Janet,
File
mailing

RCAA
Regional Commission on Airport Affairs
19900 4th Ave SW
Normandy Park, WA 98166
(206) 824-3120
FAX (206) 824-3451

April 20, 1995

TO AIRPORT-INTERESTED PARTIES

Enclosed please find two reports which we hope will provide you with useful information regarding delay, capacity and noise issues related to Sea-Tac Airport, as well as feasible alternatives to the third runway. The two reports were submitted by our non-profit organization to a special arbitration panel given binding powers by the Puget Sound Regional Council to decide the third runway issue at Sea-Tac, as part of the official, decision-making study processs.

One report is on so-called "Demand and System Management" alternatives to the third runway, and related issues which have bearing upon the Expert Arbitration Panel's consideration of those alternatives. While viewpoints are offered in that report, we hope you will find the documented citations useful as well. They come from the FAA, the Port of Seattle, key airline groups, and other such sources. The second, and shorter report, is addressed to some key aspects of the noise issues that are before the Panel. Where necessary, both reports cite from the procedural orders of the Expert Panel that have guided this process. The Port of Seattle and a number of other entities have also been submitting materials to the Panel. The Panel is scheduled to hold its next hearings May 3-5 at the PSRC's Seattle offices, 1011 Western, from 9:30 to about 4:30 each day.

In the "Demand and System Management/Related Matters" Report, our key points are as follows.

1) There exists substantial conflicting information about which third runway option really is preferred, and there is substantial evidence that the minimum length required by the airlines is not envisioned, despite the official designation of a preferred alternative that does meet that requirement.

2) The Port's own documents, as well as observations by the Panel on its own role, point to an attempt to stifle open and fair consideration of demand and system management alternatives to the third runway. (Remaining alternatives in this process are substantial but do not include a completely new airport, due to an earlier decision by the PSRC to end a new airport feasibility study).

3) Based on impartial and well documented sources, the third runway in fact may never be built. Problems related to cost, competitive standing with similar projects nationwide, airline approval conditions related to financing and design, and finally, the up to 8 & 1/2 Kingdomes of fill dirt required, are all substantial obstacles. The implication is that consideration and implementation of alternatives, including some of those discussed elsewhere in the report, is necessary not only because the project is uneccesary to begin with, but also because regardless of one's viewpoint, it may well not be achieveable.

4) Although delays are used as a justification for the third runway, less than one percent of flights are classified as delayed, according to the FAA, and the figure has been steadily declining each year. Future projections of worsened delay are based on faulty assumptions and methods.

5) Future demand forecasts for Sea-Tac are overstated and in fact ignore the advice of the Port's own industry experts that there is "excess system capacity."

6) A variety of demand and system management alternatives could defer or obviate the supposed need for the third runway. These include a regional airport system utilizing existing airport facilities (recommended by the FAA) and peak hour pricing (allowed by U.S. DOT). Moreover, because Sea-Tac planes are nearly half-empty on average, major increases in passenger volume could occur with more efficiency rather than more flights.

The second report on noise is much shorter, and the main points are highlighted in bold and numbered.

Please feel free to contact me to discuss these reports or any related issues. We expect to have supplemental reports available highlighting additional technical and informational perspectives on the Sea-Tac third runway issue, one from a consultant on high speed rail and another on air traffic management, delay, forecasts and airport planning.

Sincerely,

Matt Rosenberg

Matt Rosenberg
Executive Director

RCAA
Regional Commission on Airport Affairs
19900 4th Ave SW
Normandy Park, WA 98166
(206) 824-3120
FAX (206) 824-3451

RESPONSE TO PROCEDURAL ORDER OF FEB. 24, 1995 ISSUED BY THE EXPERT ARBITRATION PANEL ON NOISE AND DEMAND AND SYSTEM MANAGEMENT

ON THE SUBJECT OF DEMAND AND SYSTEM MANAGEMENT ALTERNATIVES TO THE PROPOSED THIRD RUNWAY AT SEA-TAC AIRPORT

AND

RELATED MATTERS

Submitted to the Expert Arbitration Panel on Noise and Demand/System Management, c/o Puget Sound Regional Council, 1011 Western Ave., Seattle WA.

by

Regional Commission on Airport Affairs, Matt Rosenberg, Executive Director. Friday, April 14, 1995.

This response will be divided into subject areas described below, corresponding with certain major issues raised by the Expert Panel in its Feb. 24, 1995 procedural order. ***(Please note that certain of our "Exhibits" appended here as evidence may have multiple pages).*** Because the responses of the Port and the State DOT to that order and the related March 3, 1995 Technical Information Request will not be made available to the public until the same day, April 14, that we submit these comments, we will be unable in this submission, to comment on the specifics, and flaws therein, of the Port and State DOT responses. We hope and expect that we and/or consultants we may retain, will be able to do so, in writing, prior to the issuance of the next procedural order by the Panel.

Nonetheless, based on ample and impartial evidence already available, we believe the contents of this submission could be taken by the panel to strongly support a position that there is no need for the third runway due to factors such as overstated delay and demand projections. Moreover, there are demand and system management alternatives which would indeed "obviate or defer the need" (p. 4 of Feb. 24 order) to contruct the runway.

SUBJECT AREAS

1. WHAT ARE THE THIRD RUNWAY OPTIONS UNDER CONSIDERATION? We will discuss the answers provided and revealing questions posed in Port of Seattle, FAA and other documents. One key point that emerges is a major discrepancy between the length of the "preferred alternative" recommended by Port consultants and the much shorter length shown in the (March, 1995) FAA 1994 Aviation Capacity Enhancement Plan. Because the airlines have stated (as we will reveal) that they absolutely will not support a third runway shorter than 8,500 feet for safety and operational reasons, this serious discrepancy is of significance to the project timeline and (by the panel's definition) therefore of bearing on the feasibility of alternatives to the third runway.

Moreover, the FAA's cost estimate of $400 million for the third runway is not even close to corresponding with the Port's cost estimates of any runway options, except for one bearing an **identical** price tag from the Port, **a 7,000-foot new runway.**

Conflicting, or at least disparate information with respect to minimum runway separations desired or under review is also discussed.

2. THE 1996 IMPLEMENTATION STANDARD FOR "FEASIBILITY" OF THIRD RUNWAY ALTERNATIVES SHOULD NOT BE USED.

2a. THE PORT'S OWN DOCUMENTS REVEAL ITS INTENT TO QUASH INDEPENDENT SCOPING OF DEMAND AND SYSTEM MANAGEMENT ISSUES. THIS IS OF BEARING UPON THE "FEASIBILITY" FRAMEWORK.

3. THIRD RUNWAY TIMELINE UNDERSCORES FEASIBILITY OF ALTERNATIVES. The best case scenario would put the runway in operation no earlier than 2001, the same year airline leases with the Port expire, and measures such as peak hour pricing could be implemented as allowed under federal policy. More likely, the best case analysis is 2003 and ***the likely scenario, due to a variety of complicating factors discussed, is that the third runway would either never be built or would be delayed until a number of years beyond 2003, to somewhere between 2005 and 2020.*** As the panel has noted, the longer the runway can reasonably be expected to be forestalled, the greater the time frame available for development and implementation of alternatives.

4. REVIEW OF KEY DELAY DATA FOR SEA-TAC, AND DISCUSSION OF RELATED ISSUES SHOW THE THIRD RUNWAY IS NOT JUSTIFIED BY DELAYS. Startling actual Sea-Tac delay data shows that ***only seven-tenths of one percent of Sea-Tac flights suffer delays***

beyond the key 15 minute threshold used in the FAA's official delay reporting system, Air Traffic Operation Management Systems (ATOMS). Downward trends in Sea-Tac delay data are significant. The "total delay hours" approach that is also used by the FAA and the Port to predict a delay crisis in the future is based on poor methodology and a basic faulty assumption that the added flights that will cause the airport to exceed its capacity are actually needed to allow for significantly increased passenger volumes. They are not needed to allow for these gains, due to a huge number of empty seats on existing flights, as we shall discuss.

Passengers and airlines bear responsibility for the great increases in flight volume since deregulation and for much of the delays. They benefit from increased flight operations, and should rationally bear the costs. Passengers are already working around delay. Experts discount simplistic solutions and the "cry wolf" economic claims about airport delay.

5. FUTURE DEMAND PROJECTIONS BY THE PORT DO NOT JUSTIFY A THIRD RUNWAY, BUT RATHER SHOW THAT INCREASED PASSENGER VOLUME COULD EASILY BE ACCOMODATED BY GREATER EFFICIENCIES AND BETTER ALLOCATION OF AIRPORT RESOURCES. MOREOVER, THE FUTURE PROJECTIONS ARE BIASED AND OVERSTATED.

6. DEMAND AND SYSTEM MANAGEMENT MEASURES COULD OBVIATE OR DEFER THE PURPORTED NEED FOR THE THIRD RUNWAY. These include peak-hour pricing which, perhaps coupled with other measures if necessary, could greatly help ***reduce the disproportionate share of resources used by smaller air taxi and commuter planes at Sea-Tac, which carry only a tiny fraction of total passengers.***

Also advocated is what we call ***the "De-Facto Demand Management" policy of third runway denial by and within the powers of the Expert Panel, precisely to force greater use of the millions of unused seats that fly out of Sea-Tac every year on flights that are nearly half-empty on average AND ARE PROJECTED TO STAY NEARLY HALF-EMPTY FOR THE NEXT 25 YEARS, according to Sea-Tac's own figures.***

We also propose the ***development of a regional airport system utilizing existing airports (particularly Paine Field),*** an option that is regarded by the FAA as worthy of serious considertion.

7. PSRC'S "VISION 2020" METROPOLITAN TRANSPORTATION PLAN -- "MTP" -- (MARCH 9, 1995 " FINAL DRAFT"), AND RELATED PROPOSED AMENDMENTS, ACKNOWLEDGE THE IMPORTANCE OF DEMAND MANAGEMENT AND SYSTEM MANAGEMENT AS ALTERNATIVES TO EXPANDED INFRASTRUCTURE.

---

1. PORT OF SEATTLE THIRD RUNWAY OPTIONS UNDER CONSIDERATION, AND A MAJOR DISCREPANCY.

The currently preferred alterative is an 8,500-foot long third runway, 2,500 feet west from the easternmost of the two current runways, according to the Port. (Port of Seattle Master Plan Update - Technical Report 6 - Airside Options Evaluation, p. 1-8)(RCAA Exhibit 1) & Port of Seattle Airside Preliminary Comparison Data (RCAA Exhibit 2, 2nd page). Land acquisition and construction costs are estimated at $456 million to $524 million (Ex. 2). While the Port has stated it will not consider runway options that are any more than 2,500 feet apart from the eastern runway, three of the seven new runway options listed in the FAA's Capacity Enhancement Plan Update for Sea-Tac are 3,300 feet apart. (RCAA Exhibit 3)

We are told that one or some of the 3,300-foot separation runway options may be evaluated in the Environmental Impact Statement done by the FAA, but none in the Port's Master Plan Update. FAA further states that the 3,300-foot separation options are being examined for purely theoretical and comparitive reasons.

In 1994, the Port did identify an 8,500 foot third runway option placed 3,300 feet apart from the eastern runway, and estimated construction-related costs of $773 million to $935 million. (Ex. 3)

WHAT SEPARATION? Relevant to exactly what runway options are really being contemplated, the Air Transport Association wrote to the Port in 1994, stating that a separation any less than 3,400 or 3,300 feet "will compel us to operate the runways as 'dependent' which would require a staggered interval between the two arriving streams during instrument (IFR) 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." (3/28/94 ATA letter to Port)(RCAA Exhibit 4).

Later that year, after an article in the Seattle Times revealing the ATA preference, and the associated up-to-one billion-dollar price tag, the ATA wrote that after further review it had changed its mind and would have to accept a 2,500 foot separation. (9/26/94 ATA letter to Port)(RCAA Exhibit 5).

WHAT LENGTH? Serious discrepancies also exist as to the intended length of the runway.

The ATA letter to the Port that shifted ground on the runway separation issue, nonetheless stated a firm requirement on <u>minimum runway length.</u>

" . . this new runway . . . 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 threshhold, 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 8,500 feet." (Ex. 5)***

A MAJOR DISCREPANCY: While the Port's "recommended alternative" is indeed 8,500, both the 1993 FAA Aviation System Capacity Plan and, more importantly, its successor document, the FAA's 1994 Aviation Capacity Enhancement Plan (released in March, 1995) show a third Sea-Tac runway at considerably less than 8,500 feet: at 7,000 feet in the 1993 document (RCAA Exhibit 6), and at clearly less than 7,000 feet based on the scale bar in the 1994 document (RCAA Exhibit 7).

DISCREPANCY IS NOT EASILY EXPLAINED: Interestingly, a great many of the other diagrams for proposed new runways at other airports nationwide that are shown in the "1994" (March '95) FAA document cited above, do have explicitly-stated planned lengths noted in the accompanying text. Given that the Port declared the 8,500 foot option the preferred alternative in documents dated September 1994 (Ex. 1), how is it that an FAA national planning document released in March 1995 (after a two-month delay to correct unspecified errors in early drafts, according to agency staff) nonetheless shows a third runway at scale length of less than 7,000 feet and has no length stated numerically? Wouldn't this disparity with published official airport operator Master Plan documents claiming an 8,500 option as preferred, have been one of the errors they would have caught, if it really were an error? Is, in fact, the Port trying to peddle an unacceptable 7,000-foot alternative to sceptical airlines?

A CONVERGENCE: In further support of the possibility that a 7,000 foot runway, unacceptable to the airlines and therefore possibly unbuildable, is what is actually being eyed, the price tag given by the FAA for the third runway in the (March '95) 1994 Aviation Capacity Plan is $400 million (RCAA Exhibit 8, 3d page), and the only option identified by the Port (in its official Airport Master Plan Update documents detailing runway options) with anything close to the same price tag **(exactly the same, in fact)** is "Option 4B," a 7,000 foot runway (Port's Airport Master Plan Update - Technical Report 6 - Airside Options Evaluation, p. 5-33)(RCAA Exhibit 9) & (Ex. 2).

2. DEFINITION OF FEASIBILITY OF THIRD RUNWAY ALTERNATIVES. The meaning and intent of PSRC Resolution 93-03 with regard to how the "feasibility" of third runway alternatives are to be defined is identified by the Panel as an important question (2/24/95, p. 3, para. 3 & 4). The panel determined that said feasibility must be determined NOT in terms of whether the alternatives could be implemented in 1996, but instead in terms of whether they could be implemented in a way that would defer or obviate the "need" to build the third runway.

Knowing that prior to the Feb. 24 procedural order, the Port had already declared to the panel and in staff memos that no alternatives were feasible because they could not be implemented by 1996, and aware that the Port or the PSRC may seek to reject the Panel's determination (as both have recently done with respect to the baseline measurement year issue in the noise inquiry) we offer some obervations in support of the Panel's determination on how feasibility of alternatives is defined.

NO CONSTRAINTS: First, no constraints are stated in PSRC Resolution 93-03 or the related PSRC Implementation Steps memo which bind the panel to a "must-be-implemented-by-1996" definition of the feasibility of demand or system management alternatives to the third runway. 93-03 states that the ***third runway*** would be authorized by April 1, 1996 "after" or "when" several conditions are met, including "after demand and system management programs are pursued and achieved, or determined to be infeasible, based on independent evaluation." ***If none of those things occur by the date, then the approval is not granted.***

MEANING OF INDEPENDENCE (AGAIN): Moreover, as discussed in earlier proceedings relating to the panel's powers with respect to the noise inquiry, "independent evaluation" here as well does NOT have a qualified meaning. The panel is not empowered only to determine independently whether such alternatives can be pursued and achieved by 1996. Rather, the phrase, if it is to have any meaning at all, grants the panel leeway to "independently evaluate" what is the proper and necessary timeline for implementation of such types of measures, whether they are feasible within that independently determined timeline, and if so whether such measures have in fact been pursued and achieved.

IMPLEMENTATION STEPS MEMO UNDERSCORES PANEL'S POWER TO DETERMINE THE TIMELINE AND FEASIBILITY OF THIRD RUNWAY ALTERNATIVES: If there were any ambiguity on the panel's right to determine the timeline and feasibility of third runway of alternatives, the Implementation Steps memo erases it, stating, "***The Expert*** Arbitration ***Panel determines which*** demand management/system management ***options are feasible, considering the reasonableness of methods and assumptions employed by the lead agencies,*** as well as issues such as long term regional goals, existing contractual obligations and legal constraints, safety, operational efficiency, and expense." (Emphasis added).

"IT WOULD TAKE YEARS TO BRING THE THIRD RUNWAY INTO OPERATION." In accordance with this clearly permitted leeway granted by the Implementation Steps memo, the Expert Panel states, "If the (93-03) Resolution were interpreted to require that 'feasible' demand or system management options must be implementable by April 1996, the demand and system management condition for approval of the third runway would be meaningless. . . . Consequently, it is our view 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 defer or obviate the need to contruct the third runway. We note that even under the most favorable conditions, it would take years to bring the new runway into operation." (2/24/95, p. 3, para. 4 - p. 4, para. 1)

2a. THE PORT'S OWN DOCUMENT REVEALS ITS INTENT TO CONTROL SCOPING OF DEMAND AND SYSTEM MANAGEMENT SO AS TO MAKE CONSIDERATION OF THIRD RUNWAY ALTERNATIVES MOOT.

BACKGROUND: In its order (2/24/95, p. 4, footnote 6), panel members note, "The Panel was appointed to make an 'independent evaluation' under the Resolution. It does not make sense to the panel to read the Resolution in such a way that its consideration of the evidence could lead to only a single, pre-determined result: that all of the demand and system management options are not 'feasible' within the meaning of the Resolution because they cannot be achieved by April 1996."

THE MEMO: In fact, the Port of Seattle's "Friday Strategy Group" Memo dated April 26, 1993, just days before Resolution 93-03 was voted on by the PSRC Executive Board, evidences a strong concern that PSRC have no say-so on scoping of demand and system management issues (as well as scoping of noise).

The memo (RCAA Exhibit 10), from the Port's then-Government Relations Manager to key and high-ranking Port staff members states that one of the "basic principles and assumptions" of the Port is, "PSRC should not be scoping demand management, system management and noise performance standards. Such issues should be a part of Port's EIS. PSRC should only be working with DOT on scoping of major supplemental airport site." (p. 2).

Elsewhere the Port memo gives assignments to various key staffers, such as, "Discuss with FAA officials funding of PSRC's request to scope demand management, systems management and noise performance standards at Sea-Tac;" and, "discuss with Montgelas (a State DOT rep. on PSRC Exec. Bd.) and clarify DOT's position regarding PSRC's appropriate role regarding demand management, system management and noise performance standards at Sea-Tac;" and, "Discuss with Berentson (?) about supporting Montgelas on issue of PSRC's appropriate role regarding demand management, etc." (p. 1).

We ask, how is it that the Regional Transportation Planning Organization overseeing the third runway study should not be allowed, as the Port urges, to scope the issues, including definitions and setting of procedural rules for the consideration of system and demand management alternatives to the third runway?

We remind the panel of the Port's similar contentions at the Aug. 11 and 12, 1994 hearings, and thereafter, that the Panel, hired by PSRC to do an independent evaluation, had no right to set the parameters of the noise inquiry beyond the Port's own suggested definition, which was wedded to the Port's Noise Budget and so-called Noise Mediation Agreement.

We believe the panel's concern about an attempted "fix" (our phrase) is far from disconnected with the above-cited Port memo. The memo appears indicative of a bad-faith attempt to eradicate independent setting of parameters by PSRC for consideration of the feasibility of third runway alternatives, (we believe) so that inquiry would result in exactly the ATTEMPTED "no feasible alternatives" conclusion that Panel members have found disturbing and unacceptable.

Consequently, we believe the Port's "Friday Strategy Group" Memo is further evidence of the need for continued vigilance by the Panel with respect to the conclusions and assumptions made by the Port regarding the purported need for the third runway, the supposed infeasibility of alternatives, and all related issues within the Panel's purview.

3. THIRD RUNWAY TIMELINE.

DUE TO EXCESSIVE COST AND CONSTRUCTION DIFFICULTIES THAT CAN BE REASONABLY PREDICTED NOW, THE THIRD RUNWAY MAY WELL NEVER BE BUILT, OR WOULD AT LEAST TAKE UNTIL SOMETIME BETWEEN 2005 AND 2020. EITHER CASE ALLOWS TIME FOR DEMAND OR SYSTEM MANAGEMENT ALTERNATIVES THAT WOULD DEFER OR OBVIATE THE NEED FOR THE PROJECT. MOREOVER, EVEN IF THE FAA AND PORT TIMELINES OF 2001 AND 2003 APPLY (THEY SHOULD BE VIEWED AS BEST CASE), THEY STILL ALLOW TIMELY IMPLEMENTATION OF ALTERNATIVES.

2001 BEST CASE: In the very best case scenario, the Sea-Tac third runway would be operative no sooner than 2001, the year cited by FAA (FAA 1994 Aviation Capacity Plan, DOT-FAA-ASC-94-1 p.2-17) (Ex. 8).

That, of course, is the same year that a number of leases between the Port of Seattle and Sea-Tac airlines expire and additional possiiblities beyond those which may well be available now*, occur with respect to demand and system management measures that could obviate or defer the need for construction of the third runway.

