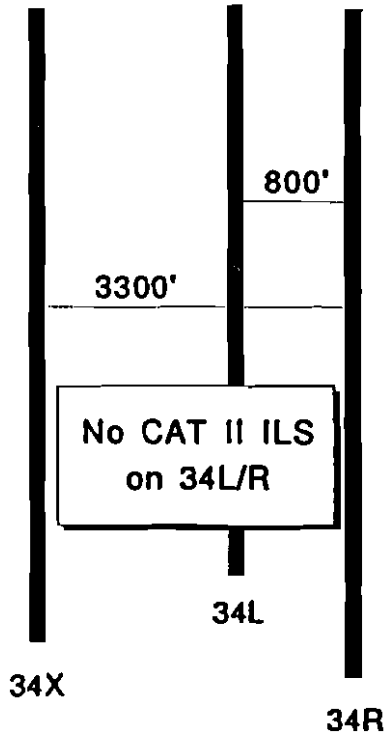
IFR1/2

800' < Ceiling < 2500'
1800' < Visibility < 2 sm



IFR3/4

Visibility < 1800'



- Props (Primary)
- Jets (Primary)
- Props (Secondary)
- Jets (Secondary)

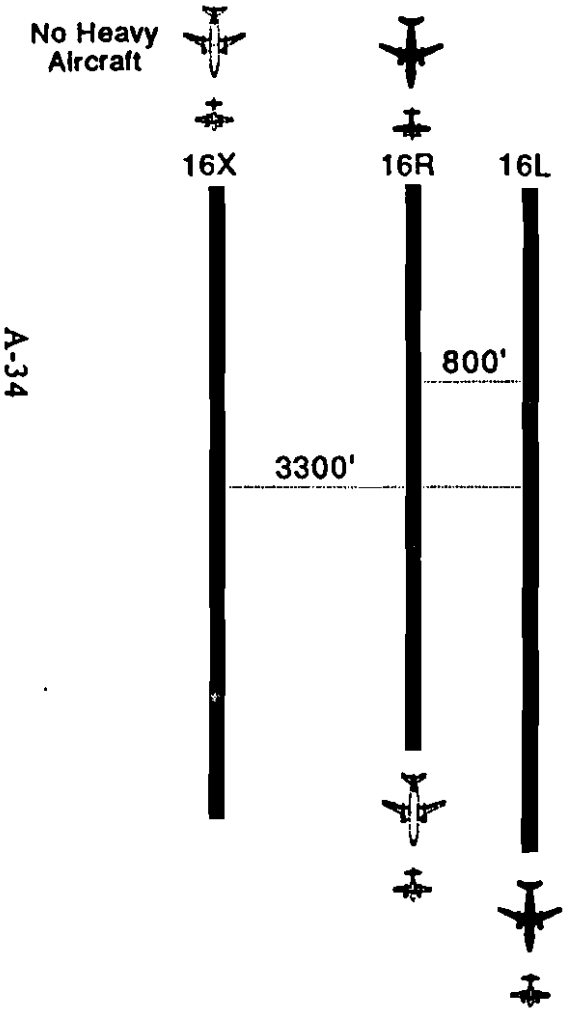
EXP_07.GED

SEA-TAC International Airport
Capacity Design Team Study

Experiment - 08

VFR1

Ceiling > 5000'
Visibility > 5 sm

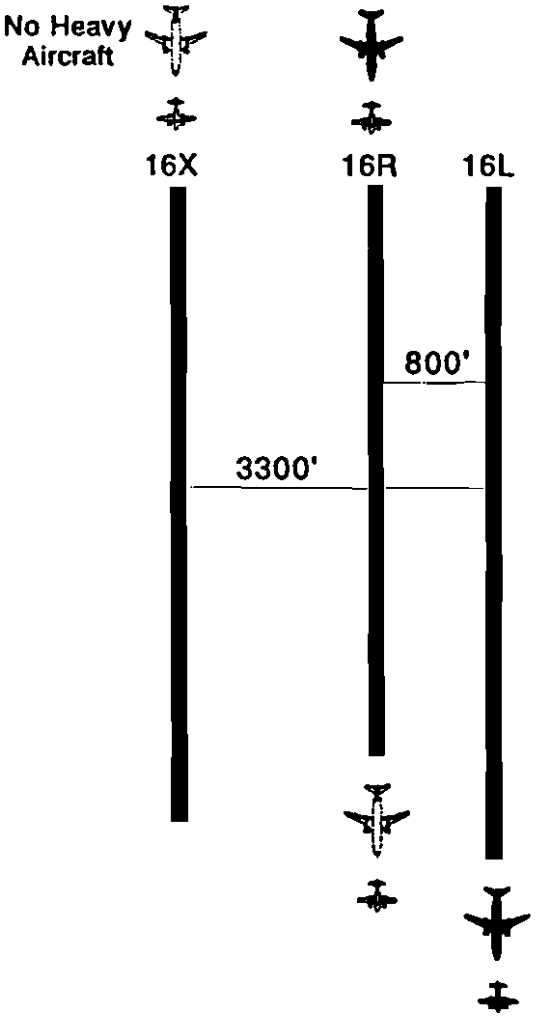


New Full Use Runway w/ 3300' Separation & PRM

No Heavy A/C on 16/34X

VFR2

2500' < Ceiling < 5000'
3 sm < Visibility < 5 sm



- Props (Primary)
- Jets (Primary)
- Props (Secondary)
- Jets (Secondary)