(*) *Has the panel had an opportunity to thoroughly review the existing leases between airlines and the Port? If so, is the Panel satisfied these leases really do prohibit any type of significant demand management measures?*

"2003" BEST CASE: In relation to the "2003-and-then-some" alternate best case scenario, we ask the Panel to consider the "Sea-Tac Third Runway Hypothetical Project Schedule" from the Working Draft of a study done for the Port by TAMS Consultants, Inc. in September of 1989, titled "Sea-Tac International Airport Potential Future Air Carrier Runway." (RCAA Exhibit # 11).

Several points are revealed. A third runway of 7,000 feet is evaluated here, not the longer 8,500-foot version that is the Port staff's current recommended option. Even so, this earlier, shorter, presumably less costly and somewhat less complicated third runway is "hypothetically" projected to be finished in March of 2002.

However, this hypothetical timeline assumes that the draft EIS is released in July of 1994. In fact, the draft EIS is now scheduled for release in late April of 1995 (a 9 month lag). It could be reasonably inferred that this would mean the third runway could not be in place any earlier than January 2003 IF the current preferred alternative was to be the same 7,000-foot strip envisioned in the 1989 TAMS report. However, if the 8,500-foot option that is the current preferred alternative cited by staff, were chosen for implementation, this 2003 timeline would have to be extended, perhaps to somewhere around 2004 or beyond.

OTHER, LONGER TIMELINES: However, due to myriad difficulties the project will face, discussed below, it could be reasonably expected that, in fact, the timeline is likely to be much longer than either the FAA's 2001 estimate or the inferred "2003-and-then-some" estimate that could be drawn from the 1989 TAMS report done for the Port.

FACTORS WHICH COULD EXTEND RUNWAY TIMELINE

EXCESSIVE COSTS, POOR COMPETITIVE STANDING: *The proposed Sea-Tac third runway has a very high estimated cost and a very poor competitive standing vs. other U.S. new runway projects.* The most recent comprehensive FAA review of new runway projects nationwide shows just how poorly Sea-Tac's project stacks up in terms of cost, and in terms of greater operational efficiencies that are well-known to be tied to wider separation of new runways from existing runways. (FAA 1994 Aviation Capacity Enhancement Plan, DOT-FAA-ASC-94-1, p. 2-15 to 2-18)(Ex. 8) and charts in Appendix D, not attached here, but available.

(Simultaneous bad weather approaches on parallel runways require anywhere from 3,300 to 4,300 feet minimum separation at present.)

For purposes of comparison with Sea-Tac, only new runway projects for which runway lengths were explicity stated and separations*** were explicity stated or easily ascertained from diagrams in the FAA document cited above, were chosen.

AIRPORT	RUNWAY NAME	LENGTH	SEP. ***	COST (millions)
Baltimore	10R/28L	7,800	3,500	$48
Charlotte	18W/36W	8,000	5,000	$43
Fort Meyers	6R/24L	9 to 10K	4,300	$87
Greer (Greenville/Spartanburg SC)	3R/21L	10,000	4,300	$50
Louisville	17L/35R	7,800	4,950	$42
Louisville	17R/35L	10,000	4,950	$51
Phoenix	7/25	7,800	4,500	$88
Salt Lake	16/34	12,000	6,300plus	$120
Sea-Tac	***16W/34W***	***6.5/8.5K****	***2,500***	***$400/524*****
Spokane	3L/21R	8,800	4,400	$11
Syracuse	10L/28R	7,500	3,400	$46
Tampa	18R/36L	9,650	5,000	$55
Tulsa	18E/36E	9,600	5,200plus	$115

* No length is given for the proposed Sea-Tac third runway in the FAA source document cited above, but the scale measurement of the runway in that document is under 7,000 feet. In the Port's Master Plan Update Technical Report 6 -- Airside Options Evaluation, options of 7,000 to 8,500 feet in length are identified as most deserving of further analysis, and an 8,500-foot option that is 2,500 feet apart from the easternmost current runway is deemed the preferred alternative (Ex. 1)

** The FAA source document cited above gives $400 million as the estimated cost (Ex. 8) In Ex. 2, the identified "preferred alternative" (8,500 feet long) is estimated to cost between $456 million and $524 million, although a 7,000-foot option is priced at exactly $400 million, as noted in Section 1 of this report (Ex. 9)

*** In accordance with operational concerns about separation between parallel runways and in accordance with procedures used during parallel runway operations in low visibility weather conditions, the distances between the proposed new runway at each airport and the parallel runway ***furthest*** away, is what provides the basis for the separation distances given in the above chart. In most of the above cases, however, there was only one additional existing runway parallel to the proposed new runway.

The excessively high costs alone, along with documented airline approval conditions rebuffing noise and demand management issues before the Panel (discussed later in this section), and documented airline approval conditions related to runway length and separation (discussed in Section 1), all increase the likelihood that the project will fail to get federal funding support or airline support, and therefore may well not be built at all, or would be delayed greatly.

FAA makes it clear competition is tough for federal funding of new runways and other airport capacity-related projects. "While much has been done and more is planned to increase system-wide capacity, it should be noted that the FAA's resources are limited. The demand for Facilities and Equipment (F & E) and Airport Improvement Program (AIP) funds far exceeds availability. However, the FAA will continue to explore innovative methods of increasing system capacity." (FAA 1994 Aviation System Capacity Plan, DOT-FAA-ASC-94-1, p. 7-4)(RCAA Exhibit 12).

AIRLINE APPROVAL ALSO CONDITIONED ON FEDERAL FUNDING: Second, the airlines using Sea-Tac have made it clear that they will withhold approval for the proposed third runway pending, "the receipt by the Port of maximum federal funding in the form of future discretionary airport grants." The airlines also note they will require a full cost-benefit analysis. (9/13/93 letter to FAA from Seattle Airlines Airport Affairs Committee)(RCAA Exhibit # 13).

Based upon the extremely high project cost, there is a distinct possibility that federal funding to cover a significant portion of the proposed third runway project could be unavailable.

DETAILED RUNWAY FINANCING PLAN NEEDED TO ASSESS PROJECT PROSPECTS AND TIMELINE: In order for the panel to better assess how soon the third runway could be completed without any federal funding at all, or with only a small amount, we suggest that the Port be required by the Panel to submit a fully detailed financing plan with no federal funding included. The plan should also include full noise mitigation costs related to the new runway, debt service, and a full description of where the 12 to 17 million cubic yards of required fill dirt would come from, and how related costs are calculated.

AIRLINE APPROVALS ALSO CONDITIONED UPON "HANDS OFF" NOISE AND DEMAND MANAGEMENT APPROACH: The airlines also raise another point (Ex. 13) which would seem to cast additional doubts upon the possibility that the third runway will ever be built at all.

"In addition to the total cost, the airlines are concerned about proposed operating restrictions including the much discussed "Demand Mangement" and any other requirements in excess of the principles agreed to in Noise Mediation . . . . we expect all parties to adhere to the spirit and intent of the complex agreements reached voluntarily in the noise mediation process. Satisfactory resolution of these matters is necessary prior to final airline approvals."

This means that if any noise requirements are imposed upon the Port beyond what the Port set as goals in its Noise Mediation process and Noise Budget, the airlines will withhold support for the third runway. At this point it is not known if that scenario will occur, but the Panel has made it clear it will at least consider requiring a greater noise reduction, and that it has ordered the Port to present, defend and achieve a plan for meaningful reduction of existing noise through measures above and beyond those articulated in the Port's existing programs.

Given these preliminary steps, even without the satisfactory "resolution" of noise issues as defined by the airlines in the above letter, events in this realm are headed in a direction quite opposite from what the airlines say is required for their approval of the runway.

In August and September of 1993 letters were exchanged between the Port and the regional FAA (Ex. 14 & 15) revealing that at that time there was no commitment of federal funding. The exchange also revealed:

1) That the Port expected to request a Letter Of Intent from the FAA and hoped to receive an actual appropriation approved by Congress for $267 million through 2005 to complete an overall capital improvment program through 2001 of $989.7 million, with third runway construction/mitigation and preliminary engineering and design then estimated to cost $387.6 million

2) That the LOI request amounted for 27 percent of the cited capital improvement plan costs, and that the rest "would be funded through a combination of PFCs, separate AIP noise-related grants, income from operations and new airline backed debt."

3) That the Port "will outline what would be required to develop additional capacity and associated mitigation without the issuance of an LOI by the FAA."

AIRLINE APPROVAL CONDITIONED ON RUNWAY LENGTH WELL IN EXCESS OF THAT SHOWN IN FAA'S MOST RECENT DIAGRAMS. In addition, we would redirect the panel to the discusssion in Section 1 of this report regarding stated minimum runway length of 8,500 feet required by the airlines as a condition for their approval (Ex. 5), and the related much shorter runway length shown in the (March, 1995) FAA "1994" Aviation Capacity Enhancement Plan (Ex. 7), as well as the Port and FAA documents showing a convergence on a $400 million cost estimate linked only to a 7,000-foot option cited by the Port (Ex. 2, 7, 8, 9).

RUNWAY WOULD REQUIRE 8-PLUS KINGDOMES OF FILL DIRT: Finally, the timeline is affected by the pressing issue of fill dirt. Sea-Tac, unlike most major U.S. airports, sits precariously perched atop a plateau. The Port's documents reveal that the "preferred alternative" (Option 5) would require 17 million cubic yards of fill dirt (Ex. 2).

This is equivalent to 8 & 1/2 Kingdomes full of dirt (Seattle's Kingdome stadium has seating capacity of about 60,000, and a volume of 1.9 million cubic yards). In order to assess whether the runway can even be built at all, it will be necessary to know from precisely where the Port intends to find that much uncontaminated fill dirt. The Port so far has indicated only that it will discuss available dirt from its own properties, though the amounts available there would fall well short of that required.

FACTORS MAY COMBINE TO MAKE THIRD RUNWAY A "NON-STARTER," OR AT LEAST DELAY IMPLEMENTATION WELL BEYOND 2001 OR 2003: In sum, financing, airline approval, and construction-related issues would seem to significantly decrease the likelihood that the third runway can be built at all, or would at least lengthen the best-case 2001 to 2003 timelines by a number of years. We believe an accurate estimation of whether, and if so, when, the third runway could be completed is of critical importance and is well within the scope of the panel's inquiry. The panel may be able to help judge how much longer the above-discussed factors could reasonably be expected to add to the timeline or whether they could result in no runway at all.

Our best estimate is that because of the above-discussed factors, there is a very real possiblity the either the third runway cannot and will not be built at all, or that at best it could not be completed until sometime between 2005 and 2020. In any case, we believe the evidence available now supports the case for, extends the timeline and adds to the the feasibility of, demand and system management alternatives to the third runway.

4. SEA-TAC DELAYS DOWN - FUTURE PROJECTIONS OF WORSENED DELAYS ARE FLAWED. THE DELAY-DISASTER SCENARIO IS UNWARRANTED AND THE CASE FOR THE THIRD RUNWAY IS NOT SUPPORTED BY DELAY FACTORS.

This section stems from several parts of the Panel's 2/24/95 procedural order on Demand and System Management.

a) The Panel asks (p. 4), "What are the existing capacity constraints, the current and expected levels of demand, and the existing and expected levels of delay at Sea-Tac for the next ten years if the third runway is not built?"

b) In addition, the Panel notes (p. 5), "We think it is 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 Apriul 1996. If the POS and WSDOT wish us to find that the implementation of demand maangement or system management options cannot reasonably be expected to obviate or defer the need to contstruct 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. The Panel also invites comments from the PSRC, the FAA and the public on these matters."

c) Even more specifically, the panel asks for the Port to state the capacity and delay problems which justify the third runway (2/24/95, p. 5, para. 3) and; to discuss current and forecast future delay information including an explanation of what role increasing operations would have on future delay, as well as total minutes of delay versus number and percent of delays over and under the 15-minute threshold in '93 and '94 (3/3/95, p. 2, Questions 3 & 4). The Panel also asks the FAA to provide data on delays at Sea-Tac and the 25 largest commercial U.S. airports, as well as to document references the agency uses to assess the acceptability, or lack thereof, of delays and congestion (3/3/95, p. 9, Questions 2 & 3).

With all this in mind, we offer the following remarks and evidence.

ATOMS DELAYS MINISCULE AT SEA-TAC -- LESS THAN ONE PERCENT OF FLIGHTS!! Neither current nor projected future delays justify the third runway. ***The current percentage of flights actually delayed 15 minutes or more (the criterion used in the FAA's official delay descriptor program, ATOMS) at Sea-Tac for 1993, the most recent year given, is currently seventh-tenths of one percent,*** or 6.8 per thousand. FAA 1994

Aviation Capacity Enhancement Plan (DOT/FAA-ASC-94-1) (p. 1-15/Table 1-3) (RCAA Exhibit 16).

We have learned that according to official FAA data, ***that figure for Sea-Tac in 1994 decreased even further, to six-tenths of one percent,*** or 6.1 per thousand.

DOWNWARD TREND OF 75 PERCENT IN ATOMS DELAYS AT SEA-TAC: Even more revealing, ***the percentage of flights actually delayed more than 15 minutes at Sea-Tac has declined dramatically in recent years,*** according to the same FAA document cited above, from 3 percent, or 30.5 per thousand flights in 1990, steadily down to the less-than-one-percent level through 1993. Such delays have declined by nearly three-quarters from 1990 through 1993 at Sea-Tac (Ex. 16).

SEA-TAC FARING BETTER THAN OTHER MAJOR AIRPORTS: While some other major airports also experienced varying decrease in the crucial 15-minute-plus ATOMS delays, a number of major airports experienced ***increases*** in the same period. These airports included Newark, Boston, Denver Stapleton, Dallas-Fort Worth, Miami, LAX, Salt Lake City and Nashville.

The apocalypse seems not near. The average delay at Sea-Tac is a very tolerable, 5 to 6 minutes (Port of Seattle Master Plan Update)(RCAA Exhibit 17). And as noted, the rate is literally less than one-in-a-thousand-flights for serious, more-than-15-minute delays (Ex. 16).

THE ANNUAL DELAY HOURS SCAM: Sea-Tac's and the FAA's alarmist delay claims are based in part on another delay measure used by the FAA which aggregates each minute of delay, no matter how tolerable, routine or insignificant that delay is (such as delays equal to, less than or even greater than the current average delay at Sea-Tac of 5 or 6 minutes) and adds it all up annually.

This way, airports which want new runways can be classified as "in excess of 20,000 annual delay hours," a dreadful sounding classification until it is examined closely, side by side with ATOMS data. In these biased "total delay hours" terms, many major U.S. airport have a supposedly severe delay problem, due to the sheer volume of flights and the routine occurence of marginally consequential delays, under 15 minutes.

Because of the extremely high dollar value the FAA, the Port and the airlines like to attach to aggregate delay hours, it is necessary to discuss the issue in economic terms.

DELAY COSTS IN ECONOMIC TERMS: Just as someone commuting to work or to the airport expects and tolerates a certain amount of delay due to traffic jams on the highway (especially driving on I-5 to Sea-Tac), so too can five, 10 or even 14 minutes of delay be viewed as a rational economic cost that should be borne by travellers and airlines.

Since 1978 travellers have received new benefits from the increased schedule choices and lower fares engendered by industry deregulation. Since 1978 airlines seeking greater passenger volumes and profits have felt it necessary to offer dozens of flights per day between the same city pairs and airports that one or more of their competitors are also offering a dozen or more daily flights between.

One result of their decisions, made in the name of "customer service," "consumer choice" and "competition," is an abundance of flights, and annual average load factors of little more than 60 percent for all of the major U.S. carriers on their domestic routes, throughout the 1980s and into the '90s. Sea-Tac's load factor for domestic air carrier operations in 1993 was 57.8 percent, and for air taxi and commuter operations, 44.6 percent (Master Plan Update - Technical Report 6 - Preliminary Forecast Report, p. 5-34)(RCAA Exhibit 18).

U.S. air carrier, air taxi and commuter operations grew from 14.7 million in 1980, nearly 33 percent to 21 million in 1988 (Transportation Research Board Special Report 230 - "Winds of Change: Domestic Air Transport Since Deregulation," 1991, p. 216)(RCAA Exhibit 19). That number grew to 24 million in FY 1993 and was estimated at 25.1 million for FY 1994. This additional 10.4 million take-offs and landings between 1980 and 1994 translates into a 70.7 percent increase. ("FAA Aviation Forecasts: Fiscal Years 1995-2006," FAA-APO-95-1, p. IX-32, Table 30)(RCAA Exhibit 20).

Sea-Tac's pattern of increased operations corresponds closely with the broader national pattern. Total annual operations at Sea-Tac grew from 174,000 in 1976 to 316,000 in 1988 (Transportation Research Board Special Report 230 - "Winds of Change: Domestic Air Transport Since Deregulation," 1991, p. 214-215)(RCAA Exhibit 21). By FY 1993, Sea-Tac operations had grown to 339,968. (FAA 1994 Aviation Capacity Enhancement Plan, DOT-FAA-ASC-94-1, Appendix A-2)(RCAA Exhibit 22). This represents a 95 percent increase in Sea-Tac operations since deregulation.

These great increases in national and Seattle aircraft operations have been undertaken so that airlines may attempt to earn greater profits and passengers may have greater schedule choices and convenience. If airlines, the FAA, passengers or the business community feel delays, and even bad-weather delays, have become or will become a problem, they would do well to consider their own role in the situation, and bear some of the responsibility and much of the costs, accordingly.

If, as the Port projects, average delays per operation were in future years to exceed by seven minutes each the 15 minute FAA ATOMS threshhold, due to choices by the airlines to offer somewhere between 85,000 and 100,000 more flights, the common sense response has to be, "you make your own bed, so lie in it." In this scenario, it would still be eminently just, reasonable and economically rational to force those parties that are reaping the benefits of increased service to bear the additional costs of greater delays.

If those parties (airlines and consumers) find the delay costs from 100,000 more Sea-Tac flights are too costly without the "relief" afforded by a third runway, the additional flights can be rescinded, and the associated additional delays would ease, while more passengers could still fill the plethora of empty seats that now exist based on average load factors.

In fact, the additional flights and the "delay crisis" might not occur at all because if passengers are actually so concerned about delays, expect them, and want to avoid them, the "inevitable" demand for added flights may never materialize. Should not some rationality be ascribed to travel consumers? Aren't there enough schedule choices already?

Moreover, if somehow the crisis does occur, and passengers find delays too severe, they can fly off-peak, or if that is somehow not possible, they can voice their dissatisfaction to the airlines and urge them to ease back on the manic overscheduling.

ALTERNATIVES TO PREVENT FUTURE DELAY INCREASES: Certainly simple avoidance of overscheduling, or imposition of peak-hour congestion pricing measures, along with reliance on system variables, including implementation of technological advances in air traffic control, and utilization of existing airports such as Paine Field, would have as much or more to do with slaying the Sea-Tac delay bogeyman as new runways would.

WORKING AROUND DELAY, NOW: Precedent for working around delay is well established. Airline schedules are adjusted constantly already due to profitability or the lack thereof, and travellers have become well-school in air travel survival skills, often flying at different times, out of different airports, or building in a certain expected amount of travel delay to their schedules.

Is there not a reason for on-board built-in phones on airplanes, and for passengers using lap-top computers on airplanes? Why do airlines offer and passengers use special office facilities at the airport equipped with faxes, copiers, modems and telephones? All these opportunities are especially useful for delayed passengers eager to recoup the "lost time" "dollar value" of airport congestion and delay. We are already managing delay, and adjusting to what modest amounts of it currently occur.

OUTSIDE EXPERTS DEFLATE THE "CRY WOLF" APPROACH TO AIRPORT DELAY PROBLEMS AND CAPACITY CONSTRAINTS. The Washington State Air Transportation Commission ("AIRTRAC") 1993 Final Report and Policy Recommendations section titled "Appendix - Summary of Technical Analyses" offered the following observations in a subsection titled "The Costs and Effects of Air Capacity Expansion Delay," p. A-3 (RCAA Exhibit 23).

"There is little documentation of wider economic costs associated with capacity constraints. The case studies found that there are direct economic costs arising from capacity constraints. They take the form of additional operational costs for airlines and the value of passengers' time lost due to delays. Little evidence was found, however, to support the premise that there are wider economic costs, such as slower growth, associated with existing capacity constraints, although there is an expectation that at some future time capacity constraints will cause wider economic costs. Furthermore, there is little information outlining the effect of capacity constraints upon the location and expansion decisions of businesses and, hence, upon economic development. Air capacity is only one of many considerations for businesses making location and expansion decisions."

The report continued, ***"Case-study results found that airlines and airports typically make specific operational adjustments in response to congestion and work around capacity constraints to increase passenger throughput."***

Another source, The Transportation Research Board (of the National Research Council), puts airport delays in perspective in its 1990 "Special Report 226 - Airport System Capacity." On p. 114, under the heading "General Conclusions - Causes of Congestion and Delay" (RCAA Exhibit 24), the Board notes, "Since much of the congestion and delay is experienced at airports, it is widely perceived that the root cause is insufficient airport infrastructure. Although it is true that the runways, taxiways, aprons and gates at many of the most heavily used airports cannot always accomodate the growing number of aircraft seeking to use them, it is not correct to ascribe all congestion and delay to a lack of airport facilities."

The Board continues, "congestion and delay are complex system problems that stem from the interaction of many factors, of which insufficient airport infrastructure is but one. Adverse weather, traffic peaking as a result of airline hubbing practice, airspace congestion and inadequacy of the air traffic control system are also important causes of delay."