EXP_08.GEO

SEA-TAC International Airport
Capacity Design Team Study

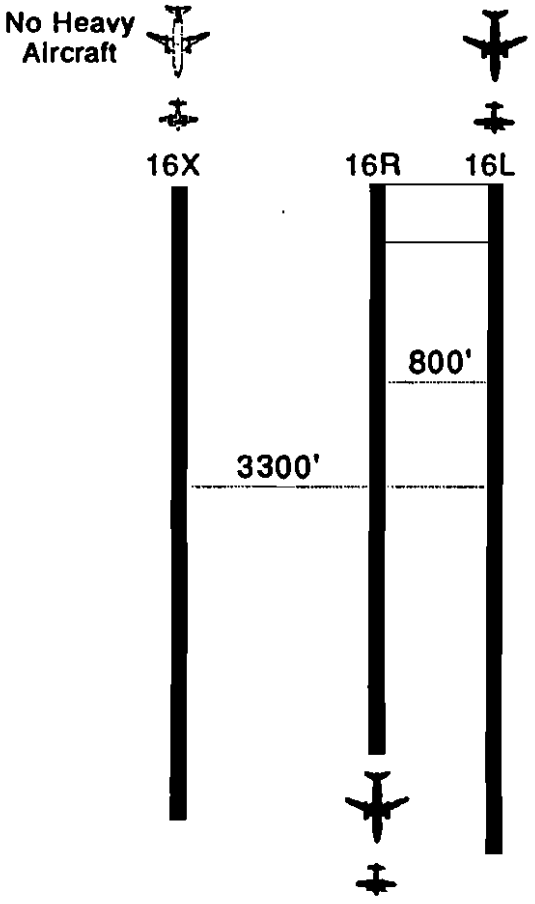
Experiment - 08

New Full Use Runway w/ 3300' Separation & PRM

No Heavy A/C on 16/34X

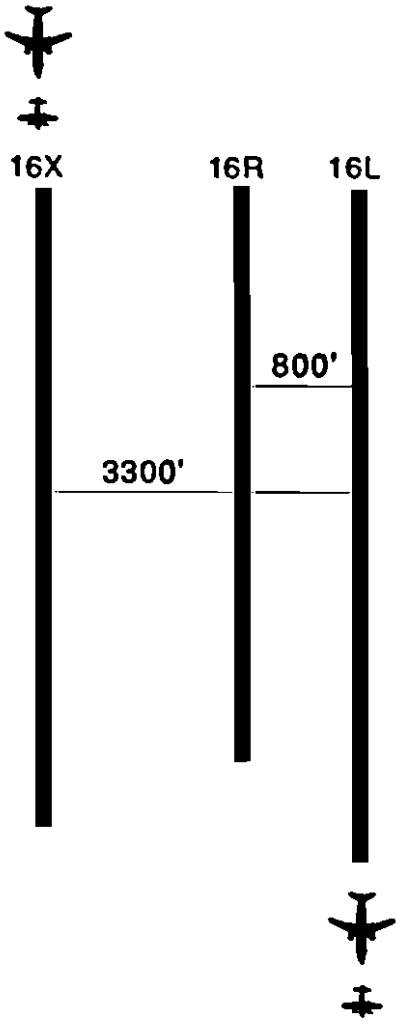
IFR1/2/3

800' < Ceiling < 2500'
600' < Visibility < 2 sm



IFR4

Visibility < 600'



No Heavy Aircraft

- Props (Primary)
- Jets (Primary)
- Props (Secondary)
- Jets (Secondary)

EXP_08.GED

SEA-TAC International Airport
Capacity Design Team Study

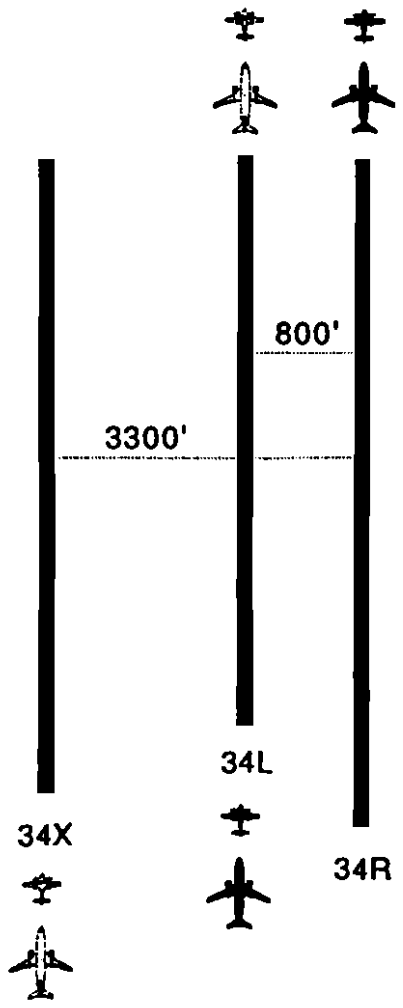
Experiment - 08

New Full Use Runway w/ 3300' Separation & PRM

No Heavy A/C on 16/34X

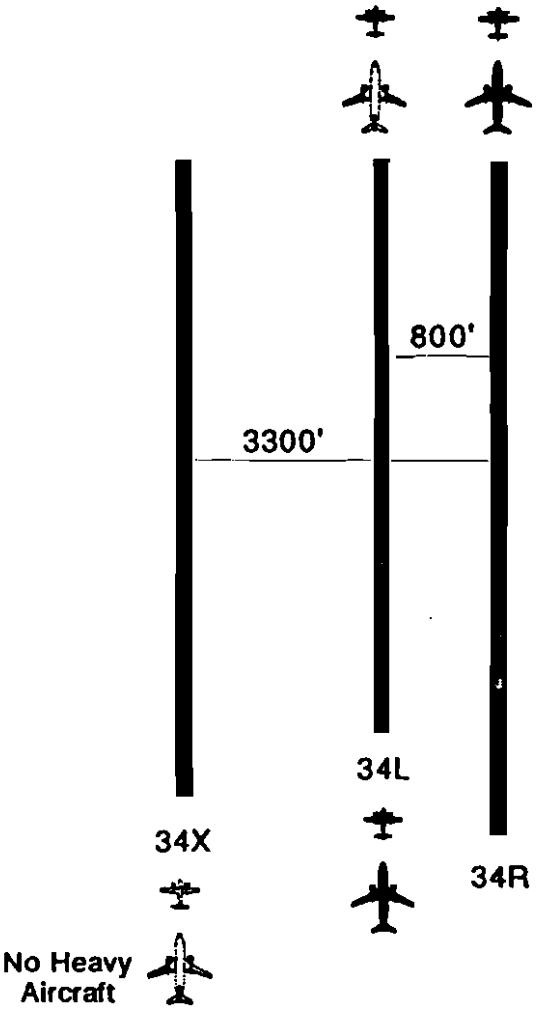
VFR1

Ceiling > 5000'
Visibility > 5 sm



VFR2

2500' < Ceiling < 5000'
3 sm < Visibility < 5 sm



- Props (Primary)
- Jets (Primary)
- Props (Secondary)
- Jets (Secondary)