The board concludes, "There is no simple, universal permanent solution to congestion and delay. A combination of remedies must be applied, each appropriate to a specific part of the problem and none so widely effective and long lasting that it promises to eliminate congestion and delay once and for all. Like friction in mechanical devices, congestion and delay are inherent in the air transport system, ***and the best that can be acheived is a higher degree of efficiency that reduces them to an acceptable level at an affordable cost."*** (Emphasis theirs).

These observations would seem to sharply rebut the claims by the Port that failing to build the third runway would result in a capacity shortfall that would cause severe delays, and that serious economic ill would befall the region if the additional capacity is not provided by construction of the runway.

DELAY NATIONALLY IS SCANT, ACCORDING TO ATOMS DATA: FAA's own ATOMS data reveals delay is greatly exaggerated, to the point that the apple-pie/motherhood economic arguements about the need for new runways to ease delays become distinctly incredible. At the nation's "worst" delay airports, only 2 to 4 percent of total flights experience delays worse than the 15-minute FAA ATOMS benchmark, with the exception of the worst, Newark, where it is a whopping 8 percent (Ex. 8).

SEA-TAC'S FUTURE DELAY "CRISIS" BASED ON FALSE COMPUTER MODELLING ASSUMPTIONS: Sea-Tac forecasts a crisis by 2015, using the SIMMOD computer model for delay forecasting to calaculate average annual delay of 22 minutes per flight ***IF " . . . future flight schedules (are) input"*** resulting in 425,000 operations per year. (Master Plan Update, Technical Report 6 - Preliminary Forecast Report, p. 4-1, 4-6, 4-8)(RCAA Exhibit 25) & (Ex. 17).

This crisis scenario makes several faulty assumptions.

1) The added flights have to come, and will.

2) The 25 % increase in operations is beneficial even though load factors would be between 59 and 60 percent for domestic air carrier operations and 55 percent for air taxi and commuter flights (Technical Report 6, p. 5-34)(Ex. 18).

3) The major increase in operations is desired even though it would require the expenditure of at least $348 to $524 million, excluding noise mitigation and, apparently, financing costs (much or all from system user taxes) in order to alleviate the projected delays. (This would make

the project close to, if not the, most expensive single new runway in U.S. aviation history).

4) Overt demand mangement measures such as peak hour pricing or slot allocation could not help alleviate the projected delays.

5) De-Facto demand management through a do-nothing runway decision would somehow NOT foster increased load factors and passenger volume due to the millions of empty seats flying out of Sea-Tac now each year.

All these assumptions ARE implicit in the projected demand crisis by the Port, and are false. The panel revealingly notes (2/24/95, p. 5, para. 3) that to discharge its own duties and for the public to "appreciate what motivates the proposal to build the new runway," the Port should justify its delay and capacity claims.

"WHAT MOTIVATES THE THIRD RUNWAY": Close examination of the FAA and Port data and asssumptions, as discussed above, reveals ***the Port's actual motivations for the third runway are much less related to efficiency, good management and the greater public good than to the "edifice complex" and the language in the Federal Aviation Act of 1958 charging the agency with the duty to "promote civil aviation." Airport growth for its own sake is what motivates the Sea-Tac third runway proposal. Worse, the desired outcome is driving the methods of data collection and modelling which are purportedly being done to arrive at an unbiased recommendation.***

5. FUTURE DEMAND AT SEA-TAC IS GREATLY OVERSTATED AND BASED ON FAULTY ASSUMPTIONS AND POOR FORECASTING METHODS. THEREFORE, THE STATED NEED FOR THE THIRD RUNWAY ON THE BASIS OF MEETING FUTURE DEMAND IS BASED ON FALSE PREMISES.

UNCERTAINTY IN FORECASTS, EXPECTED CHANGES: The Port acknowledges their future demand projections are murky, in their major forecast document released to date.
" . . .the forecasts presented here are planning-level estimates and are not intended to be exact predictions. It is anticipated that these forecasts will be updated in several years in response to changing conditions, such as the national or local economy or the aviation industry." (Master Plan Update - Technical Report 5 - Preliminary Forecast Report, p. 5-1)(RCAA Exhibit 26).

PORT'S AVIATION INDUSTRY EXPERTS WARN OF SLOW GROWTH AND OVER-CAPACITY: The Port also reports on the findings of its own panel of aviation industry experts' findings on issues related to forecasting, presented in 1993. The findings include the following points. "Air transportation is a maturing industry in the United States. Therefore future growth will be at a slower rate. We have not seen the end of technological improvements in communications such as teleconferencing. . ."

"Air travel will grow no faster than the general economy. The 1990s will be a time of greater price growth than volume growth for the airlines. ***The industry has excess system-wide capacity now."*** (Master Plan Update - Technical Report 5 - Preliminary Forecast Report, pp. 5-4 & 5-5, emphasis added.)(RCAA Exhibit 27).

EMPTY SEATS GALORE: Excess seating capacity is abundant too, according to the Port's report. The load factor on domestic air carrier operations (planes with more than 60 seats) was 57.8 percent in 1993, according to the Port, and is expected to grow to a whopping 60 percent by the year 2020 (when the "needed" and "inevitable" 85,000 additional flights will have resulted in a delay "crisis"). Load factors on domestic air taxi and commuter flights (less than 60 seats) was an underwhelming 44.6 percent in 1993 and is expected to grow to 55 percent by 2020. These two categories account for the vast bulk of aircraft operations at Sea-Tac. (Master Plan Update - Technical Report 5 - Preliminary Forecast Report, p. 5-34) (Ex. 18).

Put another way, there are 13.4 million "departing seats" on domestic air carrier aircraft leaving Sea-Tac each year, and 7.8 million of them are full, but they are accompanied in the air by another 5.6 million empty departing seats. The smaller planes, in the domestic air taxi/commuter class, offer only 1.3 million departing seats per year, and only 580,000 of them are filled. (Master Plan Update - Technical Report 5 - Preliminary Forecast Report, p. 5-32)(RCAA Exhibit 28).

DISPROPORTIONATE ACCESS FOR SMALLER PLANES: Yet these smaller planes, which offer only about one-twelfth the total number of departing seats as the larger planes, and carry only about one-thirteenth the departing passengers, are somehow allowed to consume 37 percent as many total arrival and departure opportunities as the larger, air carrier aircraft, which with higher load factors could do much to increase efficiency and reduce delays (Ex. 18 & 28).

The 2020 Sea-Tac projections show the smaller plane class still carrying only one-eighth as many departing passengers as the larger planes do now, yet taking up one-half as many total operations as the larger planes do now and still one-third as many as the larger planes would in 2020 if the inefficient and unwarranted major increase in Sea-Tac flights does occur (Ex. 18).

These current and projected future situations, depicted by the Port, show the danger of misallocating scare resources.

The smaller planes, which service a very few passengers, relatively, are allowed to take up a disproportionately huge amount of the airspace and the arrival and departure slots at Sea-Tac, in relation to total annual aircraft operations occuring at the airport. As pilots of the larger aircraft and air traffic controllers have often noted, the smaller airplanes impose just about the same burden in terms of facility usage and tower personnel as the larger planes, but carry so many fewer passengers.

The two most active "larger aircraft" domestic carriers at Sea-Tac offer 126 and 161 average seats per domestic departure but the two most active "smaller aircraft" domestic carriers offer 32 and 19 average seats (Ex. 28).

THIRD RUNWAY PLAN FACILITATES CONTINUED INEFFICIENCIES OF BOTH THE LARGWER AND SMALLER AIRCRAFT AT SEA-TAC: Average seats per departure for the "larger aircraft" (domestic air carrier) operations are projected to grow by more than 25 percent between 1993 and 2020, from 151.2 to 205. Yet the average load factor on those flights, as noted earlier in this section, is projected to grow only 2.2 percent, from 57.8 percent to 60 percent, and importantly, the smaller planes will continue to hog slots but carry a miniscule proportion of passengers. (Ex. 18 & 28)

RUBBING IT IN: Further compounding the already unjustifiably large and inefficient role of smaller aircraft at Sea-Tac is the continued addition of more air taxi flights, clogging valuable air space and taxing resources. Witness the recent introduction of 10 daily flights in and out of Sea-Tac, between Seattle and Olympia, which are 50 to 60 miles apart by car. The flights are on airplanes which hold 8 passengers, Piper Navajo Chieftans. A recent newspaper advertisement for the flights boasted, "The Ultimate H.O.V. (High Occupancy Vehicle) Lane," a take-off on one highway demand management technique. One might add, at 8 seats per airplane, "Not high-occupancy enough." (Harbor Airlines ad in The Olympian, 2/26/95).

DEMAND FORECASTS FOR INCREASED FLIGHTS IGNORE ALL THE EMPTY SEATS ON EXISTING FLIGHTS, AND FORECASTS SELECTED FOR INCREASED PASSENGER VOLUME ARE MUCH HIGHER THAN ALL FORECAST ALTERNATIVES CONSIDERED: Somehow, with all the empty seats, and varying passenger volume estimates, we are supposed to be assured that the 431,000 total airline operations projected by the Port for 2020 (Master Plan Technical Report 5 - Preliminary Forecast Report, p. 5-39)(RCCC Exhibit 29) are inevitable and that we must build a third runway to avoid the delays which would otherwise result.

With all these inefficiencies in mind, now consider the Port's projected increase in total departing domestic passengers, an increase the Port claims is also inevitable even without the third runway. The Port projects that annual departing ("enplaning") passengers will grow from 8.7 million in 1993 to 22.8 million in 2020, although the Port acknowledges that forecasts other than the one it prefers happen to show as few as 13.7 million departing domestic passengers in 2020, or 14.8, 15.8, 16 or 17.2 million (Master Plan Technical Report 5 - Preliminary Forecast Report, p. 5-8)(RCAA Exhibit 30).

PORT'S FUTURE PASSENGER PROJECTIONS ON THE ROSY SIDE: Revealingly, the Port concedes its "highest" estimate, the one selected, is based on a questionable approach. "In this approach, the number of Sea-Tac domestic enplanements were projected as a percentage share of U.S. domestic enplanements. Domestic enplanements at Sea-Tac have increased from 1.38 percent of the U.S. market in 1970 to 1.84 percent in 1993. The Sea-Tac share of the national market is projected to continue this increasing trend and grow to 1.95 percent in 2010 and 2 percent in 2020. When this projected market share was applied to the FAA forecast for the nation, a projection of 22.8 million domestic enplanements for Sea-Tac in the year 2020 resulted. The relatively high projection under this forecast approach reflects the aggressive nationwide growth projection by the FAA in spite of relatively flat performance over the past seven years . . . ." (Master Plan Technical Report 5 - Preliminary Forecast Report, p. 5-9)(RCAA Exhibit 31).

Far from "inevitable," this sounds like a vague guesstimate founded upon wishful thinking and questionable methodology. Tellingly, the Port's demand projection assumptions of "aggressive nationwide growth" in aviation activity are in direct contradiction to the observations of the Port's own panel of industry experts, as cited earlier. It is necessary to reiterate here what they told the Port in 1993.

"Air transportation is a maturing industry in the United States. therefore future growth will be at a slower rate . . . . . . Air travel will grow no faster than the general economy. The 1990s will be a time greater price growth than volume growth for the airlines. ***The industry has excess system-wide capacity now."*** (Master Plan Update - Technical Report 5 - Preliminary Forecast Report, pp. 5-4 & 5-5, emphasis added.)(Ex. 27).

6. DEMAND AND SYSTEM MANAGEMENT MEASURES CAN BE IMPLEMENTED BEFORE LIKELY COMPLETION OF THIRD RUNWAY CONSTRUCTION AND COULD OBVIATE OR DEFER THE NEED FOR THE THIRD RUNWAY.

DEMAND MANAGEMENT MEASURES DO OFFER FEASIBLE ALTERNATIVES TO THE THIRD RUNWAY.

FAA SUGGESTS "DE-PEAK" SEA-TAC SCHEDULES: The FAA's checklist of Capacity Design Team Recommendations for major U.S. airports lists several measures suggested for Sea-Tac that could help obviate the need for the third runway. A major recommendation in the area of demand management is "De-peak airline schedules." (FAA 1994 Aviation System Capacity Enhancement Plan, DOT-FAA-ASC-94-1, p. 2-9)(RCAA Exhibit 32).

FEDS ALLOW PEAK-HOUR PRICING TO REDUCE CONGESTION AND INCREASE EFFICIENCY: The FAA's Airport Rates and Charges Policy, according to Aviation Daily, retains language "to allow peak pricing at airports despite objections raised by airline and general aviation user groups. The agencies (DOT & FAA) said that the concept stated in the policy is adopted from the Dec. 22, 1988 order and opinion on the Massachusetts Port Authority landing fee increase and represents no change in existing department policy. The final policy states, 'a properly structured peak pricing system that allocates limited resources using price during periods of congestion will not be considered to be unjustly discriminatory. An airport operator may, consistent with policies expressed in this policy statement, establish fees that enhance the efficient utilaization of the airport." (Aviation Daily, 2/6/95)(Ex. 33).

Peak-hour pricing schemes could well be imposed after 2001 when current leases which supposedly bar such action now, will have expired.

Slot allocation measures are another possibility.

DE-FACTO DEMAND MANAGEMENT YIELDING GREATER EFFICIENCY AND ALLOWING FOR SUBSTANTIAL PASSENGER VOLUME INCREASES ON EXISITING FLIGHTS WOULD RESULT FROM A DECISION BY THE PANEL TO DENY THE THIRD RUNWAY. On another plane, the evidence discussed in the above two sections supports the "de-facto demand management" case. A denial of the third runway in order to force greater efficiencies is a valid decision for the panel to make. This would force greater load factors while still permitting major increases in passenger volume and regional economic activity and growth due to more than 40 percent of current seats being empty, on average.

The counter-arguement by the Port that without new runways, flights and congestion would stretch the airport past its breaking point, assumes that airlines and passengers are essentially oblivious to their own role in the negative effects of increased flight scheduling and airport congestion. As discussed in Section 3 on Delay, this is not the case.

SYSTEM MANAGEMENT MEASURES ALSO OFFER FEASIBLE ALTERNATIVES TO THE THIRD RUNWAY.

TECHNOLOGY-RELATED AIR TRAFFIC CONTROL MEASURES: The FAA's checklist of Capacity Design Team Recommendations for major U.S. airports lists several additional measures suggested for Sea-Tac that could help obviate the need for the third runway. Major recommendations in the area of system management are: "angled exits/improved exits," "install/upgrade ILSs," "wake vortex advisory system," "improve IFR approach procedures," and "reduced separation between arrivals." (FAA 1994 Aviation Capacity Enhancement Plan, DOT-FAA-ASC-94-1, p. 2-9)(RCAA Exhibit 32).

In this same document, FAA discusses some of the suggestions in greater detail.

WAKE VORTEX PROGRAM: The report notes that Sea-Tac is among the airports that are candidates for improved operations on closely-spaced runways under bad-weather, or IFR, flight conditions, through a direct application of research ongoing in FAA's Wake Vortex Program. Given that Sea-Tac's two current runways are separated by 800 feet, the inclusion of Sea-Tac as a candidate for improved bad weather operations from this program would seem to clearly indicate that the 800-foot separation is not considered by FAA to be an insurmountable obstacle. (FAA 1994 Aviation System Capaciity Plan, DOT-FAA-ASC-94-1, p. 3-7)(RCAA Exhibit 34).

BROADER SYSTEM MANAGEMENT PERSPECTIVE OF FAA: The FAA notes, "For the few delay-problem airports in the Northeast, in California and elsewhere, renewed emphasis must be given to finding innovative solutions. New airports, expanded use of existing commercial service airports, civilian development of former military bases, and joint civilian and military use of existing military facilities--these options and more must be explored systematically with a view toward developing regional airport systems to serve the expanding air transportation needs of these large metropolitan areas." (FAA's 1994 Aviation System Capacity Plan, DOT-FAA-ASC-94-1, p. 2-2)(Ex. 35).

A REGIONAL AIRPORT SYSTEM IS A FEASIBLE SYSTEM MANAGEMENT ALTERNATIVE TO THE THIRD RUNWAY. HOWEVER, IT HAS NOT BEEN SUFFICIENTLY PURSUED.

THE VALIDITY OF THE PAINE FIELD ALTERNATIVE: The panel will at some point no doubt be told that a regional process has eliminated Paine Field and other airports in the four-county area for consideration, and that therefore a regional airport system cannot be viewed by the Panel as a feasible alternative to the third runway. We would disagree.

An airline could begin doing business at Paine Field within a few weeks, or months at the most, if it wished to. As a recipient of FAA grants the airport could not refuse to allow some level of operations by a certificated commercial carrier. High-level staff of Snohomish County, which operates Paine Field, have directly acknowledged this, although they tend not to do so publicly. Moreover, noise mitigation controls and perhaps certain operational restrictions, which ARE permitted under the Aviation Noise and Capacity Act of 1990 with conscensus from airlines, the airport and the FAA, could address some of the existing community concerns about noise from commercial operations there, thereby adding to the feasibility of the Paine Field alternative.

In addition, there is every likelihood that efforts will continue, as they have since the PSRC declined to enter Phase 2 of ITS supplemental airport feasibility study in October of 1994, to identify supplemental airports to serve Western Washington. Legislation for a state level airport siting commission (SB 5362) passed the Senate Transportation Committee in March and failed to clear the full Senate only due to a scorched-earth lobbying campaign carefully orchestrated from the shadows by the Port of Seattle.

Finally, the long timeline for actual completion of the third runway, and the very real possibility that neither sufficient funds nor fill dirt will be available for construction, adds additional creedence to the arguement that an existing supplemental airport such as Paine Field could be put into commercial operation and serve as a feasible alternative to the third runway.

PAINE FIELD WAS ACTUALLY REMOVED FROM CONSIDERATION PREMATURELY, IN 1993, WHEN THE PSRC NEW AIRPORT/THIRD RUNWAY STUDY PROCESS BEGAN. PAINE WAS NEVER EVEN ALLOWED TO BE CONSIDERED. THEREFORE, A SIGNIFICANT COMPONENT OF WHAT COULD BE A REGIONAL AIRPORT SYSTEM, A FEASIBLE SYSTEM MANAGEMENT ALTERNATIVE TO THE THIRD RUNWAY, HAS NOT BEEN "PURSUED".

In order for sufficient votes to be corraled at the PSRC General Assembly meeting in late April, 1993, to allow passage of 93-03, a clause was added to amend the Regional Airport System Plan to "eliminate small supplemental airports, including Paine Feild, as a preferred alternative." (PSRC Resolution 93-03, p. 3). Such an idea is contrary to the very notion of a "Regional Airport System Plan." Moreover, while the Resolution says the Plan shall eliminate Paine as a "preferred alternative," it does not say it can't be considered, or that as a legitimate system management option under review by the panel, its use as a commercial facility cannot be found by the Panel to constitute a feasible alternartive to the third runway.

FAA ON REGIONAL AIRPORT SYSTEMS, AND PAINE: FAA, in its 1994 annual airport capacity report (released in March, 1995) goes into greater detail on the benefits of a regional airport system, giving what appears to be a strong endorsement of the concept, and, in the text accompanying a chart listing many areas where such systems should be or are being contemplated, specifically cites the Boston and Seattle regions (and Paine Field) as examples of potential multiple airport system areas.

"The ultimate challenge for many delay-problem airports in the country in their efforts to implement capacity-enhancing improvements is the availability and expense of additional land . . . . airport authorities with delay-problem airports may need to look at development of a regional airport system. In a regional airport system, various airports are identified to serve different roles and functions within the region. For example, one airport in the region may handle all or most of the international and long-haul traffic, while other airports handle the domestic and short-haul demand. There are variations of a regional airport system in use in many of the major metropolitan areas, including New York, Chicago, Dallas-Fort Worth, Houston, Los Angeles, San Francisco, and Washington, D.C."

FAA continues, "this same concept has also been suggested in Boston and Seattle, with each proposing to introduce limited air carrier or commuter service at another airport in the area, . . Hanscomb Field in Bedford, MA and Snohomish County Paine Field in Everett, WA. . . One study in Massachusetts demonstrated that development of scheduled air carrier service at the existing Hanscomb Field could be almost as effective as building a new airport in terms of relieving Boston-Logan. However, there is strong local opposition to this initiative . . . current efforts are focusing instead on measures to enhance the role of existing air carrier airports servicing the outlying portions of the Logan market. Since the state has abandoned efforts to land bank a site for a new air carrier airport, creating a more effective regional airport system is critical. . ." (FAA 1994 Aviation Capacity Enhancement Plan, DOT-FAA-ASC-94-1, p. 6-15)(RCAA Exhibit 36).

FAA ON "NEW HUBS AT EXISTING AIRPORTS," AND PAINE: FAA further specifies that, apart from the broader concept of regional airport systems, a single existing airport in the same metropolitan region as a so-called "delay-problem" airport, can help ease delays at the main airport. "As one solution to the growth in flight delays" (?projected future growth in delays at Sea-Tac?)" at traditional connecting airport hubs, airlines may develop new hubs at existing airports. A new connecting hub could produce delay savings by diverting some of the growth that would otherwise occur at nearby primary hub airports." FAA then provides another chart, showing Paine Field and Sea-Tac as an example of this relationship. (FAA 1994 Aviation Capacity Enhancement Plan, DOT-FAA-ASC-94-1, pp. 6-6 & 6-7)(RCAA Exhibit 37).

7. The PSRC's "VISION 2020" "FINAL DRAFT METROPOLITAN TRANSPORTATION PLAN" (MTP) PROVIDES SOME THEORETICAL SUPPORT FOR DEMAND AND SYSTEM MANAGEMENT MEASURES IN RELATION TO AVIATION CAPACITY ISSUES. HOWEVER, MORE GUIDANCE IS NEEDED ON WHAT SYSTEM ALTERNATIVES SHOULD BE RECOMMENDED IF THE THIRD RUNWAY IS REJECTED BY THE PANEL.

With respect to aviation, the Draft MTP for Vision 2020 is largely pro-forma, notable mainly for illuminating how much more valuable it could be than for how valuable it is.

First, and most directly linked to the issue of the proposed third runway at Sea-Tac and possible alternatives, the draft MTP does acknowledge that the third runway can be pursued "provided the project meets the independent evaluations of noise reduction and demand/system management conditions . . ." (PSRC Draft Metropolitan Transportation Plan, p. 57)(RCAA Exhibit 38).

The MTP then notes that an October 1994 PSRC resolution ended the PSRC new airport study and reiterated the third runway veto power of the Expert Panel with respect to issues of reducing existing noise, and addressing demand and system management alternatives to the third runway. The Draft MTP then notes that the October 1994 resolution, "recommended cooperative actions by the state, local governments and regional transportation planning organizations to examine and seek implementation of options for air and ground travel within the Northwest that could address long-term air travel and inter-regional ground travel needs, with such options including consideration of high-speed rail." (Ex. 38).

Notably absent is any discussion of how a more near-term plan should be developed if indeed the third runway fails to pass muster with the independent evaluation and binding decision-making powers of the Expert Arbitration Panel.

Also notably absent is any stated role as to what specifically the PSRC will do to advance consideration and implementation of long term options beyond planning to "recommend cooperative actions." No doubt PSRC is developing more specific plans.

Beyond this, the draft MTP notes that " . . non-military airports of national significance in the central Puget Sound Region are listed as part of the National Plan of Intergrated Airport Systems" including Paine Field and a number of other facilities (Ex. 38).

for Option 4C. Using the year 2015 computed annual aircraft delay savings, the payback period for the added cost of Option 5 compared to Option 4C is about 6 to 7 years. For these reasons, Option 5 is recommended as the preferred operational alternative.

Specific benefits resulting from the selection of Option 5 are as follows:

- Aircraft delays are reduced to the lowest levels for demand expected through the year 2015.
- Fewer aircraft would be restricted from using the runway due to landing length limitations.
- All aircraft using a longer new runway would have greater takeoff/stopping distance available.
- An 8,500-foot runway length would provide a greater measure of redundancy in that it could accommodate heavy jet aircraft when one of the existing runways is closed for maintenance or emergency.

#1, cont.

TECHNICAL REPORT NO. 6

AIRSIDE OPTIONS EVALUATION

AIRPORT MASTER PLAN UPDATE
FOR
SEATTLE - TACOMA INTERNATIONAL AIRPORT

Prepared by:

P&D AVIATION

Prepared for:

The Port of Seattle
SEATTLE - TACOMA INTERNATIONAL AIRPORT

SEPTEMBER 19, 1994

The P&D Aviation Team

P&D Aviation • Barnard Dunkelberg & Company • Berk & Associates
Mestre Greve Associates • Murase Associates • O'Neill & Company
Parsons Brinckerhoff • Thompson Consultants International
Landrum & Brown • Claire Barrett & Associates

Port of Seattle 6/16/94

AIRSIDE OPTIONS PRELIMINARY COMPARISON DATA

JUNE 16, 1994

1 Kingdome = 1.9 million cubic yards - Source: Architect of Kingdome

OPTION	KEY FACTORS: ESTIMATED CONSTRUCTION ACQUISITION (ACRES, NOTE 2)	KEY FACTORS: ESTIMATED FILL (CY MILLION)	KEY FACTORS: ESTIMATED NUMBER OF HOMES OR BUILDINGS	COSTS (NOTE 1): PRELIMINARY LAND COSTS ($ MILLIONS)	COSTS (NOTE 1): THIRD RUNWAY ($ MILLIONS)	COSTS (NOTE 1): SAFETY AREAS, EXTENSION, NAVAIDS,ETC. ($ MILLIONS)	COSTS (NOTE 1): TOTAL ($ MILLIONS)	ENVIRONMENT: NOISE IMPACT AREA (ACRES)	ENVIRONMENT: AIR QUALITY (EMISSIONS PER DAY)	ENVIRONMENT: OTHER (NOTE 3)	BENEFITS: YEAR 2020 ARRIVAL CAPABILITY (NOTE 4)	BENEFITS: DELAY SAVINGS RANK (NOTE 5)
OPTION 1	0	0	0	0	0	0	0					8
OPTION 2	0	3	0	0	29-33	50-58	79-91				31%	7
OPTION 3	130-150	12 (6 Kingdomes)	210-240	38-46	197-227	58-67	293-340		AIRSIDE OPTIONS ENVIRONMENTAL SCREENING IS UNDERWAY. THIS ANALYSIS IS TO BE COMPLETED BY THE END OF JULY 1994.		31%	6
OPTION 4A	180-210	17	280-320	52-62	271-312	76-87	399-461				91%	5
OPTION 4B	130-150	12	210-240	38-46	219-252	60-69	317-367				91%	4
OPTION 4C	150-170	13	250-290	45-55	234-269	60-69	339-393				97%	3
OPTION 5	180-210	17 (8-9 Kingdomes)	280-320	52-62	288-331	76-87	416-480				99%	2
OPTION 6 (NOTE 6)	480-550	28 (14+ Kingdomes)	470-540	177-250	520-598	76-87	773-935 (In 94 dollars? financing costs? roads?)				99%	1

- Costs
- Kingdomes
- "not our policy" → 85
- ATA

NOTES:

1. COSTS TO BE PAID BY AIRPORT USER FEES, I.E. FEDERAL AIRLINE TICKET TAX, PASSENGER FACILITY CHARGES, OTHER AIRPORT REVENUES, ETC. COSTS DO NOT INCLUDE MITIGATION COSTS. MITIGATION COSTS ARE TO BE DETERMINED DURING THE ENVIRONMENTAL IMPACT STATEMENT PROCESS.
2. ACQUISITION AREAS ARE PRELIMINARY ESTIMATES TO BE USED FOR COMPARATIVE EVALUATION PURPOSES ONLY. THESE ESTIMATES WILL BE REFINED DURING SUBSEQUENT EIS AND DESIGN STUDIES.
3. OTHER ENVIRONMENTAL SCREENING CRITERIA INCLUDE EFFECT ON LAND USE, WATER RESOURCES, NATURAL RESOURCES, HUMAN/SOCIAL ENVIRONMENT, AND GROUND TRANSPORTATION.
4. PERCENTAGE OF YEAR 2020 SEA-TAC AIRCRAFT TYPES CAPABLE OF LANDING ON THIS LENGTH RUNWAY.
5. DELAY SAVINGS ARE TO BE ESTIMATED BY THE FAA CAPACITY TASK FORCE IN TERMS OF HOURS AND DOLLARS.
6. THIS OPTION IS NOT CONSISTENT WITH PORT OF SEATTLE COMMISSION POLICY. THIS OPTION IS INTENDED TO REASSESS COST-BENEFIT ANALYSIS.

WHAT RUNWAY OPTIONS ARE BEING CONSIDERED?

OPTION	DESCRIPTION
OPTION 1	EXISTING AIRFIELD
OPTION 2	5,200' COMMUTER RUNWAY, 1500' SPACING
OPTION 3	5,200' COMMUTER RUNWAY, 2,500' SPACING
OPTION 4A	7,000' RUNWAY, 2,500' SPACING
→ (?) OPTION 4B	7,000' RUNWAY, 2,500' SPACING, STAGGERED
OPTION 4C	7,500' RUNWAY, 2,500' SPACING, STAGGERED
* → OPTION 5	8,500' RUNWAY, 2,500' SPACING
→ OPTION 6	8,500' RUNWAY, 3,300' SPACING

Port of Seattle, 6/16/94 Airside Options Preliminary Comparison Data

#3

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

1 The delay savings benefits of these alternatives are not necessarily additive.

#5, cont.

Sarah Dalton, 3/10/95 TAC handout

FAA Capacity Enhancement Plan Update for Sea-Tac distributed by Sarah Dalton, NW Mountain Region FAA, at 3/10/95 Sea-Tac TAC Mtg.

Appendix A Participants

Federal Aviation Administration

Northwest Mountain Region

Sarah Dalton
Jim Mast
Carolyn Read
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

Air craft Owners and Pilots Association

Jules Bresnick
Ray Costello

United Airlines

Phil Hogg
Jess Marker

Alaska Airlines

Ed Haeseker
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)

#4

Air Transport Association **ata** OF AMERICA

Western Regional Office
8939 S. Sepulveda Blvd. - Suite 408
Los Angeles, California 90045 - 3690
Phone 310/670-5183
Fax 310/337-7326

March 28, 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:

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.

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 mentioned Capacity Enhancement Study will address these issues in much greater detail and provide ample data on future traffic demands.

#4, cont.

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:

- SEA-TAC Airport Capacity Enhancement Plan Update
- FAA Handbook 7110.65H
- 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

Air Transport Association [ata] OF AMERICA

Western Regional Office
8939 S. Sepulveda Blvd. - Suite 408
Los Angeles, California 90045 - 3690
Phone 310/670-5183
Fax 310/337-7326

#5

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.

#5, cont.

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

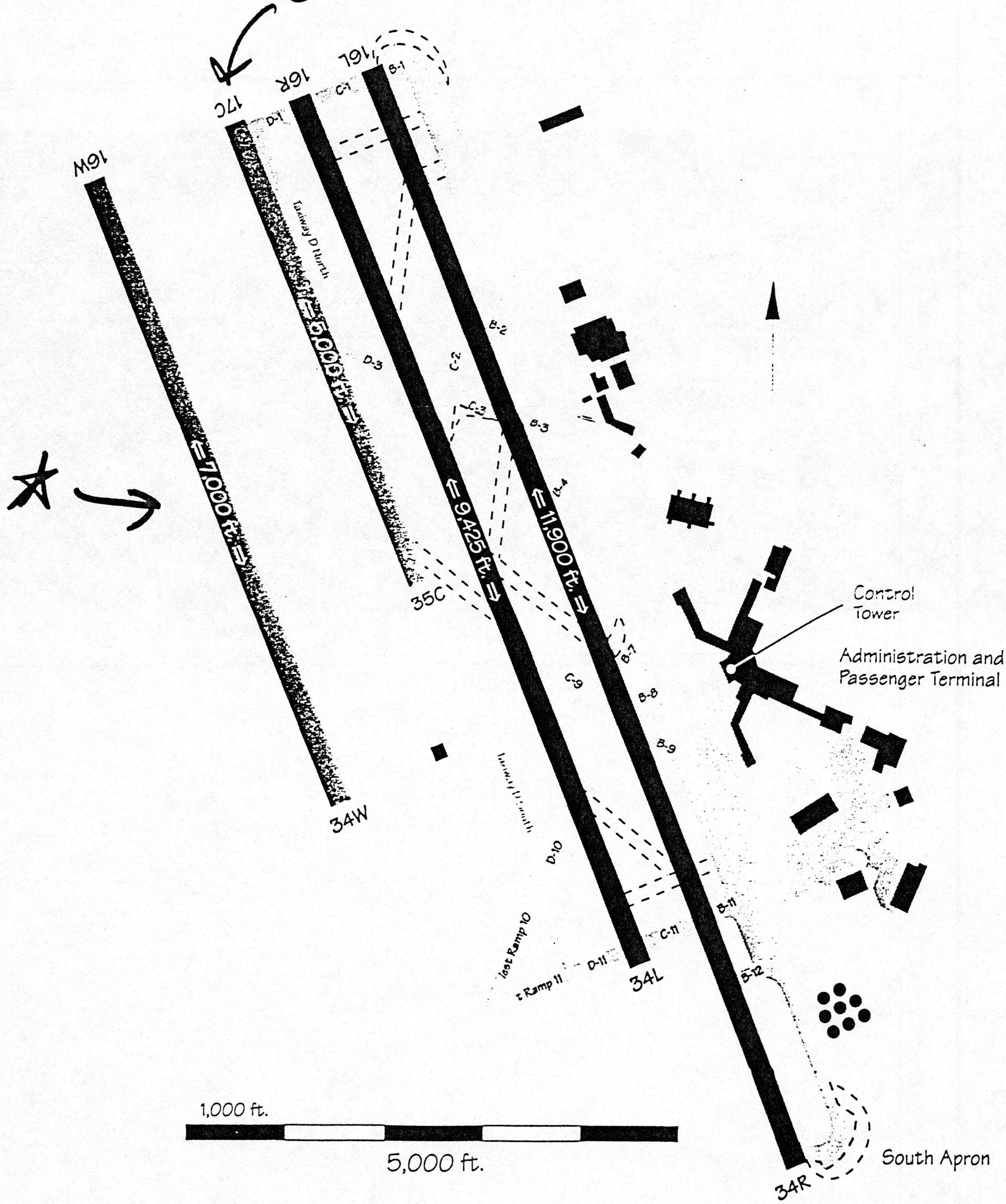
cc: ATA Member Carriers Serving Seattle-Tacoma

Seattle-Tacoma (SEA)

#6

Potential airport improvements include a new 7,000-foot runway, Runway 16W/34W, to be located 2,500 feet from Runway 16L/34R, and conversion of an existing taxiway into a new parallel commuter runway for VFR use, Runway 17C/35C.

(this 4th runway was a "typo."



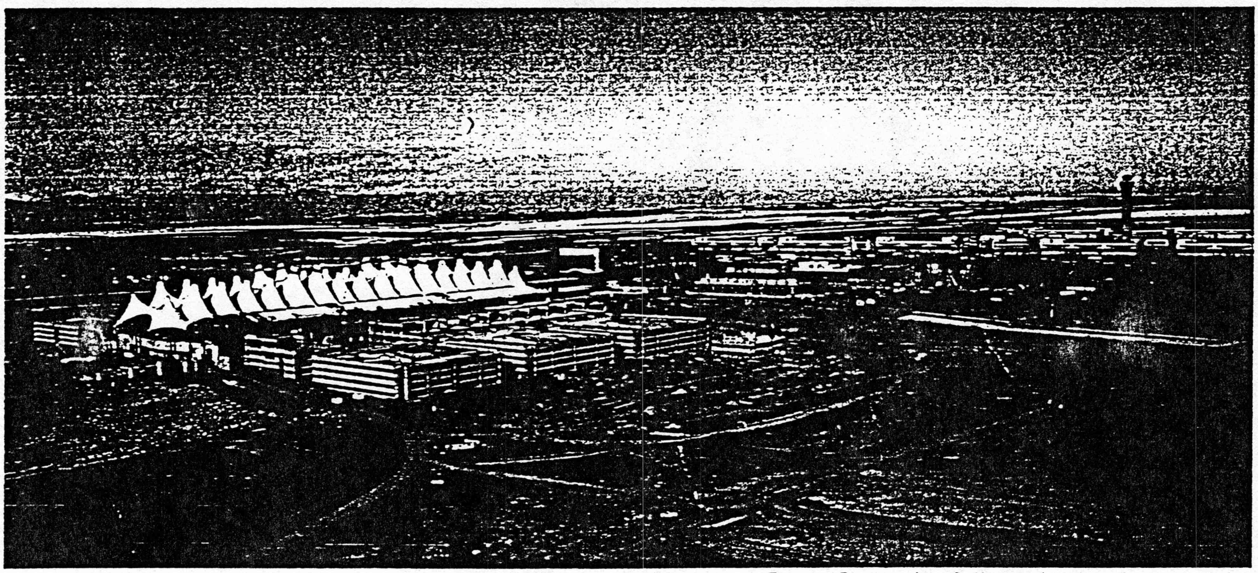
#6, cont.

1993 Aviation System Capacity Plan

U.S. Department
of Transportation

**Federal Aviation
Administration**

DOT/FAA/ASC-93-1



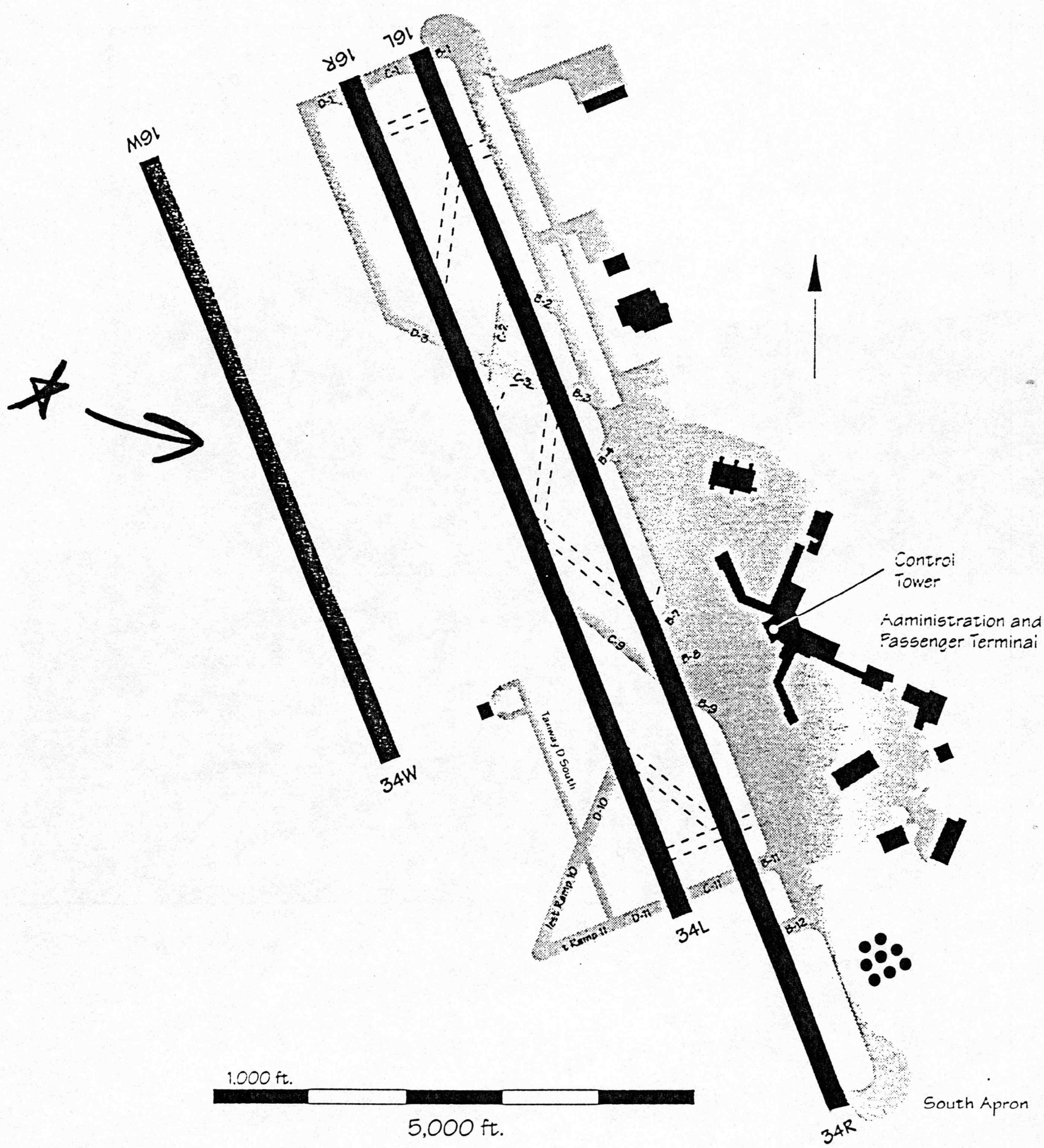
Denver International Airport (DIA) under construction

Prepared by:
Federal Aviation Administration
Office of System Capacity and Requirements
Washington, DC 20591

Seattle-Tacoma Int'l Airport (SEA)

Potential airport improvements include a new parallel runway, Runway 16W/34W, which will be located 2,500 feet from Runway 16L/34R. A decision on construction will be made in 1996, and the estimated cost of construction is $400 million.

#7



1994 ACE PLAN

Released March, 1995

#7, cont.