EXP_08.GED

SEA-TAC International Airport
Capacity Design Team Study

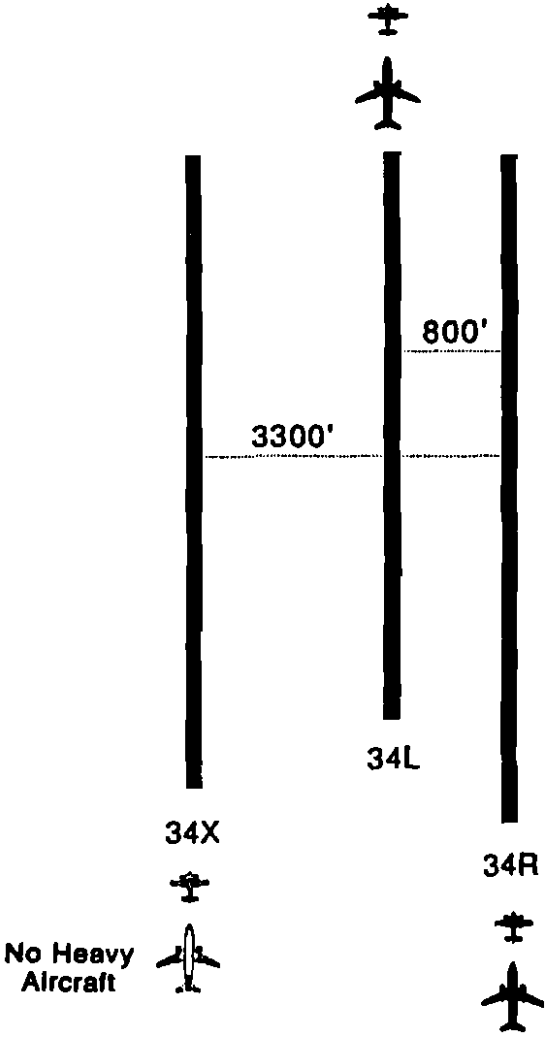
Experiment - 08

New Full Use Runway w/ 3300' Separation & PRM

No Heavy A/C on 16/34X

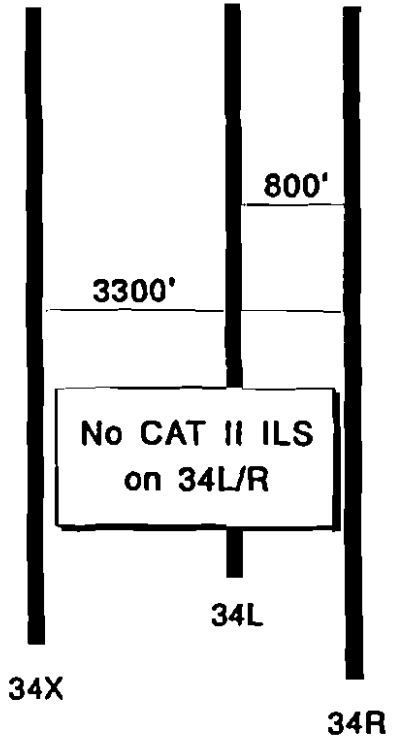
IFR1/2

800' < Ceiling < 2500'
1800' < Visibility < 2 sm



IFR3/4

Visibility < 1800'



- Props (Primary)
- Jets (Primary)
- Props (Secondary)
- Jets (Secondary)

EXP_08.GED

SEA-TAC International Airport
Capacity Design Team Study

Appendix B

Detailed SIMMOD Summaries

Seattle - Tacoma Capacity Design Team Update

August 18, 1994

SIMMOD - Simulation Model
Simulation Experiment Synopsis

A. Simulation Description

1. Simulation Alternative:	Do Nothing
2. Runway Use Weather Scenario:	South Flow Arr: 16R, [16L]; Dep: 16L, [16R]
3. Aircraft Demand Schedule:	Baseline: 1040 Ops/Day; 345,000 Ops/Year
4. Primary Weather Condition:	VFR1
5. Experiment Number:	0SV100

B. Runway Operating Configuration

C. Runway Crossing Statistics

Xing Rwy	Tot Xings	Xings Del	Avg (min)	Max (min)	Total (min)
16L	434	181	0.76	9.68	136.7

D. Aircraft Travel Times and Delay - Arrivals

Rwy	No. Arrs	Unimpeded Travel Time Air (Avg)	Ground (Avg)	Total (Avg)	Delay Air (Avg)	Ground (Avg)	Total (Avg)	System Time
16R	336	5,074 (15.1)	864 (2.6)	5,937 (17.7)	380 (1.1)	134 (0.4)	514 (1.5)	6,451
16L	184	2,731 (14.8)	381 (2.1)	3,111 (16.9)	142 (0.8)	0 (0.0)	142 (0.8)	3,253
All	520	7,804 (15.0)	1,244 (2.4)	9,049 (17.4)	521 (1.0)	134 (0.3)	656 (1.3)	9,704

E. Aircraft Travel Times and Delay - Departures

Rwy	No. Deps	Unimpeded Travel Time Air (Avg)	Ground (Avg)	Total (Avg)	Delay Ground (Avg)	Queue (Avg)	Total (Avg)	System Time
16R	98	962 (9.8)	533 (5.4)	1,495 (15.3)	12 (0.1)	104 (1.1)	116 (1.2)	1,611
16L	422	3,946 (9.4)	2,102 (5.0)	6,047 (14.3)	8 (0.0)	490 (1.2)	498 (1.2)	6,545
All	520	4,908 (9.4)	2,635 (5.1)	7,543 (14.5)	20 (0.0)	593 (1.1)	614 (1.2)	8,156

F. Aircraft Travel Times and Delay - Arrivals and Departures

No. Ops	Unimpeded Travel Time Air (Avg)	Ground (Avg)	Total (Avg)	Total Delay Ground (Avg)	Arr Air (Avg)	Dep Que (Avg)	Total (Avg)	System Time
1,040	12,712 (12.2)	3,879 (3.7)	16,591 (16.0)	155 (0.1)	521 (1.0)	593 (1.1)	1,269 (1.2)	17,861

Notes: Arrival and departure delays, travel times, and totals are in minutes.
Ground Delays Include Runway Crossing Delays

Seattle - Tacoma Capacity Design Team Update
August 18, 1994

SIMMOD - Simulation Model
Simulation Experiment Synopsis

A. Simulation Description

1. Simulation Alternative:	Do Nothing
2. Runway Use Weather Scenario:	South Flow Arr: 16R; Dep: 16R
3. Aircraft Demand Schedule:	Baseline: 1040 Ops/Day; 345,000 Ops/Year
4. Primary Weather Condition:	IFR4
5. Experiment Number:	0SV200

B. Runway Operating Configuration

C. Runway Crossing Statistics

Xing Rwy	Tot Xings	Xings Del	Avg (min)	Max (min)	Total (min)
16L	443	221	0.85	15.26	188.59

D. Aircraft Travel Times and Delay - Arrivals

Rwy	No. Arrs	Unimpeded Travel Time Air (Avg)	Ground (Avg)	Total (Avg)	Delay Air (Avg)	Ground (Avg)	Total (Avg)	System Time
16R	443	6,649 (15.0)	1,161 (2.6)	7,810 (17.6)	2,082 (4.7)	199 (0.5)	2,281 (5.2)	10,092
16L	77	1,150 (14.9)	152 (2.0)	1,303 (16.9)	134 (1.7)	0 (0.0)	134 (1.7)	1,437
All	520	7,800 (15.0)	1,313 (2.5)	9,113 (17.5)	2,216 (4.3)	199 (0.4)	2,415 (4.6)	11,528

E. Aircraft Travel Times and Delay - Departures

Rwy	No. Deps	Unimpeded Travel Time Air (Avg)	Ground (Avg)	Total (Avg)	Delay Ground (Avg)	Queue (Avg)	Total (Avg)	System Time
16L	520	4,909 (9.4)	2,688 (5.2)	7,597 (14.6)	5 (0.0)	738 (1.4)	744 (1.4)	8,341
All	520	4,909 (9.4)	2,688 (5.2)	7,597 (14.6)	5 (0.0)	738 (1.4)	744 (1.4)	8,341

F. Aircraft Travel Times and Delay - Arrivals and Departures

No. Ops	Unimpeded Travel Time Air (Avg)	Ground (Avg)	Total (Avg)	Total Delay Ground (Avg)	Arr Air (Avg)	Dep Que (Avg)	Total (Avg)	System Time
1,040	12,709 (12.2)	4,002 (3.8)	16,710 (16.1)	205 (0.2)	2,216 (4.3)	738 (1.4)	3,159 (3.0)	19,869

Notes: Arrival and departure delays, travel times, and totals are in minutes.
Runways crossing delays are included in ground delays

Seattle - Tacoma Capacity Design Team Update

August 18,1994

SIMMOD - Simulation Model
Simulation Experiment Synopsis

A. Simulation Description

1. Simulation Alternative:	Do Nothing
2. Runway Use Weather Scenario:	South Flow Arr: 16R; Dep: 16R
3. Aircraft Demand Schedule:	Baseline: 1040 Ops/Day; 345,000 Ops/Year
4. Primary Weather Condition:	IFR1/2/3
5. Experiment Number:	0SI100

B. Runway Operating Configuration

C. Runway Crossing Statistics

Xing Rwy	Tot Xings	Xinga Del	Avg (min)	Max (min)	Total (min)
16L	640	117	0.57	8.21	66.495

D. Aircraft Travel Times and Delay - Arrivals

Rwy	No. Arrs	Unimpeded Travel Time Air (Avg)	Ground (Avg)	Total (Avg)	Delay Air (Avg)	Ground (Avg)	Total (Avg)	System Time
16R	520	7,795 (15.0)	1,347 (2.6)	9,142 (17.6)	11,851 (22.8)	68 (0.1)	11,918 (22.9)	21,060
All	520	7,795 (15.0)	1,347 (2.6)	9,142 (17.6)	11,851 (22.8)	68 (0.1)	11,918 (22.9)	21,060

E. Aircraft Travel Times and Delay - Departures

Rwy	No. Deps	Unimpeded Travel Time Air (Avg)	Ground (Avg)	Total (Avg)	Delay Ground (Avg)	Queue (Avg)	Total (Avg)	System Time
16L	520	4,893 (9.4)	2,688 (5.2)	7,582 (14.6)	5 (0.0)	2,730 (5.3)	2,735 (5.3)	10,317
All	520	4,893 (9.4)	2,688 (5.2)	7,582 (14.6)	5 (0.0)	2,730 (5.3)	2,735 (5.3)	10,317

F. Aircraft Travel Times and Delay - Arrivals and Departures

No. Ops	Unimpeded Travel Time Air (Avg)	Ground (Avg)	Total (Avg)	Total Delay Ground (Avg)	Arr Air (Avg)	Dep Que (Avg)	Total (Avg)	System Time
1,040	12,688 (12.2)	4,035 (3.9)	16,723 (16.1)	73 (0.1)	11,851 (22.8)	2,730 (5.3)	14,654 (14.1)	31,377

Notes: Arrival and departure delays, travel times, and totals are in minutes.
Runways crossing delays are included in ground delays

Seattle - Tacoma Capacity Design Team Update

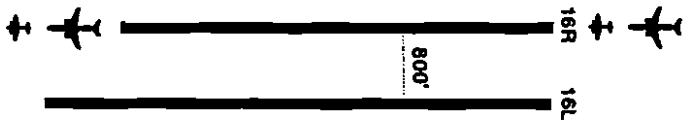
August 18,1994

SIMMOD - Simulation Model
Simulation Experiment Synopsis

A. Simulation Description

1. Simulation Alternative:	Do Nothing
2. Runway Use Weather Scenario:	South Flow Arr: 16R; Dep: 16R
3. Aircraft Demand Schedule:	Baseline: 1040 Ops/Day; 345,000 Ops/Year
4. Primary Weather Condition:	IFR4
5. Experiment Number:	0S1400

B. Runway Operating Configuration



C. Runway Crossing Statistics

Xing Rwy	Tot Xings	Xings Del	Avg (min)	Max (min)	Total (min)