Aviation Capacity Enhancement

DOT/FAA/ASC-94-1

U.S. Department of Transportation

Federal Aviation Administration

Prepared by:
Federal Aviation Administration
Office of System Capacity
and Requirements
Washington, DC 20591

Table 2-5. New and Extended Runways Planned or Proposed+

Airport	Runway	IFR Capacity (ARR/HR)† New Config.	IFR Capacity (ARR/HR)† Current Best	Est. Cost ($M)	Est. Date Oper.
Albany (ALB)	10/28 extension	29[2]	29[2]	$5.8	2005
	1R/19L parallel	++	29[2]	$7.5	2010
Albuquerque (ABQ)	3/21 extension	29[2]	29[2]	$20.0	1996
Atlanta (ATL)	E/W parallel	86[3]	57[1]	$160.0	1999
Austin (BSM) (new airport)	(Bergstrom AFB)	57[1]		$583.0	1998
Baltimore (BWI) 7,800 ft 3,500 sep. (D-5) →	10R/28L parallel	57[11]	29[2]	$48.0	1996
	10/28 extension	29[2]	29[2]	$12.0	2003
Boston (BOS)	14/32	57[11]	29[2]	$5.0	1999
Charlotte (CLT) 8,000 ft 1,200 sep. (D-7) →	18W/36W parallel	86[3]	57[1,8]	$43.0	1999
	18E/36E parallel	114[10]	57[1,8]		
Chicago O'Hare (ORD)	9/27 parallel	86[3]	57[1]		
	14/32 parallel	86[3]	57[1]		
	14L extension	57[1]	57[1]		
Cincinnati (CVG)	18R/36L extension	57[1,8]	57[1]	$11.0	1997
	9/27 extension	57[1,8]	57[1]	$25.0	1995
Cleveland-Hopkins (CLE)	5L/23R extension	29[2]	29[2]	$50.0	1999
9,600 ft (D-9)	5W/23W parallel	42[4]	29[2]	$125.0	2000
Port Columbus (CMH)	10L/28R extension	42[4]	42[4]	$21.2	1998
	10S/28S parallel	57[11]	42[4]	$108.1	
	10N/28N parallel	57[1]	42[4]	$49.4	
Dallas-Fort Worth (DFW)	17R/35L extension	57[1]	57[1,7]	$20.0	1993
	18L/36R extension	57[1]	57[1,7]	$25.0	1997
	18R/36L extension	57[1]	57[1,7]	$24.0	1997
	16E/34E	86[3]	57[1,7]	$320.0	1996
	16W/34W	114[10]	57[1,7]	$150.0	2001
Denver (DEN)	New airport	86[3]	57[1]	$2,972.0	1995
Detroit (DTW)	4/22 parallel	71[6]	57[1]	$54.5	1998
El Paso (ELP)	8/26 parallel	++	29[2]	$10.7	
Fort Lauderdale (FLL)	9R/27L extension	42[4]	42[4]	$270.0	2000
Fort Myers (RSW)	6/24 extension	29[2]	29[2]	$20.0	1994
9,000 to 10,000 ft 4,300 sep (D-15)	6R/24L parallel	57[1]	29[2]	$87.0	2000

Table 2-5. New and Extended Runways Planned or Proposed[+] #8, cont.

Airport	Runway	IFR Capacity (ARR/HR)[†] New Config.	Current Best	Est. Cost ($M)	Est. Date Oper.
Grand Rapids (GRR)	8L/26R extension	29[2]	29[2]	$3.6	1994
	17/35 replacement	29[2]	29[2]	$40.0	1998
	8L/26R parallel	57[1]	29[2]		
Greensboro (GSO)	5L/23R parallel	57[1]	29[2]		
	14/32 extension	29[2]	29[2]	15.7	1998
Greer (GSP) 10,000 ft (D-21) 6,300 sep.	3R/21L parallel	57[1]	29[2]	$50.0	2015
	3L/21R extension	29[2]	29[2]	$34.1	1999
Houston (IAH)	14R/32L extension	57[1]	57[1]	$8.0	1997
	8L/26R parallel	86[3]	57[1]	$44.0	1999
	9R/27L parallel	114[10]	57[1]	$44.0	2002
Indianapolis (IND)	5L/23R replacement	57[1]	42[4]	$37.5	1995
Islip (ISP)	15R/33L extension	29[2]	29[2]	$26.0	2000
Jacksonville (JAX)	7R/25L parallel	57[1]	29[2]	$37.0	2000
	7L/25R extension	29[2]	29[2]	$19.0	1994
Kahului (OGG)	2/20 extension	29[2]	29[2]		
Kansas City (MCI)	1R/19L parallel	57[1]	29[2]	$45.2	1994
	1L/19R extension	29[2]	29[2]	$7.0	
Las Vegas (LAS)	7R/25L extension	29[2]	29[2]	$3.2	1995
	1L/19R reconstruction	29[2]	29[2]		1997
Little Rock (LIT)	4L/22R extension	57[1]	57[1]	$30.0	1996
Louisville (SDF) 7,800 ft (D-31) both 4,950 sep.	17L/35R parallel	29[2]	29[2]	$42.0	1995
10,000 ft (D-31) →	17R/35L parallel	57[1]	29[2]	$51.0	1997
Lubbock (LBB)	8/26 extension	29[2]	29[2]	$3.8	2000
Madison (MSN)	3/21 Replacement	29[8]	29[8]	$15.0	1998
Memphis (MEM)	18E/36E parallel	57[1]	42[4]	$88.8	1997
	18L/36R extension	42[4]	42[4]	$58.0	1999
Miami (MIA)	9N/27N parallel	++	57[1]	$170	1999
Midland (MAF)	10/28 extension	29[2]	29[2]	$5.0	2005
Milwaukee (MKE)	7R/25L parallel	57[7]	29[2]	$150.0	2003
Minneapolis (MSP)	4/22 extension	42[4]	42[4]	$12.5	1995
Nashville (BNA)	2E/20E parallel	++	57[1]		
	2R/20L extension	57[1]	57[1]	38.6	2000

Table 2-5. New and Extended Runways Planned or Proposed[+] #8, cont.

Airport	Runway	IFR Capacity (ARR/HR)[†] New Config.	Current Best	Est. Cost ($M)	Est. Date Oper.
New Orleans (MSY)	1L/19R parallel	57[1]	29[2]	$340.0	2000
	10/28 parallel	57[1]	29[2]	$460.0	2020
Oklahoma City (OKC)	17L/35R extension	57[1]	57[1]	$8.0	
	17R/35L extension	57[1]	57[1]	$8.0	2014
	17W/35W parallel	57[1]	57[1]	$13.0	2004
Orlando (MCO)	17L/35R 4th parallel	86[3]	57[1]	$115.0	2000
Palm Beach (PBI)	9L/27R extension	29[2]	29[2]	$4.8	
	13/31 extension	29[2]	29[2]	$1.0	1999
	9R/27L extension	29[2]	29[2]	$0.5	1999
Philadelphia (PHL)	8/26 parallel-commuter	57[1,9]	57[7]	$215.0	1997
Phoenix (PHX) 7,800 ft (D-45) 800 sep.	7/25 3rd parallel	57[1]	42[4]	$88.0	1995
	8L/26R extension	42[4]	42[4]	$7.0	
Pittsburgh (PIT)	10C/28C extension	57[1]	57[1]	$10.0	1995
	4th parallel 10/28	71[6]	57[1]	$150.0	2000
	5th parallel 10/28	++	57[1]		
Raleigh-Durham (RDU)	Relocate 5R/23L	57[1]	57[11]		
	5W/23W	++	57[11]		
	5E/23E	++	57[11]		
Reno (RNO)	16L/34R extension	29[2]	29[2]	$22.0	1994
Richmond (RIC)	16/34 extension	29[2]	29[2]	$12.0	1997
Rochester (ROC)	4R/22L parallel	++	29[2]	$10.0	2010
	4/22 extension	29[2]	29[2]	$4.0	2000
	10/28 extension	29[2]	29[2]	$3.2	2000
St. Louis (STL)	14R/32L	++	29[2]	$390.0	1998
Salt Lake City (SLC) 12,000 ft. 6,300 sep. (D-50)	16/34 west parallel	57[1]	42[4]	$120.0	1996
San Antonio (SAT)	N/S parallel	++	29[2]	$300.0	2005
Santa Ana (SNA)	1L/19R extension	29[2]	29[2]		
Sarasota-Bradenton (SRQ)	14L/32R parallel	57[1]	29[2]	$9.0	1998
	14/32 extension	29[2]	29[2]	$4.3	1996
Seattle-Tacoma (SEA) >7,000 ft. 2,500 sep (D-54)	16W/34W parallel	42[4]	29[2]	$400.0	2001
Spokane (GEG) 8,500 ft 4,400 sep. (D-55)	3L/21R	57[1]	29[2]	$11.0	2001
Syracuse (SYR) 7,500 ft 3,400 sep. D-56	10L/28R	57[1]	29[2]	$46.0	2000

Table 2-5. New and Extended Runways Planned or Proposed+

#8, cont.

Airport	Runway	IFR Capacity (ARR/HR)† New Config.	Current Best	Est. Cost ($M)	Est. Date Oper.
Tampa (TPA) 9,650 (0-57) (700 sep)	18R/36L 3rd parallel	71[6]	57[1]	$55.0	2000
	27 extension	57[1]	57[1]		
	18L extension	57[1]	57[1]		
Tucson (TUS)	11R/29L parallel	29[2]	29[2]	$30.0	2005
Tulsa (TUL) 9,600 ft 5,200 sep (0-57)	18E/36E parallel	86[3]	57[1]	$115.0	2005
Washington (IAD)	1L/19R parallel	86[3]	57[1,7]	$60.0	2009
	12R/30L parallel	57[1]	57[1,7]	$80.0	2010
Total Available Estimated Costs of Construction:				$9.3 Billion*	

\+ See endnotes 1-11, below, which describe the IFR arrival capacity of the current and potential new configurations.

++ Information on runway location is unavailable or too tentative to determine IFR multiple approach benefit of this new construction project.

* Includes the total costs of the new Denver International Airport, $2,972 million.

† Estimates of generalized hourly IFR arrival capacity increases are included in Table 2–5. These values have been updated from those originally reported in a 1987 report. The new numbers reflect the approval of 2.5 (for wet runways inside 10 nm), 3, 4, 5, and 6 nm in-trail separations and 1.5 nm diagonal separation for dependent parallel arrivals. The updated IFR arrival capacity of any single runway that can be operated independently is 29 arrivals per hour (rounded up from 28.5); dependent parallel runways, 42 arrivals per hour; and independent parallels, 57 arrivals per hour (2 times a single runway, 28.5). Other configurations are multiples of the above. These values are provided to illustrate the approximate magnitude of the capacity increase provided. They should not be taken as the exact capacity of a particular airport, since site-specific conditions (e.g., varying aircraft fleet mixes) can result in differences from these estimates.

Endnotes

1. Independent parallel approaches [57 IFR arrivals per hour].
2. Single runway approaches [29 IFR arrivals per hour {rounded up from 28.5}].
3. Triple independent approaches (currently not authorized) [86 IFR arrivals per hour {rounded up from 85.5}].
4. Dependent parallel approaches [42 IFR arrivals per hour].
5. Triple approaches with parallel and converging pairs may permit more than 57 IFR arrivals if procedures are developed.
6. Triple parallel approaches with dependent and independent pairs (currently not authorized) [71 IFR arrivals per hour {This is a rough estimate, obtained by adding 42 & 29 as explained above}].
7. Converging IFR approaches to minima higher than Category (CAT) I ILS [57 IFR arrivals per hour].
8. Added capacity during noise abatement operations.
9. Independent parallel approaches with one short runway.
10. If independent quadruple approaches are approved [114 IFR arrivals per hour].
11. Independent parallel approaches with PRM (3,400 ft. to 4,300 ft.) [57 IFR arrivals per hour].

#9

TABLE 5-11
TOTAL ESTIMATED COSTS OF CONSTRUCTION, PROPERTY ACQUISITION AND RELOCATIONS FOR AIRSIDE OPTIONS

	Cost in 1994 Dollars			
Airside Option	Construction	Property Acquisition and Relocation [b]	Baseline Total	Baseline Plus 15% Contingency
Option 2: Commuter-Close	78,790,000	0	78,790,000	90,609,000
Option 3: Commuter-Dependent	255,038,000	41,531,000	296,569,000	341,054,000
Option 4A: Programmatic Baseline	346,800,000	64,135,000	410,935,000	472,575,000
Option 4B: Programmatic Baseline-Staggered 7K ft.	279,252,000	69,063,000	348,315,000	400,562,000
Option 4C: Staggered 7,500-foot Runway	294,027,000	75,365,000	369,392,000	424,801,000
Option 5: Dependent-Maximum Length	364,300,000	91,420,000	455,720,000	524,078,000
Option 6: Independent-Maximum Length	596,278,000	176,926,000	773,204,000	889,185,000

] Sources: Tables 5-2 through 5-10.

] Sources: Landrum & Brown, Letter dated August 15, 1994 to Port of Seattle, and revised cost estimates dated September 6, 1994, Costs include acquisition of property in the future Runway Protection Zones. Costs are based on Landrum & Brown's Cost Method 1, which reflects acquisition costs calculated as the sum of assessed value for each property affected, increased to market (sales) value, plus relocation costs. For residential relocation, the Uniform Relocation Act maximum of $22,500 per residence was used.

#9, cont.

TECHNICAL REPORT NO. 6

AIRSIDE OPTIONS EVALUATION

AIRPORT MASTER PLAN UPDATE
FOR
SEATTLE - TACOMA INTERNATIONAL AIRPORT

Prepared by:

P&D AVIATION

Prepared for:

The Port of Seattle
SEATTLE - TACOMA INTERNATIONAL AIRPORT

SEPTEMBER 19, 1994

The P&D Aviation Team

P&D Aviation • Barnard Dunkelberg & Company • Berk & Associates
Mestre Greve Associates • Murase Associates • O'Neill & Company
Parsons Brinckerhoff • Thompson Consultants International
Landrum & Brown • Claire Barrett & Associates

#10

PORT OF SEATTLE
MEMORANDUM

VIA FACSIMILE

DATE: April 26, 1993

TO: Friday Strategy Group

FROM: Desiree B. Leigh, Government Relations Manager

SUBJECT: Follow-up Assignments for the Week of April 26

1.	Prepare for this week's General Assembly strategy meeting and update vote information for Riniker.	Leigh
2.	By Tuesday noon, collect preliminary information on any proposed amendments from jurisdictions around Sea-Tac and fax to Leigh for distribution at strategy meeting.	Courtney & Garson
3.	Continue to collect information on possible amendments.	Everyone
4.	Discuss with FAA officials funding of PSRC's request to scope demand management, systems management and noise performance standards at Sea-Tac.	Stewart
5.	Discuss with Montgelas and clarify DOT's position regarding PSRC's appropriate role regarding demand management, system management and noise performance standards at Sea-Tac.	Leigh
6.	Submit names of possible candidates to Morrison.	Riniker
7.	Discuss with Berentson about supporting Montgelas on issue of PSRC's appropriate role regarding demand management, etc.	Riniker
8.	Ask Bremerton contacts to assist with getting Mayor of Bremerton at Thursday meeting. Make sure contacts brief him as well.	Garson and Yates
9.	Report back to Riniker regarding discussion with McCumber about some basic principles and our assumptions, which are:	Ford ✓

#10, cont.

- Identification of a feasible major supplemental airport site must be voted on by PSRC General Assembly.
- Independent evaluation should be done by a hearing examiner.
- PSRC should not be scoping demand management, system management and noise performance standards. Such issues should be part of Port's EIS. PSRC should only be working with DOT on scoping of major supplemental airport site.

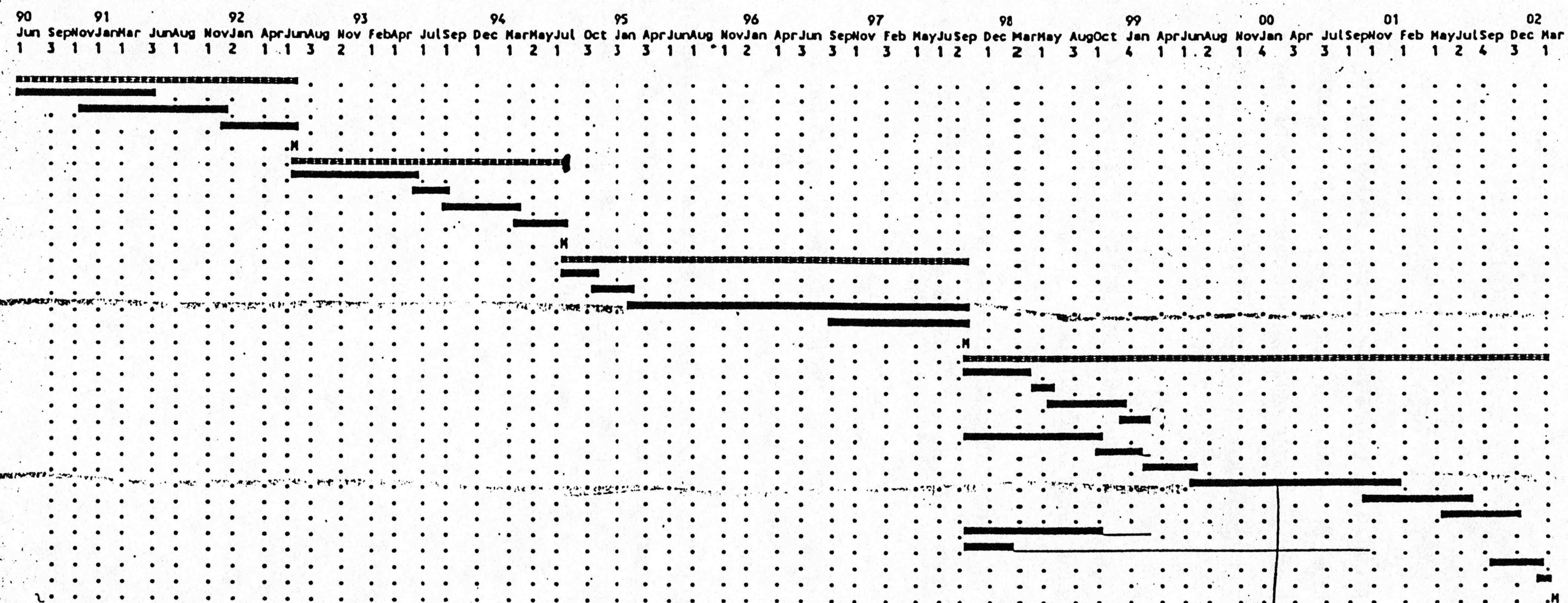
10. Cross your fingers between now and Thursday at 6:00 p.m. — Everyone

1086x

Working Draft
For Discussion Purposes Only

Schedule Name : SEA-TAC THIRD RUNWAY HYPOTHETICAL PROJECT SCHEDULE
Responsible : Mike Horton
As-of Date : 29-Sep-89 Schedule File : A:\39SCHED

Task Name	Duratn (Mths)
DECISION	24
Preliminary Planning	12
Initial Agency Contact	12
Commission & Public Discussion	6
Commission Project Authorizt'n	0
ENVIRONMENTAL IMPACT STATEMENT	24
DEIS Preparation	11
Review & Public Hearing	3
EIS Preparation	6
Final Review	4
EIS Acceptance	0
PROPERTY ACQUISITION	36
Acquisition Plan Development	3
Public Information Program	3
Negotiation	30
Initial Permit Applications	12
Complete Property Acquisition	0
CONSTRUCTION	51
Preliminary Design	6
Review	2
Final Design	6
Final Engineering Review	2
Receive Final Permits	12
Bid, Award & Approval	3
Mobilization & Demolition	4
Earthwork	18
Site Work, Taxi & Runway Const	9
Runway Lighting & Electrical	6
Nav Aid Relocation	12
Weyerhaeuser & POS Fac Reloc'n	4
Miscellaneous & Punch List	4
Testing	1
Dedication	0



Detail Task — (Started) — (Slack)
Summary Task — (Started) — (Slack)
M Milestone
>>> Conflict
Resource delay
Scale: 3 weeks per character

TIME LINE Gantt Chart Report, Strip 1

#11

Working Draft
For Discussion Purposes Only

#11, cont.

INTRODUCTION

This report presents a preliminary, concept discussion and "Order of Magnitude" cost estimate for the potential future extension of SEA-TAC International Airport, by the provision of a third runway 7,000 ft in length, by 150 ft width, located 2,500 ft west of the existing N-S runway 16L-34R. The cost estimate was prepared to address the hypothetical question which has been raised in recent long range planning discussions:

"Would it be technically feasible to add a third runway at Sea-Tac for air carrier jet operations, and if feasible, approximately how much would it cost?"

The scope of this brief evaluation effort includes an overview assessment of the basic planning criteria for the runway, and a review of potential Federal Aviation Administration (FAA), Tower and air carrier considerations.

The scope of the Project, as defined by Port of Seattle Engineering Staff, includes 16 review and cost items. These are listed on the following page.

This report is presented in two sections. The first identifies and presents basic items to be included to meet the required standards and user needs. The second includes a project schedule and cost estimate, supported by information on quantities and unit cost assumptions used to generate the conceptual layouts.

64

RECEIVED
LAW OFFICES
J. RICHARD ARAMBURU

NOV 6 1992
AM PM
7 8 9 10 11 12 1 2 3 4 5 6

Working Draft
For Discussion Purposes Only

#11, cont.

SEA-TAC INTERNATIONAL AIRPORT

POTENTIAL FUTURE THIRD AIR CARRIER RUNWAY

PRELIMINARY CONCEPT DISCUSSION

RECEIVED
OCT 12 1989
ENGINEERING

TAMS Consultants, Inc.

September 1989

#12

allel runway, and Nashville and Washington Dulles completed runway extensions. In 1993, Detroit Metropolitan Wayne County completed construction of a new parallel runway, and runway extensions were completed at Dallas-Fort Worth, San Jose, Kailua-Kono Keahole, and Islip Long Island Mac Arthur. In 1993, Salt Lake City and Memphis began construction of independent parallel runways, and Louisville Standiford Field began construction of two independent parallel runways. In 1994, Kansas City should complete construction of a new independent parallel runway.