D. Aircraft Travel Times and Delay - Arrivals

Rwy	No. Arrs	Unimpeded Travel Time Air (Avg)	Ground (Avg)	Total (Avg)	Delay Air (Avg)	Ground (Avg)	Total (Avg)	System Time
16R	520	7,795 (15.0)	1,352 (2.6)	9,147 (17.6)	24,040 (46.2)	0 (0.0)	24,040 (46.2)	33,186
All	520	7,795 (15.0)	1,352 (2.6)	9,147 (17.6)	24,040 (46.2)	0 (0.0)	24,040 (46.2)	33,186

E. Aircraft Travel Times and Delay - Departures

Rwy	No. Deps	Unimpeded Travel Time Air (Avg)	Ground (Avg)	Total (Avg)	Delay Ground (Avg)	Queue (Avg)	Total (Avg)	System Time
16R	520	4,976 (9.6)	2,798 (5.4)	7,774 (15.0)	5 (0.0)	29,349 (56.4)	29,354 (56.5)	37,128
All	520	4,976 (9.6)	2,798 (5.4)	7,774 (15.0)	5 (0.0)	29,349 (56.4)	29,354 (56.5)	37,128

F. Aircraft Travel Times and Delay - Arrivals and Departures

No. Ops	Unimpeded Travel Time Air (Avg)	Ground (Avg)	Total (Avg)	Total Delay Ground (Avg)	Arr Air (Avg)	Dep Que (Avg)	Total (Avg)	System Time
1,040	12,771 (12.3)	4,150 (4.0)	16,921 (16.3)	5 (0.0)	24,040 (46.2)	29,349 (56.4)	53,394 (51.3)	70,314

Notes: Arrival and departure delays, travel times, and totals are in minutes.
Ground Delays Include Runway Crossing Delays

Seattle - Tacoma Capacity Design Team Update

August 18, 1994

SIMMOD - Simulation Model
Simulation Experiment Synopsis

A. Simulation Description

1. Simulation Alternative:	Do Nothing
2. Runway Use Weather Scenario:	South Flow Arr: 16R, [16L]; Dep: 16L, [16R]
3. Aircraft Demand Schedule:	Future 1: 1280 Ops/Day; 425,000 Ops/Year
4. Primary Weather Condition:	VFR1
5. Experiment Number:	1SV100

B. Runway Operating Configuration

C. Runway Crossing Statistics

Xing Rwy	Tot Xings	Xings Del	Avg (min)	Max (min)	Total (min)
16L	541	261	0.83	22.19	217

D. Aircraft Travel Times and Delay - Arrivals

Rwy	No. Arrs	Unimpeded Travel Time Air (Avg)	Ground (Avg)	Total (Avg)	Delay Air (Avg)	Ground (Avg)	Total (Avg)	System Time
16R	417	6,305 (15.1)	1,076 (2.6)	7,381 (17.7)	771 (1.9)	209 (0.5)	980 (2.4)	8,361
16L	223	3,312 (14.9)	462 (2.1)	3,773 (16.9)	243 (1.1)	2 (0.0)	245 (1.1)	4,018
All	640	9,617 (15.0)	1,537 (2.4)	11,154 (17.4)	1,015 (1.6)	211 (0.3)	1,225 (1.9)	12,379

E. Aircraft Travel Times and Delay - Departures

Rwy	No. Deps	Unimpeded Travel Time Air (Avg)	Ground (Avg)	Total (Avg)	Delay Ground (Avg)	Queue (Avg)	Total (Avg)	System Time
16R	124	1,211 (9.8)	672 (5.4)	1,884 (15.2)	52 (0.4)	336 (2.7)	388 (3.1)	2,272
16L	516	4,788 (9.3)	2,575 (5.0)	7,363 (14.3)	52 (0.1)	1,187 (2.3)	1,238 (2.4)	8,602
All	640	6,000 (9.4)	3,247 (5.1)	9,247 (14.4)	104 (0.2)	1,523 (2.4)	1,627 (2.5)	10,873

F. Aircraft Travel Times and Delay - Arrivals and Departures

No. Ops	Unimpeded Travel Time Air (Avg)	Ground (Avg)	Total (Avg)	Total Delay Ground (Avg)	Arr Air (Avg)	Dep Que (Avg)	Total (Avg)	System Time
1,280	15,617 (12.2)	4,784 (3.7)	20,401 (15.9)	314 (0.2)	1,015 (1.6)	1,523 (2.4)	2,852 (2.2)	23,253

Notes: Arrival and departure delays, travel times, and totals are in minutes.
Runways crossing delays are included in ground delays

Seattle - Tacoma Capacity Design Team Update

August 18, 1994

SIMMOD - Simulation Model
Simulation Experiment Synopsis

A. Simulation Description

1. Simulation Alternative:	Do Nothing
2. Runway Use Weather Scenario:	South Flow Arr: 16R, 16L ; Dep: 16R, 16L
3. Aircraft Demand Schedule:	Future 1: 1280 Ops/Day; 425,000 Ops/Year
4. Primary Weather Condition:	IFR4
5. Experiment Number:	1SV200

B. Runway Operating Configuration

C. Runway Crossing Statistics

Xing Rwy	Tot Xings	Xings Del	Avg (min)	Max (min)	Total (min)
16L	570	298	0.89	12.40	263.73

D. Aircraft Travel Times and Delay - Arrivals

Rwy	No. Arrs	Unimpeded Travel Time Air (Avg)	Ground (Avg)	Total (Avg)	Delay Air (Avg)	Ground (Avg)	Total (Avg)	System Time
16R	570	8,465 (14.9)	1,493 (2.6)	9,958 (17.5)	32,558 (57.1)	285 (0.5)	32,843 (57.6)	42,801
16L	70	1,138 (16.3)	131 (1.9)	1,268 (18.1)	1,055 (15.1)	0 (0.0)	1,055 (15.1)	2,323
All	640	9,602 (15.0)	1,624 (2.5)	11,226 (17.5)	33,613 (52.5)	285 (0.4)	33,898 (53.0)	45,125

E. Aircraft Travel Times and Delay - Departures

Rwy	No. Deps	Unimpeded Travel Time Air (Avg)	Ground (Avg)	Total (Avg)	Delay Ground (Avg)	Queue (Avg)	Total (Avg)	System Time
16L	640	5,997 (9.4)	3,315 (5.2)	9,312 (14.6)	13 (0.0)	1,485 (2.3)	1,498 (2.3)	10,810
All	640	5,997 (9.4)	3,315 (5.2)	9,312 (14.6)	13 (0.0)	1,485 (2.3)	1,498 (2.3)	10,810

F. Aircraft Travel Times and Delay - Arrivals and Departures

No. Ops	Unimpeded Travel Time Air (Avg)	Ground (Avg)	Total (Avg)	Total Delay Ground (Avg)	Arr Air (Avg)	Dep Que (Avg)	Total (Avg)	System Time
1,280	15,599 (12.2)	4,940 (3.9)	20,538 (16.0)	298 (0.2)	33,613 (52.5)	1,485 (2.3)	35,396 (27.7)	55,934

Notes: Arrival and departure delays, travel times, and totals are in minutes.
Runways crossing delays are included in ground delays

Seattle - Tacoma Capacity Design Team Update

August 18, 1994

SIMMOD - Simulation Model
Simulation Experiment Synopsis

A. Simulation Description

1. Simulation Alternative:	Do Nothing
2. Runway Use Weather Scenario:	South Flow Arr: 16R; Dep: 16L
3. Aircraft Demand Schedule:	Future 1: 1280 Ops/Day; 425,000 Ops/Year
4. Primary Weather Condition:	IFR1/2/3
5. Experiment Number:	1SI100

B. Runway Operating Configuration

C. Runway Crossing Statistics

Xng Rwy	Tot Xings	Xings Del	Avg (min)	Max (min)	Total (min)
16L	640	145	0.55	4.42	79.5

D. Aircraft Travel Times and Delay - Arrivals

Rwy	No. Arrs	Unimpeded Travel Time Air (Avg)	Ground (Avg)	Total (Avg)	Delay Air (Avg)	Ground (Avg)	Total (Avg)	System Time
16R	640	9,606 (15.0)	1,664 (2.6)	11,270 (17.6)	65,523 (102.4)	77 (0.1)	65,600 (102.5)	76,870
All	640	9,606 (15.0)	1,664 (2.6)	11,270 (17.6)	65,523 (102.4)	77 (0.1)	65,600 (102.5)	76,870

E. Aircraft Travel Times and Delay - Departures

Rwy	No. Deps	Unimpeded Travel Time Air (Avg)	Ground (Avg)	Total (Avg)	Delay Ground (Avg)	Queue (Avg)	Total (Avg)	System Time
16L	640	5,984 (9.4)	3,315 (5.2)	9,299 (14.5)	13 (0.0)	7,430 (11.6)	7,443 (11.6)	16,742
All	640	5,984 (9.4)	3,315 (5.2)	9,299 (14.5)	13 (0.0)	7,430 (11.6)	7,443 (11.6)	16,742

F. Aircraft Travel Times and Delay - Arrivals and Departures

No. Ops	Unimpeded Travel Time Air (Avg)	Ground (Avg)	Total (Avg)	Total Delay Ground (Avg)	Arr Air (Avg)	Dep Que (Avg)	Total (Avg)	System Time
1,280	15,590 (12.2)	4,979 (3.9)	20,570 (16.1)	90 (0.1)	65,523 (102.4)	7,430 (11.6)	73,043 (57.1)	93,613

Notes: Arrival and departure delays, travel times, and totals are in minutes.
Ground Delays Include Runway Crossing Delays

Seattle - Tacoma Capacity Design Team Update

August 18, 1994

SIMMOD - Simulation Model
Simulation Experiment Synopsis

A. Simulation Description

1. Simulation Alternative:	Do Nothing
2. Runway Use Weather Scenario:	South Flow Arr: 16R; Dep: 16R
3. Aircraft Demand Schedule:	Future 1: 1280 Ops/Day; 425,000 Ops/Year
4. Primary Weather Condition:	IFR4
5. Experiment Number:	1SI400

B. Runway Operating Configuration

C. Runway Crossing Statistics

Xing Rwy	Tot Xings	Xings Del	Avg (min)	Max (min)	Total (min)

D. Aircraft Travel Times and Delay - Arrivals

Rwy	No. Arrs	Unimpeded Travel Time Air (Avg)	Ground (Avg)	Total (Avg)	Delay Air (Avg)	Ground (Avg)	Total (Avg)	System Time
16R	640	9,606 (15.0)	1,664 (2.6)	11,270 (17.6)	88,006 (137.5)	0 (0.0)	88,006 (137.5)	99,277
All	640	9,606 (15.0)	1,664 (2.6)	11,270 (17.6)	88,006 (137.5)	0 (0.0)	88,006 (137.5)	99,277

E. Aircraft Travel Times and Delay - Departures

Rwy	No. Deps	Unimpeded Travel Time Air (Avg)	Ground (Avg)	Total (Avg)	Delay Ground (Avg)	Queue (Avg)	Total (Avg)	System Time
16R	640	6,080 (9.5)	3,450 (5.4)	9,530 (14.9)	6 (0.0)	90,125 (140.8)	90,131 (140.8)	99,661
All	640	6,080 (9.5)	3,450 (5.4)	9,530 (14.9)	6 (0.0)	90,125 (140.8)	90,131 (140.8)	99,661

F. Aircraft Travel Times and Delay - Arrivals and Departures

No. Ops	Unimpeded Travel Time Air (Avg)	Ground (Avg)	Total (Avg)	Total Ground (Avg)	Arr Air (Avg)	Delay Dep Que (Avg)	Total (Avg)	System Time
1,280	15,686 (12.3)	5,114 (4.0)	20,800 (16.3)	6 (0.0)	88,006 (137.5)	90,125 (140.8)	178,138 (139.2)	198,938

Notes: Arrival and departure delays, travel times, and totals are in minutes.
Ground Delays Include Runway Crossing Delays

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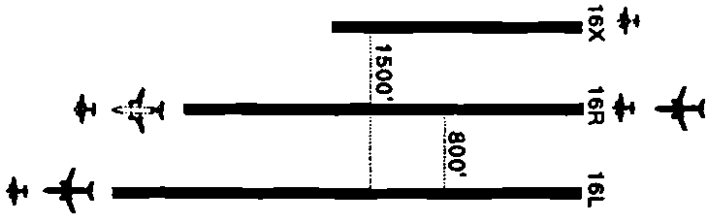
SIMMOD - Simulation Model
Simulation Experiment Synopsis