Of the top 100 airports, 60 have proposed new runways or extensions to existing runways. Of the 23 delay-problem airports in 1993, 15 are in the process of constructing or planning the construction of new runways or extensions to existing runways. Of the 32 delay-problem airports forecast for the year 2003, 24 propose to build new runways or runway extensions. The total anticipated cost of completing these new runways and runway extensions exceeds $9.0 billion.

While much has been done and more is planned to increase system-wide capacity, it should be noted that the FAA's resources are limited. The demand for Facilities and Equipment (F&E) and Airport Improvement Program (AIP) funds far exceeds availability. However, the FAA will continue to explore innovative methods of increasing system capacity.

System capacity must continue to grow in order to enable the air transportation industry to maintain the same level of service quality and allow airline competition to continue. In the dozen years since airline deregulation, real air fares have declined. Both the quality and cost of air service are strongly tied to aviation system capacity and will continue to show favorable trends only if aviation system capacity continues to grow to meet demand.

Tmp

cc. Aidan

SEATTLE AIRLINES AIRPORT AFFAIRS COMMITTEE
P.O. Box 68900
Seattle, WA 98168

#13

September 17, 1993

Mr. Wade Bryant
Federal Aviation Administration
Manager, Seattle ADO
1601 Lind Avenue S.W., Suite 250
Renton, WA 98055-4056

Dear Mr. Bryant:

This letter is written on behalf of the scheduled airlines serving Sea-Tac International Airport. The carriers are most concerned over the capacity of Sea-Tac and its runway system to accommodate current peak periods and the continued growth forecast in the future.

Over the past several years, the airlines have consistently supported the planning efforts by the Port of Seattle and the Puget Sound Regional Council to develop methods of providing additional capacity for air transportation in this region. Airline representatives have served as members of the Noise Mediation and Flight Plan panels, and we have supported in public sessions Flight Plan's "Preferred Alternative" which calls for a third runway at Sea-Tac Airport.

Our support has been conceptual only, but now with the approval by the PSRC for the Port of Seattle to proceed with planning, design, and environmental studies for a third runway, the airlines must also address the issue of cost. We recognize that no definitive cost estimates are available for the development of the third runway. As a consequence, our ultimate decision to support construction of this project will be based on a complete cost/benefit analysis when the magnitude of cost is better known. Any endorsement by the airlines for the project will also be subject to the receipt by the Port of maximum Federal funding in the form of future discretionary airport grants.

In addition to the total cost, the airlines are concerned about proposed operating restrictions including the much discussed "Demand Management" and any other requirements in excess of the principles agreed to in Noise Mediation. Such restrictions could reduce the desirability of Sea-Tac from an airline marketing perspective and thus negatively impact the very economic factors the third runway will foster. Further, we expect all part ies to adhere to the spirit and intent of the complex agreements reached voluntarily in the noise mediation process. Satisfactory resolution of these matters is necessary prior to final airline approvals.

#13, cont.

You are aware of the very difficult financial situation of the airline industry which is likely to continue well into the future. We believe that a proposed third runway project is of very high priority in the national aviation system and should receive a maximum federal funding commitment. Each dollar of Federal funding in this project will reduce the cost to the airlines using Sea-Tac, thus making the project more viable for all concerned.

We understand the Port has submitted a request for a "Letter of Intent" (LOI) for future discretionary grants as part of its financial plan for the third runway project. Since we recognize that a LOI is not a guarantee of funding, the Port must present an acceptable plan for financing the project to the extent LOI money is not forthcoming through the elimination of deferral of other planned work.

At this time, our support for a LOI for Sea-Tac does not imply full airline concurrence with the proposed project or any of the other projects in the Port's preliminary Capital Improvement Program through the year 2001. These approvals will be addressed as specified in our existing contract agreements with the Port and through other consultation procedures in place for AIP grants and PFC's.

Given the conditions noted above, and in order to allow adequate financial planning by the Port and its tenant airlines, the airlines serving Seattle support the Port's request to the FAA for a LOI for future funding grants.

Sincerely,

Clifford T. Argue

Clifford T. Argue
Chairman
Seattle Airlines Airport Affairs Committee

CTA/msd

c: Gina Marie Lindsey, Managing Director-Aviation, Port of Seattle
SEA AAAC

Port of Seattle

August 24, 1993

Mr. Wade Bryant
Manager, Seattle ADO
Federal Aviation Administration
1601 Lind Avenue S.W., Suite 250
Renton, WA 98055-4056

#14

Dear Mr. Bryant,

This is to notify the FAA that the Port of Seattle intends to proceed with the design, engineering, planning, and EIS work necessary to support a Port Commission decision to develop the Third Runway and the accompanying accelerated noise insulation program at Sea-Tac International Airport, as more fully described in Resolution #3125, passed on November 3, 1992. In addition, the Puget Sound Regional Council, acting as the region's Metropolitan Planning Organization (MPO), adopted Resolution #A-03-93 on April 29, 1993, which supported this course of action. The necessary planning work, including an updated Comprehensive Plan and an EIS are currently underway, with refined cost estimates and master planning recommendations to be completed in 1995. The Port will then be prepared to proceed with a funding plan and design to expedite the award of construction contracts upon approval of the EIS in April of 1996. In order to accomplish this objective, we are requesting a Letter of Intent so that critical financial support for this high priority project is in place.

After several years of analysis done with extensive involvement from the region and the FAA, the Port believes the proposed project to be the best alternative for reducing system-wide aircraft delays. As you are undoubtedly aware from a recent summary report of FAA Capacity Design Teams, Sea-Tac is the 7th most delayed airport of the top 28 studied, while being only the 13th busiest. This finding is consistent with other capacity studies involving Sea-Tac, underscoring the need to develop a second arrival stream during inclement weather, which occurs up to 45% of the time here.

In reviewing other pending or approved LOI's around the country, the Port is confident that this request for funds compares favorably, and competes well with other major airfield expansion projects such as St. Louis or Dallas-Ft. Worth. While detailed financial information will follow, the Port is requesting $267.5 million in LOI commitments over the next twelve years, as partial funding for total capital improvements of $989.7 million through 2001. This represents 27% of our funding requirement during the 1996-2001 timeframe. The remainder will be funded through a combination of PFC's, separate AIP Noise-related grants, income from operations, and new airline backed debt.

Seattle-Tacoma
International Airport
P.O. Box 68727
Seattle, WA 98168 U.S.A.
TELEX 703-433
FAX (206) 431-5912

#14, cont.

In response to FAA regulations, however, the Port will outline what would be required to develop additional capacity and associated mitigation without the issuance of an LOI by the FAA. Estimates made regarding construction of an additional runway with minimal federal commitments indicate a tripling of aircraft delays over current levels before expansion could be completed. This is certainly not the preferred method for achieving additional system capacity in the shortest time frame. The Port understands that the magnitude of this request requires oversight and review by the relevant committees in both the U.S. Senate and the House of Representatives, and is prepared to proceed with any necessary presentations. We look forward to working with you to determine the best means for moving this request forward to the appropriate decision-makers.

The Port welcomes any further analysis necessary to qualify for budget constrained AIP funds, and is confident that under either the current prioritization method or other proposed criteria for investment, this project will score near the top of a nationwide list of capacity enhancement investments. Attached you will find a schedule of preliminary timeframes for the major implementation phases for the third runway. The Port is fully prepared to commit all entitlements received over the life of the proposed LOI to this project. While the requested LOI exceeds preliminary ranges provided by the Airports District Office, our conclusion is the higher level of federal funding is necessary to keep the project on track, and is commensurate with the enhancement of system-wide capacity. These projections have also been made in recognition of the intent of the LOI process being targeted at investments that exceed normal levels of support.

Indeed, Paragraph 952 of Section 6 of the AIP handbook states "The magnitude of projects which are candidates for LOI's is such that they will be expected to exceed regional project approval authority." The Port is hopeful of receiving your support as this request is carried forward to the national level. Supplemental materials normally associated with a Pre-Application will follow, along with alternative funding plans.

The Port of Seattle, as the sponsor for Seattle-Tacoma Int'l Airport, understands that any Letter of Intent issued by the FAA for capital improvements is contingent upon adequate budgetary appropriations being made. Thank you for your assistance in obtaining letter of intent authorization, and if you need additional information, please contact Tim Watson at 206-248-7454.

Sincerely,

Gary Grant, President
Port of Seattle Commission

Attachments:

SEA . 600

JWB
8/27/93

#15

CONCURRENCES	
ROUTING SYMBOL	ANH-610
INITIALS/SIGNATURE	[illegible]
DATE	8/27
ROUTING SYMBOL	ANH-620
INITIALS/SIGNATURE	[illegible]
DATE	8/27
ROUTING SYMBOL	ANH-600
INITIALS/SIGNATURE	
DATE	
ROUTING SYMBOL	SEA-600
INITIALS/SIGNATURE	
DATE	
ROUTING SYMBOL	SEA 635
INITIALS/SIGNATURE	CKC
DATE	8/27
ROUTING SYMBOL	
INITIALS/SIGNATURE	
DATE	
ROUTING SYMBOL	
INITIALS/SIGNATURE	
DATE	
ROUTING SYMBOL	
INITIALS/SIGNATURE	
DATE	

August 27, 1993

Mr. Gary Grant, President
Port of Seattle Commission
Seattle-Tacoma International Airport
P.O. Box 68727
Seattle, WA 98168

Dear Mr. Grant:

This is to acknowledge receipt of your August 24 request for a Letter of Intent (LOI) to do major development at Seattle-Tacoma International (SEA-TAC) Airport over the next several years.

We do not expect funds to be available in the short term for LOI's. However, we will work closely with your personnel at the airport and our regional office to assure that everything is in order for SEA-TAC to compete on the national level if funds for LOI's do become available.

We appreciate the cooperative attitude of the your personnel associated with the airport and look forward to working with them on many of the projects SEA-TAC expects to undertake.

Sincerely,

ORIGINAL SIGNED BY

J. Wade Bryant
Manager, Seattle Airports
District Office

cc:
Gina Marie Lindsey, Managing Director of Aviation, Port of Seattle
Tim Watson, Port of Seattle - Finance

SEA-600:JWBRYANT:sjf:x2659:8/27/93
FILE: SEA-TAC SITE - MGMT

OFFICIAL FILE COPY

Table 1-3. Delays of 15 Minutes or More Per 1,000 Operations a the Top 100 Airports

#16

Airport	ID	1990	1991	1992	1993
Newark Int'l.	EWR	84.90	67.30	83.50	87.90
Chicago O'Hare Int'l.	ORD	64.60	47.90	45.40	47.50
Boston Logan Int'l.	BOS	32.30	32.80	34.60	39.20
New York LaGuardia	LGA	86.80	61.60	55.20	38.30
Denver Stapleton Int'l.	DEN	28.90	28.40	26.30	37.90
New York Kennedy Int'l.	JFK	68.30	41.70	41.20	35.70
Dallas-Fort Worth Int'l.	DFW	32.00	35.30	29.80	33.70
San Francisco Int'l.	SFO	45.80	58.10	30.20	23.80
Atlanta Hartsfield Int'l.	ATL	44.10	22.10	29.90	23.30
St. Louis Lambert Int'l.	STL	25.20	29.90	15.00	19.50
Philadelphia Int'l.	PHL	35.40	16.90	18.50	18.80
Miami Int'l.	MIA	8.60	24.00	9.70	10.50
Washington National	DCA	9.60	5.60	11.00	9.30
Los Angeles Int'l.	LAX	7.10	14.80	19.80	9.20
Detroit Metropolitan	DTW	19.90	9.30	11.20	9.10
Houston Intercontinental	IAH	12.70	12.60	7.90	8.10
Minneapolis-St. Paul Int'l.	MSP	31.90	7.90	4.40	7.20
Pittsburgh Int'l.	PIT	8.60	5.00	8.00	6.90
Washington Dulles Int'l.	IAD	7.40	9.00	7.30	6.90
Seattle-Tacoma Int'l.	SEA	30.50	18.80	13.20	6.80
Greater Cincinnati Int'l.	CVG	11.20	5.30	5.90	6.40
Orlando Int'l.	MCO	7.30	6.40	9.00	4.70
Baltimore-Washington Int'l.	BWI	17.60	6.00	5.80	3.90
Salt Lake City Int'l.	SLC	3.20	3.70	5.10	3.90
Tampa Int'l.	TPA	4.80	2.90	4.30	3.90
San Diego Int'l.	SAN	6.40	10.20	3.00	3.90
Charlotte/Douglas Int'l.	CLT	12.60	9.70	6.20	3.80
Fort Lauderdale-Hollywood Int'l.	FLL	3.00	2.10	3.70	3.80
Houston William B. Hobby	HOU	4.60	5.00	2.70	3.50
Chicago Midway	MDW	7.10	2.10	2.10	3.00
Phoenix Sky Harbor Int'l.	PHX	9.90	6.70	8.20	2.90
Nashville Int'l.	BNA	1.70	3.90	2.90	2.70
Cleveland Hopkins Int'l.	CLE	4.70	2.00	1.60	2.40
Raleigh-Durham Int'l.	RDU	2.40	2.00	3.60	2.00
Portland Int'l.	PDX	1.30	1.40	1.80	1.90
Kansas City Int'l.	MCI	2.30	3.00	0.80	1.30
Ontario Int'l.	ONT	1.20	1.60	1.30	1.20
Memphis Int'l.	MEM	3.00	2.40	1.10	1.00
Bradley Int'l.	BDL	3.80	2.40	2.00	0.90
Palm Beach Int'l.	PBI	1.40	1.50	1.00	0.80
Anchorage Int'l.	ANC	2.00	1.30	0.30	0.70
Indianapolis Int'l.	IND	0.80	1.00	2.10	0.60
Las Vegas McCarran Int'l.	LAS	1.20	0.40	0.30	0.50
San Jose Int'l.	SJC	11.10	4.30	1.70	0.40
Albuquerque Int'l.	ABQ	1.00	0.70	0.70	0.30
New Orleans Int'l.	MSY	2.00	1.10	0.60	0.30
San Juan Luis Muñoz Marín Int'l.	SJU	0.40	0.10	0.60	0.30
Dayton Int'l.	DAY	1.50	1.10	0.30	0.30
Honolulu Int'l.	HNL	0.40	0.40	0.10	0.20
San Antonio Int'l.	SAT	0.80	0.30	0.20	0.10
Kahului	OGG	0.20	0.10	0.10	0.00

the end of 1995.

PRELIMINARY NEW RUNWAY LENGTH FINDINGS

The required takeoff and landing lengths for the mix of aircraft anticipated to operate at the airport in the future were determined from aircraft performance charts and operations manuals. The significant findings of these studies are:

- A new 5,200-foot commuter runway (Options 2 and 3) would be of sufficient length to accommodate about 31 percent of the takeoffs and 31 percent of the landings in the year 2020.
- A new 7,000-foot runway (Options 4A and 4B) would be able to serve 77 percent of takeoffs and 91 percent of landings in 2020.
- A new 7,500-foot runway (Option 4C) would be able to serve 85 percent of takeoffs and 97 percent of landings in 2020.
- A new 8,500-foot runway (Option 5) would accommodate 90 percent of takeoffs and 99 percent of landings in 2020.

The capability of the new runway to accommodate all aircraft types for landing determines the amount of delay reduction which can be achieved. If approaching aircraft must cross other approaching traffic to lineup for longer runways then additional delays can occur. The following delay analysis confirms the 8,500-foot runway options result in the greatest delay reduction. The fact that the 8,500-foot runway cannot accommodate 10 percent of the aircraft takeoff requirements is not a problem since the new runway would be used very seldom for departures.

#17

PRELIMINARY DELAY ANALYSIS FINDINGS

Measurement of aircraft delays was accomplished using the Federal Aviation Administration's Airport and Airspace Simulation Model (SIMMOD). This model is a sophisticated computer simulation which realistically simulates the movement of every aircraft for a given runway option. The model produces quantitative measures of aircraft air arrival delays, departure delays, and ground taxi delays. Preliminary findings of these studies are summarized below:

- Average aircraft delays are currently estimated to be between 5 to 6 minutes per operation at Sea-Tac. During degraded weather conditions which occur 44 percent of the time at Sea-Tac, delays average 11 minutes per aircraft operation.
- By the year 2015, with no new runway, average annual delays are expected to increase by four times from 5 - 6 minutes to 22 minutes per aircraft operation. About 88 percent of the year 2015 delay can be attributed to arrival delay, 11 percent to departure delay, and 1 percent to taxi delay.
- The commuter runway options (Options 2 and 3) would result in delays in the year 2015 between 14 to 21 minutes per operation.
- The 2,500-foot runway separation options (Options 4A, 4B, 4C and 5) would decrease average delays to between 4 to 6 minutes per operation in the year 2015 assuming the runways are operated in a dependent manner.

#17, cont.

TECHNICAL REPORT NO. 5

PRELIMINARY FORECAST REPORT

AIRPORT MASTER PLAN UPDATE FOR SEATTLE - TACOMA INTERNATIONAL AIRPORT

Prepared by:

P&D AVIATION

Prepared for:

The Port of Seattle
SEATTLE - TACOMA INTERNATIONAL AIRPORT

APRIL 12, 1994

The P&D Aviation Team

P&D Aviation • Barnard Dunkelberg & Company • Berk & Associates
Mestre Greve Associates • Murase Associates • O'Neill & Company
Parsons Brinckerhoff • Thompson Consultants International

9/19/94

#18

TABLE 5-14
FORECAST OF PASSENGER AIRCRAFT OPERATIONS FOR SEATTLE-TACOMA INTERNATIONAL AIRPORT, 1993 TO 2020 [a]

Description	Actual 1993	Forecast 2000	Forecast 2010	Forecast 2020
Domestic Air Carrier Operations (Over 60 Seats)				
Enplaned Passengers (Millions)	7.9	10.1	13.0	16.3
Average Seats per Departure [b]	151.2	165	185	205
Boarding Load Factor (Percent) [c]	57.8%	58%	59%	60%
Enplanements per Departure	87.5	96	109	123
Departures (Thousands)	90	105	119	133
Operations (Thousands)	180	210	238	266
Domestic Air Taxi/Commuter Operations (60 Seats or Loss)				
Enplaned Passengers (Millions)	0.6	0.7	0.8	0.9
Average Seats per Departure [d]	25.3	28	33	38
Boarding Load Factor (Percent) [e]	44.6%	50%	55%	55%
Enplanements per Departure	11.3	14	18	21
Departures (Thousands)	53	50	44	43
Operations (Thousands)	106	100	88	86
International Operations to Canada				
Enplaned Passengers (Millions)	0.4	0.6	0.9	1.1
Average Seats per Departure [f]	64.1	71	81	91
Boarding Load Factor (Percent) [e]	46.2%	50%	55%	55%
Enplanements per Departure	29.6	36	45	50
Departures (Thousands)	13	17	20	22
Operations (Thousands)	26	34	40	44
International Operations to Other Destinations				
Enplaned Passengers (Millions)	0.3	0.5	0.6	0.8
Average Seats per Departure [d]	265.1	270	275	280
Boarding Load Factor (Percent) [g]	65.1%	66%	67%	68%
Enplanements per Departure	172.7	178	184	190
Departures (Thousands)	1.7	3	3.5	4
Operations (Thousands)	3.5	6	7	8
Total Passenger Operations				
Total Passenger Aircraft Operations	**315**	**350**	**373**	**404**
Domestic	286	310	326	352
International	29	40	47	52
Air Carrier [h]	188	223	255	287
Air Taxi/Commuter	127	127	118	117

#19

TABLE 6-4 HISTORIC AND PROJECTED AIRCRAFT OPERATIONS (FAA 1989a)

	Operations by Year (millions)			Average Annual Growth (%)	
Activity	1980	1988	2000	Historic	Projected
Air carrier operations	10.1	12.7	17.1	2.9	2.5
Air taxi and commuter	4.6	8.3	12.6	7.6	3.5
GA	49.0	37.4	47.7	(3.4)	2.1
Military	2.5	2.8	2.8	1.4	0.0

muter operations, which have been growing more than twice as fast as other forms of commercial traffic, are expected to double. GA is projected to reverse its decline and rise to nearly the peak levels reached in 1980 by the year 2000. At present, 21 airports experience more than 20,000 hours of annual flight delays. The FAA estimates that even if planned improvements to primary airports are made, 33 primary airports will exceed 20,000 hours of delay in 1997 (see text box).

Although these predictions imply substantial increases in demand and potentially large increases in delay, forecasts of aviation activity are inherently difficult to make. The business cycle directly influences demand, and fuel price instability directly affects operating costs and indirectly affects pricing and demand. The timing of such influences is unpredictable. In addition, the accelerated phaseout of Stage 2 aircraft to reduce airport noise could cause a quicker shift to larger aircraft with more seating capacity than the FAA currently assumes. A faster-than-anticipated shift to larger aircraft would reduce demand on airports.

Although no long-run forecast is certain, the FAA's forecasts of commercial operations for 2000 appear to be within reason, given the 20-year trend (Figure 6-8). The FAA's long-range forecasts of commercial operations have tended to be somewhat low, but GA projections have tended to be too high. The forecasts for 1989, for example, made in 1978 to 1980, estimated commercial revenue passenger miles (RPMs) and enplanements within a range of error of about 10 percent, which is fairly good, given the uncertainties of future commercial activity in 1979 (Table 6-5) (FAA 1978–1980, 1990a). Forecasts of total commercial operations at airports with FAA towers are quite close (within 2 to 3 percent).

Although the commercial aviation forecasts made in the late 1970s were fairly reasonable, forecasts for GA were in error by a wide margin. The FAA's 1978-1980 estimates were made during a peak of GA activity and were about 50 percent greater than what actually occurred (Table 6-5).

AIRPORTS EXPECTED TO EXCEED 20,000 HOURS OF ANNUAL DELAYS IN 1997 BY REGION

Area	Airport
Northeast	Boston Logan New York City: Kennedy, LaGuardia, Newark Pittsburgh Philadelphia
South	Washington: National, Dulles Charlotte Nashville Memphis Atlanta Orlando Miami Dallas–Fort Worth Houston: Hobby and Houston Intercontinental
Midwest	Cleveland Columbus Cincinnati Detroit Chicago O'Hare St. Louis Minneapolis
West	Salt Lake City Las Vegas Phoenix Seattle-Tacoma San Francisco San Jose Los Angeles: Los Angeles International and Ontario Honolulu

Transportation Research Board Special Report 230

Subscriber Categories
IA planning and administration
V aviation

Transportation Research Board publications are available by ordering directly from TRB. They may also be obtained on a regular basis through organizational or individual affiliation with TRB; affiliates or library subscribers are eligible for substantial discounts. For further information, write to the Transportation Research Board, National Research Council, 2101 Constitution Avenue, N.W., Washington, D.C. 20418.

Printed in the United States of America

NOTICE: The project that is the subject of this report was approved by the Governing Board of the National Research Council, whose members are drawn from the councils of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine. The members of the committee responsible for the report were chosen for their special competencies and with regard for appropriate balance.

This report has been reviewed by a group other than the authors according to the procedures approved by a Report Review Committee consisting of members of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine.

This report was supported by a grant from the Alfred P. Sloan Foundation. Additional support was provided by funds from the National Research Council Fund, a pool of private, discretionary, nonfederal funds that is used to support a program of Academy-initiated studies of national issues in which science and technology figure significantly. The National Research Council Fund consists of contributions from a consortium of private foundations, including Carnegie Corporation of New York, the Charles E. Culpepper Foundation, the William and Flora Hewlett Foundation, the John D. and Catherine T. MacArthur Foundation, the Andrew W. Mellon Foundation, the Rockefeller Foundation, and the Alfred P. Sloan Foundation; the Academy Industry Program, which seeks annual contributions from companies concerned with the health of U.S. science and technology and with public policy issues with technological content; and the National Academy of Sciences and the National Academy of Engineering endowments. The study was also sponsored by the Transportation Research Board.

Library of Congress Cataloging-in-Publication Data

National Research Council (U.S.). Transportation Research Board.
Winds of change : domestic air transport since deregulation.
p. cm. — (Special report / Transportation Research Board, National Research Council ; 230)
ISBN 0-309-05104-5
1. Airlines—United States—Deregulation. 2. Aeronautics, Commercial—United States. 3. Aeronautics and state—United States. 4. United States. Federal Aviation Agency. I. Title. II. Series: Special report (National Research Council (U.S.). Transportation Research Board) ; 230.
HE9803.A4N37 1991
387.7'0973—dc20

91-22773
CIP

Cover design: Diane Ross

#19, cont.

Committee for the Study of Air Passenger Service and Safety Since Deregulation

JOEL L. FLEISHMAN, *Chairman*, Duke University, Durham, North Carolina
GEORGE J. BEAN, Hillsborough County Aviation Authority, Tampa, Florida
LANGHORNE M. BOND, Bond & Associates, Washington, D.C.
MELVIN A. BRENNER, Melvin A. Brenner Associates, Weston, Connecticut
JOHN J. FEARNSIDES, The MITRE Corporation, McLean, Virginia
CORNISH F. HITCHCOCK, Public Citizen Litigation Group, Washington, D.C.
ADIB KANAFANI, University of California, Berkeley
TODD R. LA PORTE, University of California, Berkeley
MICHAEL E. LEVINE, Yale University, New Haven, Connecticut
JAMES W. MAR, Pacific Grove, California
JOHN R. MEYER, Harvard University, Cambridge, Massachusetts
ROBERT P. NEUSCHEL, Northwestern University, Evanston, Illinois
CLINTON V. OSTER, JR., Indiana University, Bloomington
JUDITH A. ROGALA, Flagship Express, Inc., Ypsilanti, Michigan
KARL M. RUPPENTHAL, Walnut Creek, California

Liaison Representatives

DANIEL S. KLEIN, Air Transport Association of America, Washington, D.C.
DALE E. MCDANIEL, Federal Aviation Administration, U.S. Department of Transportation
SIEGBERT PORITZKY, Airport Operators Council International, Washington, D.C.
DAVID TRAYNHAM, Subcommittee on Aviation, House Committee on Public Works and Transportation, Washington, D.C.
SAMUEL WHITEHORN, Senate Committee on Commerce, Science, and Transportation, Washington, D.C.

Transportation Research Board Staff

ROBERT E. SKINNER, JR., Director for Special Projects
STEPHEN R. GODWIN, Study Director
MARK A. DAYTON, Senior Program Officer
THOMAS R. MENZIES, Research Associate
NANCY A. ACKERMAN, Director of Publications
LUANNE CRAYTON, Assistant Editor

Consultants

HERBERT N. JASPER
JOHN S. STRONG

TABLE 30

#20

INSTRUMENT OPERATIONS

AT AIRPORTS WITH FAA TRAFFIC CONTROL SERVICE

(In Millions)

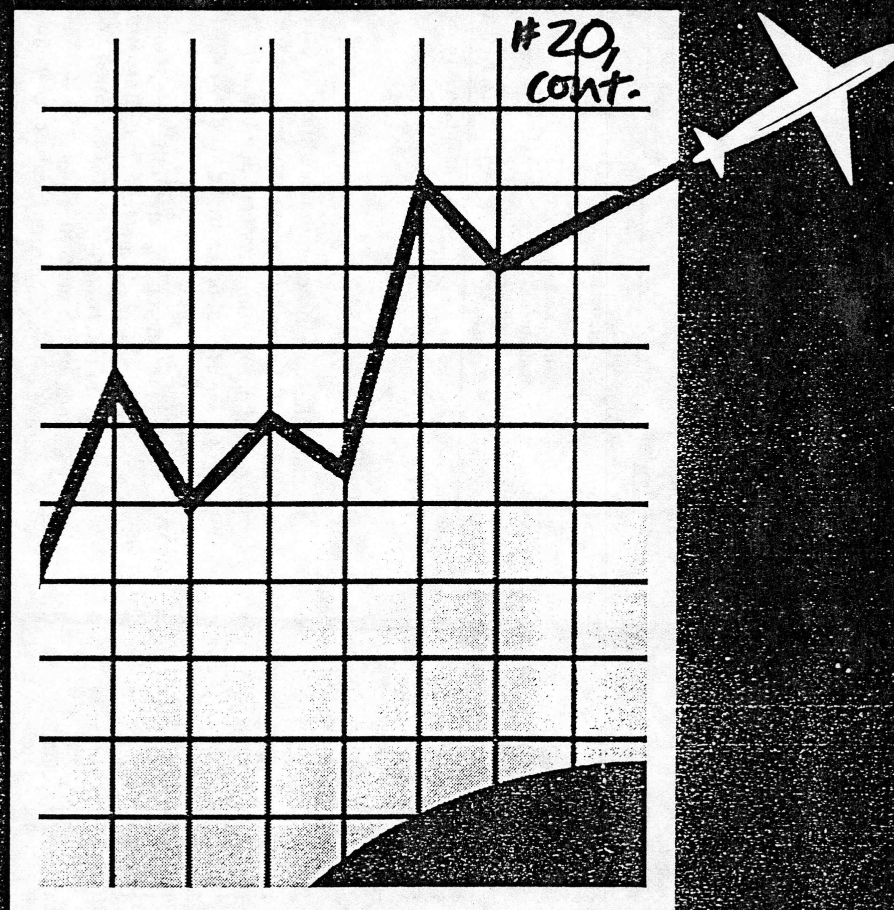
FISCAL YEAR	AIR CARRIER	AIR TAXI/ COMMUTER	GENERAL AVIATION	MILITARY	TOTAL	
Historical*						
1989	13.6	8.4	18.6	4.5	45.0	(9.4)
1990	14.0	9.4	19.1	4.4	46.8	(10.0)
1991	13.5	9.5	18.1	4.0	45.1	(9.5)
1992	13.4	9.9	18.2	4.1	45.6	(9.4)
1993	13.6	10.4	17.7	3.9	45.7	(9.1)
1994E	14.3	10.8	18.0	3.7	46.7	(9.2)
Forecast						
1995	14.7	11.1	18.3	3.6	47.7	(9.4)
1996	15.1	11.4	18.6	3.5	48.6	(9.4)
1997	15.5	11.7	18.9	3.5	49.6	(9.4)
1998	15.9	12.0	19.2	3.5	50.6	(9.4)
1999	16.3	12.3	19.5	3.5	51.6	(9.4)
2000	16.7	12.6	19.8	3.5	52.6	(9.4)
2001	17.1	12.9	20.0	3.5	53.5	(9.4)
2002	17.3	13.2	20.2	3.5	54.2	(9.4)
2003	17.5	13.5	20.4	3.5	54.9	(9.4)
2004	17.7	13.8	20.6	3.5	55.6	(9.4)
2005	17.9	14.1	20.8	3.5	56.3	(9.4)
2006	18.1	14.4	21.0	3.5	57.0	(9.4)

* Source: FAA Air Traffic Activity.

Notes: Non-IFR instrument counts at Terminal Control Area (TCA) facilities and expanded area radar service are included in totals and are shown in parenthesis (See Table 31). Data include instrument operations at FAA operated military radar approach control facilities.

Detail may not add because of rounding.

FAA AVIATION FORECASTS



Fiscal Years 1995–2006

U.S. Department of Transportation
Federal Aviation Administration

FAA-APO-95-1
March 1995

"Winds of Change" - T.R.B. Rpt. #230, 1991

#21

TABLE 6-3 DELAYS AT SELECTED AIRPORTS REPORTED TO SDRS, 1976–1988

Location Identifiction	City	Total Operations (thousands) 1976	1988	Percent Change	Average Delay (minutes per operation) 1976	1985	1988
ABQ	Albuquerque	227	230	1.3		6.7	7.8
ATL	Atlanta	490	779	59.0	8.7	8.5	9.0
AUS	Austin	165	189	14.5		3.9	4.1
BDL	Windsor Locks	140	180	28.6		5.2	7.5
BNA	Nashville	215	271	26.0		4.8	8.1
BOS	Boston	307	438	42.7	6.4	8.3	9.2
BWI	Baltimore	233	308	32.2	4.2	4.6	6.8
CHS	Charleston	129	134	3.9	3.7	4.6	5.1
CLE	Cleveland	235	254	8.1	4.4	5.1	5.1
CVG	Covington	148	272	83.8	2.9	3.6	6.6
DAY	Dayton	168	213	26.8		5.3	8.5
DCA	Washington, D.C.	326	328	0.6	6.2	6.6	8.3
DEN	Denver	419	502	19.8	6.4	8.7	8.4
DFW	Dallas–Fort Worth	360	675	87.5	5.1	8.7	9.4
DTW	Detroit	247	375	51.8	4.0	7.2	6.2
EWR	Newark	193	380	96.9	7.5	10.7	11.0
HNL	Honolulu	321	377	17.4	4.6	6.5	6.4
IAD	Washington, D.C.	188	231	22.9	5.2	5.2	8.6
IAH	Houston	208	295	41.8	4.1	5.0	5.7
IND	Indianapolis	215	220	2.3	3.6	4.4	5.8
JAX	Jacksonville	128	156	21.9	3.7	4.1	4.7
JFK	New York	332	330	−0.6	10.5	9.4	11.0
LAS	Las Vegas	300	371	23.7		4.8	5.5
LAX	Los Angeles	483	624	29.2	4.7	7.3	7.8
LGA	New York	345	365	5.8	9.2	9.8	11.0
MCI	Kansas City, Mo.	179	232	29.6		6.4	6.8
MCO	Orlando	94	295	213.8		4.8	7.4
MEM	Memphis	310	353	13.9	3.3	5.1	4.6
MIA	Miami	301	399	32.6	5.2	5.9	6.9
MKE	Milwaukee	229	193	−15.7		4.9	6.7
MSP	Minneapolis	252	380	50.8	2.7	5.5	6.4
MSY	New Orleans	156	148	−5.1	3.0	3.5	4.4
OAK	Oakland	399	400	0.3		5.8	4.6
ONT	Ontario, Calif.	156	141	−9.6		6.3	6.4
ORD	Chicago	718	803	11.8	9.0	9.0	10.8
PBI	West Palm Beach	220	231	5.0		5.3	6.2
PDX	Portland	217	272	25.3		4.6	5.2
PHL	Philadelphia	311	416	33.8	6.8	5.5	8.2
PHX	Phoenix	425	464	9.2	3.4	5.7	6.9
PIT	Pittsburgh	310	390	25.8	5.4	6.0	6.2
RDU	Raleigh-Durham	198	275	38.9	3.5	4.7	8.6
SAN	San Diego	207	206	−0.5		5.7	6.4
SAT	San Antonio	195	198	1.5		4.5	4.6

(continued on next page)

TABLE 6-3 (continued)

Location Identifiction	City	Total Operations (thousands) 1976	1988	Percent Change	Average Delay (minutes per operation) 1976	1985	1988
SEA	Seattle	174	316	81.6	3.7	4.6	5.5
SFO	San Francisco	343	455	32.7	5.3	8.5	8.2
SJC	San Jose	470	347	−26.2		7.0	5.7
SLC	Salt Lake City	255	290	13.7		6.1	6.5
SMF	Sacramento	140	183	30.7		3.7	4.4
STL	St. Louis	321	433	34.9	4.7	6.9	7.6
TPA	Tampa	192	244	27.1	3.7	4.1	5.1

NOTE: Data provided by the FAA. Airport identification codes are listed in Appendix C.

Summary

Because the data series measure different aspects of delay, they yield somewhat different results; nonetheless, the FAA data tend to show that the largest delay problems occur at a few airports. Most of these airports, however, are critical nodes in the network, and three of them (LGA, JFK, and ORD) were already under slot-control limits because of capacity problems before deregulation. Of the 11 airports with more than 20 delays per 1,000 operations, 7 are hubs and 4 are primarily O&D airports. The delay data do not distinguish between airport and ATC capacity limits, but they do indicate the areas in which problems occur. It appears that roughly one-third of delays result from peak demands that exceed the supply of ATC and runways. Most delay, roughly 60 percent, occurs in poor weather, but the effects of weather interact with the heavy traffic. With more slack in the demand, the effects of weather would not be so great.

PROJECTED INCREASES IN DEMAND

On the basis of the federal government's estimates of demand and supply, delays can only be expected to worsen at many airports in the years ahead. The FAA projects that the number of operations (arrivals and departures) by major commercial domestic carriers will increase by one-third between 1988 and 2000 (FAA 1989a, 1990a). This substantial increase results from projecting an average annual growth rate of 2.5 percent, which corresponds with projected growth in the economy and is slightly slower than the growth experienced during the last decade (Table 6-4). Air taxi and com-

#22

Table A-1. Airport Operations and Enplanements, 1991 and 1992[1]

City-Airport	Airport ID	Rank	Enplanements FY91	Enplanements FY92	Operations FY91	Operations FY92	Operations FY93
Chicago O'Hare Int'l	ORD	1	27,827,241	29,986,963	808,759	838,093	851,865
Dallas-Fort Worth Int'l	DFW	2	24,092,801	25,963,239	731,070	763,372	789,183
Los Angeles Int'l	LAX	3	22,519,698	22,911,585	660,680	678,398	681,845
William B. Hartsfield Atlanta Int'l	ATL	4	18,886,533	20,966,165	639,698	611,889	655,640
San Francisco Int'l	SFO	5	15,186,626	15,257,138	435,309	424,829	423,404
Denver Stapleton Int'l	DEN	6	13,270,540	14,476,601	491,275	499,001	552,238
New York John F. Kennedy Int'l	JFK	7	12,577,222	13,363,580	304,315	328,528	351,205
Miami Int'l	MIA	8	12,492,320	12,587,255	481,709	486,222	527,545
Newark Int'l	EWR	9	11,050,061	11,967,280	381,850	403,978	431,944
Detroit Metropolitan Wayne County	DTW	10	10,354,655	10,986,668	390,863	413,544	460,009
Phoenix Sky Harbor Int'l	PHX	11	11,111,486	10,958,400	499,157	487,615	520,403
Boston Logan Int'l	BOS	12	10,338,977	10,641,027	440,715	482,582	495,347
Minneapolis-St. Paul Int'l	MSP	13	9,770,403	10,639,045	382,856	404,243	442,341
Lambert St. Louis Int'l	STL	14	9,621,236	10,476,785	412,539	429,473	441,142
Honolulu Int'l	HNL	15	10,113,891	10,220,760	393,709	413,725	365,195
Las Vegas McCarran Int'l	LAS	16	9,653,154	10,038,181	398,637	407,668	440,393
Orlando Int'l	MCO	17	8,839,819	9,989,092	275,157	294,387	327,199
New York LaGuardia	LGA	18	9,788,285	9,751,311	332,930	337,279	335,071
Greater Pittsburgh Int'l	PIT	19	8,343,024	9,350,221	386,260	421,903	419,581
Charlotte/Douglas Int'l	CLT	20	8,425,447	9,099,577	440,956	466,351	446,315
Houston Intercontinental	IAH	21	8,452,340	8,977,522	310,404	320,234	352,340
Seattle-Tacoma Int'l	SEA	22	7,934,250	8,773,365	340,411	346,180	339,968
Philadelphia Int'l	PHL	23	7,423,013	7,850,375	382,646	377,033	390,736
Washington National	DCA	24	7,219,161	7,331,346	297,559	312,014	315,912
Salt Lake City Int'l	SLC	25	5,800,044	6,510,001	301,755	316,783	324,595
San Diego Int'l Lindberg Field	SAN	26	5,617,219	5,923,072	206,424	214,844	209,267
Greater Cincinnati Int'l	CVG	27	5,044,813	5,780,241	297,963	304,214	306,811
Washington Dulles Int'l	IAD	28	5,407,070	5,308,389	267,007	287,111	277,483
Nashville Int'l	BNA	29	4,300,568	5,068,011	274,139	302,030	318,886
Raleigh-Durham Int'l	RDU	30	4,640,334	4,939,336	270,534	289,462	294,006
Tampa Int'l	TPA	31	4,748,930	4,793,304	233,650	229,470	240,425
Baltimore-Washington Int'l	BWI	32	4,966,257	4,370,829	282,320	265,844	261,674
Cleveland Hopkins Int'l	CLE	33	3,885,103	4,266,092	244,626	237,216	247,502
San Juan Luis Muñoz Marín Int'l	SJU	34	4,012,422	4,192,629	200,292	205,560	180,749
Ft. Lauderdale-Hollywood Int'l	FLL	35	3,960,913	4,109,796	209,752	204,183	217,786
Houston William P. Hobby	HOU	36	3,781,702	4,008,376	267,199	242,999	239,634
Memphis Int'l	MEM	37	3,932,939	3,958,432	321,814	344,655	337,608
San Jose Int'l	SJC	38	3,443,484	3,775,332	336,928	342,918	312,399
Kansas City Int'l	MCI	39	3,482,600	3,697,821	168,193	176,754	184,848
Portland Int'l	PDX	40	3,178,617	3,589,361	264,854	269,445	280,263
New Orleans Int'l	MSY	41	3,255,817	3,340,961	152,126	137,373	141,384
Metropolitan Oakland Int'l	OAK	42	3,013,384	3,186,437	413,916	419,233	439,214
Indianapolis Int'l	IND	43	2,925,853	3,139,728	234,045	247,553	238,789

1. At the top 100 airports, ranked by 1992 enplanements, based on preliminary data intended for the FAA's annual report, *Terminal Area Forecasts.*

#23

that air transportation supports good jobs and economically healthy communities. On the other hand, citizens also believe more emphasis should be placed upon protecting the environment and mitigating the negative impacts of air transportation. In addition, Washington citizens also regard air transportation as an important factor in balancing growth statewide, managing growth in the central Puget Sound region, and promoting economic development in eastern Washington.

- **The social importance of air transportation likely will increase.** Due to Washington's relative isolation from the rest of the nation and an increasingly aging population, most citizens believe that air transportation will increase in importance over time. Washington has increasingly international and aging populations which greatly value air transportation.

THE COSTS AND EFFECTS OF AIR CAPACITY EXPANSION DELAY

The purpose of this study was to assess the expected impact of inadequate air capacity upon Washington state's economy. To conduct this analysis, three case studies were conducted (Boston, San Francisco, and Vancouver, British Columbia) to identify the impacts of capacity constraints.

Study Findings

There is little documentation of wider economic costs associated with capacity constraints. The case studies found that there are direct economic costs arising from capacity constraints. They take the form of additional operational costs for airlines and the value of passengers' time lost due to delays. Little evidence was found, however, to support the premise that there are wider economic costs, such as slower growth, associated with existing capacity constraints, although there is an expectation that at some future time capacity constraints will cause wider economic costs. Furthermore, there is little information outlining the effect of capacity constraints upon the location and expansion decisions of businesses and, hence, upon economic development. Air capacity is only one of many considerations for businesses making location and expansion decisions.