A. Simulation Description

1.	Simulation Alternative:	Class 3 & 4 Runway - No BFI Interaction
2.	Runway Use Weather Scenario:	South Flow Arr: 16R, [16L,16X]; Dep: 16L, [16R]
3.	Aircraft Demand Schedule:	Future 1: 1280 Ops/Day; 425,000 Ops/Year
4.	Primary Weather Condition:	VFR2
5.	Experiment Number:	1SV202

B. Runway Operating Configuration



C. Runway Crossing Statistics

Xing Rwy	Tot Xings	Xings Del	Avg (min)	Max (min)	Total (min)
16R	63	43	0.91	5.31	39.1
16L	640	270	0.6683	8.33	180.5

D. Aircraft Travel Times and Delay - Arrivals

Rwy	No. Arrs	Unimpeded Travel Time Air (Avg)	Ground (Avg)	Total (Avg)	Delay Air (Avg)	Ground (Avg)	Total (Avg)	System Time
16R	577	8,568 (14.9)	1,454 (2.5)	10,022 (17.4)	31,591 (54.8)	162 (0.3)	31,752 (55.0)	41,775
16X	63	916 (14.5)	234 (3.7)	1,150 (18.3)	1,552 (24.6)	55 (0.9)	1,607 (25.5)	2,757
All	640	9,484 (14.8)	1,688 (2.6)	11,173 (17.5)	33,142 (51.8)	216 (0.3)	33,359 (52.1)	44,532

E. Aircraft Travel Times and Delay - Departures

Rwy	No. Deps	Unimpeded Travel Time Air (Avg)	Ground (Avg)	Total (Avg)	Delay Ground (Avg)	Queue (Avg)	Total (Avg)	System Time
16L	640	5,997 (9.4)	3,226 (5.0)	9,222 (14.4)	13 (0.0)	787 (1.2)	800 (1.3)	10,022
All	640	5,997 (9.4)	3,226 (5.0)	9,222 (14.4)	13 (0.0)	787 (1.2)	800 (1.3)	10,022

F. Aircraft Travel Times and Delay - Arrivals and Departures

No. Ops	Unimpeded Travel Time Air (Avg)	Ground (Avg)	Total (Avg)	Total Delay Ground (Avg)	Arr Air (Avg)	Dep Que (Avg)	Total (Avg)	System Time
1,280	15,481 (12.1)	4,914 (3.8)	20,395 (15.9)	229 (0.2)	33,142 (51.8)	787 (1.2)	34,159 (26.7)	54,554

Notes: Arrival and departure delays, travel times, and totals are in minutes.
Runways crossing delays are included in ground delays

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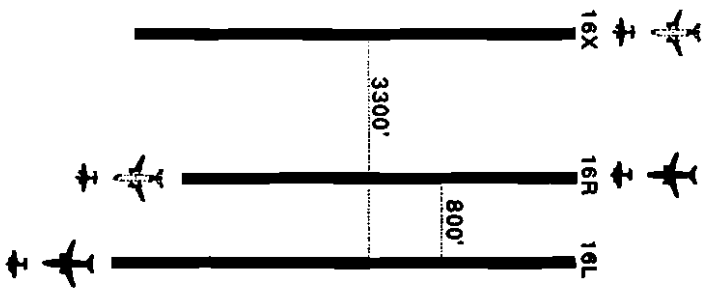
SIMMOD - Simulation Model
Simulation Experiment Synopsis

A. Simulation Description

1. Simulation Alternative:	Full Use Runway 3300' from 16R and 109 Operations at BFI
2. Runway Use Weather Scenario:	South Flow Arr: 16R, 16X; Dep: 16L, 16R
3. Aircraft Demand Schedule:	Future 1: 1280 Ops/Day; 425,000 Ops/Year
4. Primary Weather Condition:	VFR2
5. Experiment Number:	1SV206

B. Runway Operating Configuration



C. Runway Crossing Statistics

Xing Rwy	Tot Xings	Xings Del	Avg (min)	Max (min)	Total (min)
16R	205	120	0.87	4.89	104.6
16L	640	270	0.83	15.80	224.6

D. Aircraft Travel Times and Delay - Arrivals

Rwy	No. Arrs	Unimpeded Travel Time Air Air	Ground (Avg)	Total (Avg)	Delay Air (Avg)	Ground (Avg)	Total (Avg)	System Time
16R	435	6,294 (14.5)	1,066 (2.5)	7,360 (16.9)	1,897 (4.4)	139 (0.3)	2,036 (4.7)	9,396
16X	205	3,311 (16.2)	863 (4.2)	4,174 (20.4)	709 (3.5)	195 (1.0)	904 (4.4)	5,078
All	640	9,605 (15.0)	1,929 (3.0)	11,534 (18.0)	2,606 (4.1)	334 (0.5)	2,940 (4.6)	14,474

E. Aircraft Travel Times and Delay - Departures

Rwy	No. Deps	Unimpeded Travel Time Air (Avg)	Ground (Avg)	Total (Avg)	Delay Ground (Avg)	Queue (Avg)	Total (Avg)	System Time
16L	640	5,984 (9.4)	3,226 (5.0)	9,210 (14.4)	19 (0.0)	1,005 (1.6)	1,024 (1.6)	10,234
All	640	5,984 (9.4)	3,226 (5.0)	9,210 (14.4)	19 (0.0)	1,005 (1.6)	1,024 (1.6)	10,234

F. Aircraft Travel Times and Delay - Arrivals and Departures

No. Ops	Unimpeded Travel Time Air (Avg)	Ground (Avg)	Total (Avg)	Total Delay Ground (Avg)	Arr Air (Avg)	Dep Que (Avg)	Total (Avg)	System Time
1,280	15,589 (12.2)	5,154 (4.0)	20,744 (16.2)	353 (0.3)	2,606 (4.1)	1,005 (1.6)	3,964 (3.1)	24,707

Notes: Arrival and departure delays, travel times, and totals are in minutes.
Runways crossing delays are included in ground delays

Seattle - Tacoma Capacity Design Team Update

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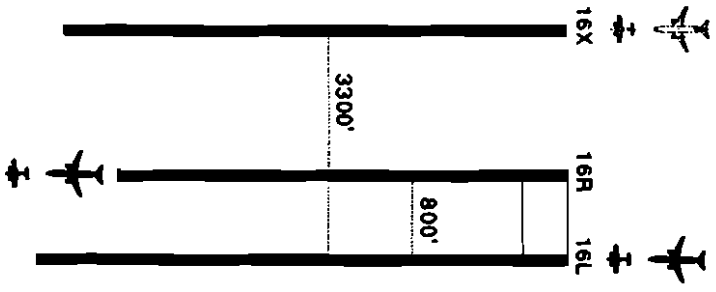
SIMMOD - Simulation Model
Simulation Experiment Synopsis

A. Simulation Description

1. Simulation Alternative:	Full Use Runway 3300' from 16L with PRM and 109 Operations at BFI
2. Runway Use Weather Scenario:	South Flow Arr: 16L, [16X]; Dep: 16R
3. Aircraft Demand Schedule:	Future 1: 1280 Ops/Day; 425,000 Ops/Year
4. Primary Weather Condition:	IFR1/2/3
5. Experiment Number:	1SI106 - No Glide Slope Interference

B. Runway Operating Configuration



C. Runway Crossing Statistics

Xing Rwy	Tot Xings	Xings Del	Avg (min)	Max (min)	Total (min)
34L	869	130	0.82	4.80	106.2
34R	229	104	0.65	14.93	67.4

D. Aircraft Travel Times and Delay - Arrivals

Rwy	No. Arrs	Unimpeded Travel Time Air (Avg)	Ground (Avg)	Total (Avg)	Delay Air (Avg)	Ground (Avg)	Total (Avg)	System Time
16X	229	3,696 (16.1)	969 (4.2)	4,665 (20.4)	676 (3.0)	153 (0.7)	829 (3.6)	5,494
16L	411	5,906 (14.4)	838 (2.0)	6,745 (16.4)	1,800 (4.4)	66 (0.2)	1,866 (4.5)	8,610
All	640	9,602 (15.0)	1,807 (2.8)	11,409 (17.8)	2,476 (3.9)	219 (0.3)	2,695 (4.2)	14,104

E. Aircraft Travel Times and Delay - Departures

Rwy	No. Deps	Unimpeded Travel Time Air (Avg)	Ground (Avg)	Total (Avg)	Delay Ground (Avg)	Queue (Avg)	Total (Avg)	System Time
16R	640	5,984 (9.4)	3,507 (5.5)	9,491 (14.8)	58 (0.1)	7,770 (12.1)	7,827 (12.2)	17,318
All	640	5,984 (9.4)	3,507 (5.5)	9,491 (14.8)	58 (0.1)	7,770 (12.1)	7,827 (12.2)	17,318

F. Aircraft Travel Times and Delay - Arrivals and Departures

No. Ops	Unimpeded Travel Time Air (Avg)	Ground (Avg)	Total (Avg)	Total Delay Ground (Avg)	Air (Avg)	Queue (Avg)	Total (Avg)	System Time
1,280	15,586 (12.2)	5,314 (4.2)	20,900 (16.3)	277 (0.2)	2,476 (3.9)	7,770 (12.1)	10,522 (8.2)	31,423

Notes: Arrival and departure delays, travel times, and totals are in minutes.
Ground Delays Include Runway Crossing Delays

Seattle - Tacoma Capacity Design Team Update

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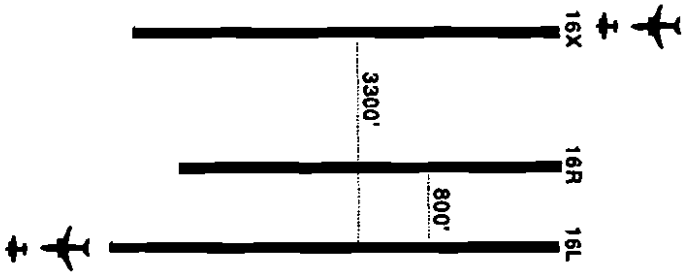
SIMMOD - Simulation Model
Simulation Experiment Synopsis

A. Simulation Description

1. Simulation Alternative:	Full Use Runway 3300' from 16R and 109 Operations at BFI
2. Runway Use Weather Scenario:	South Flow Arr: 16X; Dep: 16L
3. Aircraft Demand Schedule:	Future 1: 1280 Ops/Day; 425,000 Ops/Year
4. Primary Weather Condition:	IFR4
5. Experiment Number:	1SI406

B. Runway Operating Configuration



C. Runway Crossing Statistics

Xing Rwy	Tot Xings	Xings Del	Avg (min)	Max (min)	Total (min)
16L	640	203	0.75	14.56	151.6

D. Aircraft Travel Times and Delay - Arrivals

Rwy	No. Arrs	Unimpeded Travel Time Air Air	Ground (Avg)	Total (Avg)	Delay Air (Avg)	Ground (Avg)	Total (Avg)	System Time
16X	640	9,690 (15.1)	2,547 (4.0)	12,237 (19.1)	87,885 (137.3)	147 (0.2)	88,032 (137.6)	100,269
All	640	9,690 (15.1)	2,547 (4.0)	12,237 (19.1)	87,885 (137.3)	147 (0.2)	88,032 (137.6)	100,269

E. Aircraft Travel Times and Delay - Departures

Rwy	No. Deps	Unimpeded Travel Time Air (Avg)	Ground (Avg)	Total (Avg)	Delay Ground (Avg)	Queue (Avg)	Total (Avg)	System Time
16L	640	5,984 (9.4)	3,226 (5.0)	9,210 (14.4)	13 (0.0)	621 (1.0)	634 (1.0)	9,843
All	640	5,984 (9.4)	3,226 (5.0)	9,210 (14.4)	13 (0.0)	621 (1.0)	634 (1.0)	9,843

F. Aircraft Travel Times and Delay - Arrivals and Departures

No. Ops	Unimpeded Travel Time Air (Avg)	Ground (Avg)	Total (Avg)	Total Delay Ground (Avg)	Arr Air (Avg)	Dep Que (Avg)	Total (Avg)	System Time
1,280	15,674 (12.2)	5,773 (4.5)	21,446 (16.8)	160 (0.1)	87,885 (137.3)	621 (1.0)	88,666 (69.3)	110,112

Notes: Arrival and departure delays, travel times, and totals are in minutes.
Runways crossing delays are included in ground delays