Case-study results found that airlines and airports typically make specific operational adjustments in response to congestion and work around capacity constraints to increase passenger throughput. The frequencies of services and the destinations served in the case studies indicate that airports are to date largely unaffected by capacity constraints.

#23, cont.

FINAL REPORT AND POLICY RECOMMENDATIONS

to the

LEGISLATIVE TRANSPORTATION COMMITTEE

November 1993

AIRTRAC

Washington State Air Transportation Commission

#24

GENERAL CONCLUSIONS

Causes of Congestion and Delay

Since much of the congestion and delay is experienced at airports, it is widely perceived that the root cause is insufficient airport infrastructure. Although it is true that the runways, taxiways, aprons, and gates at many of the most heavily used airports cannot always accommodate the growing number of aircraft seeking to use them, it is not correct to ascribe all congestion and delay to a lack of airport facilities. Congestion and delay are complex system problems that stem from the interaction of many factors, of which insufficient airport infrastructure is but one. Adverse weather, traffic peaking as a result of airline hubbing practice, airspace congestion, and inadequacy of the air traffic control system are also important causes of delay.

There is no simple, universal, permanent solution to congestion and delay. A combination of remedies must be applied, each appropriate to a specific part of the problem and none so widely effective and long lasting that it promises to eliminate congestion and delay once and for all. Like friction in mechanical devices, congestion and delay are inherent in the air transport system, *and the best that can be achieved is a higher degree of efficiency that reduces them to an acceptable level at an affordable cost.*

System Problem—System Solution

A broad systemwide approach is called for to deal effectively with delay and to provide the air transport system capacity necessary to accommodate long-term growth in travel demand. We cannot simply build, ration, manage, or research our way to greater aviation system capacity. The approach must include new infrastructure, improved air traffic control, more efficient use of airspace and airport facilities, advanced air and ground vehicle technology, and the research to make these attainments possible.

In concentrating on airports, as this report does, the intent is to focus on a part of the system where many of the prospective solutions come into play. The issues to be addressed include more than how to upgrade and expand airport infrastructure. There is the fundamental question of whether (and under what circumstances) new airport infrastructure is the appropriate solution. Attention also must be given to how present and future infrastructure is to be used; how market mechanisms and system management methods can be employed; how improvements are to be funded; and how a national policy and strategic approach that harnesses

Transportation Research Board Special Report 226

Subscriber Category
V aviation

Mode
4 air transportation

Subject Areas
12 planning
13 forecasting
14 finance
15 socioeconomics

Transportation Research Board publications are available by ordering directly from TRB. They may also be obtained on a regular basis through organizational or individual affiliation with TRB; affiliates or library subscribers are eligible for substantial discounts. For further information, write to the Transportation Research Board, National Research Council, 2101 Constitution Avenue, N.W., Washington, D.C. 20418.

Printed in the United States of America

NOTICE: The project that is the subject of this report was approved by the Governing Board of the National Research Council, whose members are drawn from the councils of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine. The members of the committee responsible for the report were chosen for their special competencies and with regard for appropriate balance.

This report has been reviewed by a group other than the authors according to the procedures approved by a Report Review Committee consisting of the members of the National Academy of Sciences, National Academy of Engineering, and the Institute of Medicine.

Library of Congress Cataloging-in-Publication Data

National Research Council (U.S.). Committee for the Study of Long-Term Airport Capacity Needs.
Airport system capacity: strategic choices / Committee for the Study of Long-Term Airport Capacity Needs.
p. cm. — (Special report / Transportation Research Board, National Research Council ; 226)
Includes bibliographical references.
ISBN 0-309-04956-3
1. Airports—United States—Planning. I. Title. II. Series: Special report (National Research Council (U.S.). Transportation Research Board) ; 226.
TL725.3.P5N39 1990
387.7'36'0973—dc20 ISSN 0360-859x 90-34787
CIP

Cover Design: Karen L. White

Photographs on cover and p. iv are courtesy Philippe Jenney. All other photographs are courtesy the Federal Aviation Administration.

Committee for the Study of Long-Term Airport Capacity Needs

JOSEPH M. SUSSMAN, *Chairman*, Massachusetts Institute of Technology, Cambridge
MARILYN R. BLOCK, The Naisbitt Group, Inc., Washington, D.C.
JOHN J. CORBETT, Spiegel and McDiarmid, Washington, D.C.
JAMES C. DELONG, Airport Business Center, Philadelphia, Pennsylvania
THOMAS DUFFY, National Center for Municipal Development, Washington, D.C.
MICHAEL J. DURHAM, American Airlines, Inc., Fort Worth, Texas
NIGEL D. FINNEY, Metropolitan Airports Commission, Minneapolis, Minnesota
RICHARD L. HARRIS, JR., Dean Witter Reynolds, San Francisco, California
RICHARD L. HAURY, Greiner, Inc., Denver, Colorado
JOHN B. HAYHURST, Boeing Commercial Airplane Co., Seattle, Washington
ADIB KANAFANI, University of California, Berkeley
JOHN D. KASARDA, University of North Carolina at Chapel Hill
JAMES P. LOOMIS, Battelle Memorial Institute, Columbus, Ohio
AMEDEO R. ODONI, Massachusetts Institute of Technology, Cambridge
WILLARD G. PLENTL, JR., North Carolina Department of Transportation, Raleigh
RON J. PONDER, Federal Express Corporation, Memphis, Tennessee
J. DONALD REILLY, Airport Operators Council International, Washington, D.C.
NAWAL K. TANEJA, Ohio State University, Columbus

Liaison Representative
QUENTIN S. TAYLOR, Federal Aviation Administration, Washington, D.C.

Transportation Research Board Staff
ROBERT E. SKINNER, JR., Director for Special Projects
LARRY L. JENNEY, Senior Program Officer
NANCY A. ACKERMAN, Director of Publications

#24, cont.

SECTION 4
AIRSIDE OPERATIONS ANALYSIS

#25

INTRODUCTION

This section describes the results of the operational analyses of the initial airfield options identified in Section 3. The operational analyses consists of estimating average airfield approach and departure delays and average taxiing times.

AIRFIELD DELAYS

Methodology

The Federal Aviation Administration's Airport and Airspace Simulation Model (SIMMOD) was used in this analysis. SIMMOD is a sophisticated computer simulation model which realistically simulates the movement of every aircraft, step by step, resolving conflicts and monitoring time along each segment of a flight or taxi path. These capabilities allow existing and future flight schedules to be input and used to forecast the effects of proposed runway changes. The model produces quantitative measures of aircraft air arrival delays, departure queue delays, and ground taxi delays.

The conduct of these studies was overseen by the Seattle-Tacoma Airport Capacity Design Team. This team was formed to evaluate means of increasing capacity and efficiency at Sea-Tac and reducing costly aircraft delays. The Capacity Team was composed of representatives from the Port of Seattle, FAA, airlines, and consultants.

The prime objective of the Capacity Team was to identify and assess various actions at Sea-Tac which would increase airport capacity, improve efficiency of operations, and reduce aircraft delays. The purpose of the process was to ascertain the technical merits of each alternative action and its impact on aircraft delay. The Team began these studies in October 1993 and will complete this work in early 1995. The results presented herein are therefore preliminary and subject to further refinement.

Inputs and assumptions used in the analysis are described below.

Weather Conditions. Weather conditions and their patterns of occurrence are important considerations when calculating airport capacity and aircraft delays. The spacing between aircraft specified by the FAA and the applicable air traffic control (ATC) operational rules, differ depending on the weather, i.e., the cloud ceiling and visibility. For example, when the cloud ceiling and visibility are high enough to permit aircraft pilots to maintain visual separation from each other, aircraft can land simultaneously on the two closely spaced parallel runway at the Airport. During less-favorable weather conditions, radar separation must be provided by ATC, resulting in a single aircraft arrival stream and greater in-trail spacing between arriving aircraft. The time of occurrence of various weather conditions versus the demand for landing and take-offs is also important.

Figure 4-1 illustrates the frequency of occurrence of various types of weather conditions at Sea-Tac. During VFR 1 (Visual Flight Rules) weather, simultaneous visual approaches can be conducted to both existing runways or to a third parallel runway at the Airport. -- i.e., up to three arrival streams. During VFR 2 conditions dual arrival streams

SECTION 5
AVIATION DEMAND FORECASTS

INTRODUCTION

This section describes the methodology and results of the development of aviation forecasts for Seattle-Tacoma International Airport. Activity at the airport was projected for the years 2000, 2010 and 2020. Forecasts were prepared for three elements of airport activity: air passengers, air cargo, and aircraft operations (takeoffs and landings).

Purpose

These forecasts have been prepared as an element of the Airport Master Plan Update to be used to develop airport facility requirements and to estimate the timeframes when future improvements are needed. These forecasts will also be considered in estimating aircraft noise impacts and other impacts related to airport activity.

The objective of the forecast task is to develop updated master plan forecasts which can account for a range of potential future airport scenarios and provide a sound basis for guiding the development of future facility improvements at the airport. Accordingly, the forecasts presented here are planning-level estimates and are not intended to be exact predictions. It is anticipated that these forecasts will be updated in several years in response to changing conditions, such as the national or local economy or the aviation industry.

Forecast Approach

Based on past experience in the development of forecasts for Sea-Tac Airport, as well as other large commercial airports, the approach to preparing updated forecasts included the following strategies:

- A multiple regression analysis forecast model similar to the one used for Flight Plan Phase I was used to prepare new forecasts. Updated data was used, including estimated data for 1993. In addition to using proven causal factors in the model (such as population, personal income and average air fares), other potentially relevant factors which are believed to influence aviation demand were examined.

- The forecast approaches were based on data from 1970 to 1993 (more than twenty years of historical data) to account for long term cycles in the airline industry and the economy.

- Alternative forecast approaches were developed as a check against the primary forecast methodology. Alternative approaches were generally based on aggregate, or top down, methods such as historical trend extrapolations and share of the market.

- Upper, lower and mid-range forecasts were prepared to bracket the possible range of future activity at the airport.

- In this preliminary report these forecasts represent unconstrained demand. No Sea-Tac demand is allocated to supplemental airports. In future documentation for the Airport Master Plan Update, the following scenarios will be considered, and the affect of each on the airport forecasts will be determined:

  - Allocation of some air passenger demand share of the Sea-Tac international passenger market are: Canada (52%), Asia (25%), and Europe and Central and South America (23%). The Asian economy is projected to grow rapidly over the next 20 years. Trans-Pacific air travel is projected by Boeing (Current Market Outlook, World Demand and Airplane Supply Requirements, 1993) to increase at an annual rate of 8.2 percent between 1992 and 2000 compared with 4.8 percent for U.S. domestic air travel. In spite of the robust Asian air travel market, travel to Asia from Sea-Tac has declined over the past three years due, in part, to the consolidation of international flights at other cities.

- Bilateral Agreements. International airlines generally conduct operations within the framework of international bilateral agreements that control market entry, capacity, and pricing. In the United States, the State Department, with the assistance of the Department of Transportation (DOT), negotiates bilateral agreements with representatives of other countries. These agreements may specify the U.S. gateway for the airline service which such agreements contemplate. In awarding authority for new service in limited entry markets, the DOT seeks to promote a competitive environment.

  Although there is no longer an operating agreement for Hong Kong service, new airports such as Japan's new gateway, Kansai International Airport provide opportunities for new service. The North American Free Trade Agreement (NAFTA) is expected to result in fewer restrictions in air travel between the U.S. and Canada.

- International Air Fares. International air travel demand is sensitive to changes in international air fares as is domestic travel. The FAA forecasts that international air fares, in real dollars, will continue to declin to 2020.

Although some of the above factors ar external, the Port is capable of influencing som of the conditions that affect demand, includin the availability of needed airport facilities (suc as runway length, runway capacity, termina capacity).

EXPERT PANEL FINDINGS

In October 1993, the Port of Seattle held tw business planning meetings in which exper panels were assembled to discuss the future o the air travel industry and implications for lon term growth in activity at Sea-Tac. Members o the expert panels included airline industr representatives, economists, and airline industr analysts.

The following opinions were expressed b individual panel members relating to the growt of aviation activity at Sea-Tac:

- Air transportation is a maturing industry i the United States. Therefore future growt will be at a slower rate. We have not see the end of technological improvements i communications such as teleconferencing. However, shifts in technology may or ma not impact air traffic.

- Slower growth is expected in the 1990s tha the 1980s. The greatest growth is expecte to be in the leisure travel market. The leisure share of the market has grown from 45 percent in the mid-1980's to 63 percent today.

- Both business and leisure air travelers have become very sensitive to air travel costs, although leisure travelers are more price-conscious.

- Although big growth may not occur in the international market, continued growth is expected. Of the international markets, Asian markets are the most robust, especially China.

- Air travel will grow no faster than the general economy. The 1990s will be a time of greater price growth than volume growth for the airlines. The industry has excess system-wide capacity now. One airline reported that it will be cutting system-wide capacity by 4 percent. Airlines will put aircraft in service at locations that give them the best return.

- High labor costs and (to a lesser degree) airport costs are important factors affecting airline performance. For established airlines, labor is 35 percent of the costs. While airport-related costs are about 7 to 7.5 percent of airline costs now, they are increasing the fastest. One airline reported that, over the last 6 years, its landing fees have increased an average of 7.4 percent a year and its terminal rentals have grown at 11.5 percent a year.

- High speed rail service cannot be competitive with air travel, unless it is subsidized. A major benefit of high speed rail is its convenience, and high speed rail will not work in a suburban market.

- Airlines at Sea-Tac experience delays at peak times now. A third runway would provide additional capacity and, while costs are a concern, is generally viewed favorably by the airlines.

DOMESTIC ENPLANEMENT FORECAST

The Flight Plan Phase I forecast was prepared by developing projections of originating passengers, then estimating the number of connecting passengers to arrive at total enplanements. While this approach is logical and technically sound, it has two disadvantages.

First, hard data on originating passengers are incomplete. A 10 percent sample survey conducted by the U.S. Department of Transportation measures scheduled air carrier originations, but the data base also includes commuter carrier passengers if they travel one segment of their flight itinerary in commuter service and another segment in air carrier service. Furthermore, no reliable data are available on originating and connecting passengers for domestic commuter service and international service.

Second, under this procedure, only a portion of the passenger base is projected (i.e., originating passengers) by a statistical procedure. A significant portion of total enplaned passengers, under this procedure, must be estimated by a percentage factor.

The approach taken for this Airport Master Plan Update was to forecast enplaned passengers then disaggregate the forecasts into originating and connecting passengers. This approach resulted in measures of statistical significance which are extremely good in terms of the degree of variation in past numbers of passengers which is explained by the model.

Primary Forecast Approach

The primary forecast approach was developed using multiple regression analysis in which mathematical relationships were developed between the number of historic domestic enplaned passengers and various parameters known to influence air passenger travel. A number of such relationships were examined, based on parameters such as population, employment, and personal income in the Puget Sound region; average nationwide domestic airfares; per capita income and unemployment

#28

TABLE 5-13
ENPLANEMENTS AND DEPARTURES BY TYPE OF SERVICE
AND AIRLINE, NOVEMBER 1992 THROUGH OCTOBER 1993 [a]

Airline	Enplaned Passengers (Thousands)	Number of Departures	Average Seats Per Departure	Departing Seats (Thousands)
Domestic Air Carrier Passenger Service (Over 60 Seats)				
American Airlines	625.6	6,825	177	1,208.0
Alaska Airlines	1,631.4	21,057	126	2,653.2
Horizon Air	212.9	5,460	65	354.9
Markair	274.8	3,797	131	497.4
Continental Airlines	343.0	3,513	151	530.5
Delta Airlines	722.5	8,116	199	1,615.1
Hawaiian Airlines	93.0	367	302	110.8
American West Airlines	270.2	2,862	141	403.5
Morris Air Service	420.0	3,961	128	507.0
Northwest Airlines	830.0	7,367	196	1,443.9
Reno Air	218.8	2,377	144	342.3
Trans World Airlines	173.8	2,823	189	533.5
United Airlines	1,765.2	18,210	161	2,931.8
U.S. Air	199.2	2,232	144	321.4
Subtotal	**7,780.4**	**88,967**		**13,453.3**
Summary Statistics				
Average Seats Per Departure	151.2			
Average Boarding Load Factor % (Enplaned Passengers Per Seat)	57.8			
Average Enplanements Per Departure	87.5			
Domestic Air Taxi/Commuter Passenger Service (60 Seats or Less)				
Horizon Air	409.7	29,621	32	947.9
Empire Airlines	3.1	979	19	18.6
Harbor Airlines	20.6	5,763	8	46.1
United Express	145.9	15,019	19	285.4
Subtotal	**579.3**	**51,382**		**1,298.0**
Summary Statistics				
Average Seats Per Departure	25.3			
Average Boarding Load Factor % (Enplaned Passengers Per Seat)	44.6			
Average Enplanements Per Departure	11.3			

#29

TABLE 5-15
SUMMARY OF AIRCRAFT OPERATIONS FORECASTS AT
SEATTLE-TACOMA INTERNATIONAL AIRPORT, 1993 TO 2020

Description	Aircraft Operations (Thousands)			
	Actual 1993 [a]	Forecast [b]		
		2000	2010	2020
Airline Operations				
Passenger Aircraft Operations [c]				
Air Carrier Aircraft Operations	188	223	255	287
Air Taxi/Commuter Aircraft Operations	127.0	127	118	117
Subtotal Passenger Aircraft Operations	315.0	350	373	404
(Average Annual Growth Rate)		(1.5%)	(0.6%)	(0.8%)
All-Cargo Operations	16.0	20	23	27
(Average Annual Growth Rate)		(3.2%)	(1.4%)	(1.6%)
Total Airline Operations	331.0	370	396	431
(Average Annual Growth Rate)		(1.6%)	(0.7%)	(0.9%)
Other Operations%				
General Aviation Operations [d]	8.1	8.9	9.5	10.3
(Average Annual Growth Rate)		(1.4%)	(0.7%)	(0.8%)
Military Operations	0.3	0.3	0.3	0.3
(Average Annual Growth Rate)		(0%)	(0%)	(0%)
Total Airport Operations	339.5	379.2	405.8	441.6
(Average Annual Growth Rate)		(1.6%)	(0.7%)	(0.8%)

[a] Source: Breakdown of airline operations was estimated by P&D Aviation.

[b] Source: P&D Aviation.

[c] Source: Table 5-14.

[d] Projected to remain at 2.4% of airline operations.

#30

TABLE 5-2
ALTERNATE PROJECTIONS OF DOMESTIC ENPLANEMENTS
AT SEATTLE-TACOMA INTERNATIONAL AIRPORT, 1993 TO 2020

Method	Domestic Enplanements (Millions)			
	Actual 1993 [a]	Forecast [b] 2000	2010	2020
Primary Forecast Approach				
Ln (Domestic Enplanements) vs. Ln (Income) - Ln (Domestic Airfare)				
PSRC Projected Values	8.7	10.8	13.8	17.2
Alternate Values	8.7	10.8	12.9	16.0
Alternative Forecast Approaches				
Ln (Domestic Enplanements) vs. Ln (Population) + Ln (Per Capita Income) - Ln (Domestic Airfare)				
PSRC Projected Values	8.7	10.3	12.9	15.8
Alternate Values	8.7	9.7	12.2	14.8
Updated Flight Plan Originations Model				
PSRC Projected Values	8.7	10.0	12.2	14.5
Alternate Values	8.7	9.5	11.6	13.7
Percent of U.S. Domestic	8.7	12.2	17.1	22.8
Trend of Past Sea-Tac Domestic Enplanements				
20 Year Trend	8.7	10.4	13.5	16.6
10 Year Trend	8.7	11.4	15.5	19.4

[a] Source: Port of Seattle, "Traffic and Operations Report."

[b] Source: P&D Aviation analysis.

#31

equation was not chosen as the primary forecast approach because the addition of the third independent variable did not significantly improve the statistical reliability of the equation.

Under this alternative approach, the number of domestic enplanements projected for the year 2020 ranges from 14.8 to 15.8 million, somewhat lower than projected under the primary forecast approach.

Updated Flight Plan Originations Model. In this approach an update of the Flight Plan Phase I model was developed maintaining the original model structure but using input data from 1970 through 1993. The updated model is:

Ln of domestic air carrier originations =

- 9.019
+ 0.930 x Ln of population of Puget Sound region (in thousands)
- 1.296 x Ln of per capita income of Puget Sound region (in millions of 1982 dollars)
- 0.854 x Ln of air fare (in 1992 cents per passenger mile)

(where Ln equals natural logarithm)

Domestic air carrier originations were estimated to continue to be 72.5 percent of domestic air carrier enplanements. The results of this alternative approach are shown in Table 5-2. Under this approach, domestic enplanement projections for 2020 range from 13.7 to 14.5 million. Lower passenger projections throughout the forecast period than the projections developed in the Flight Plan Phase I study reflect the slower growth in passengers that has occurred since 1988, compared with earlier years, as well as some reduction in projected population and an increase in projected air fares.

National Market Share. In this approach, the number of Sea-Tac domestic enplanements were projected as a percentage share of U.S. domestic enplanements (Table 5-3). Domestic enplanements at Sea-Tac have increased from 1.38 percent of the U.S. in 1970 to 1.84 percent in 1993. The Sea-Tac share of the national market is projected to continue this increasing trend and grow to 1.95 percent in 2010 and 2.00 percent in 2020. When this projected market share was applied to the FAA forecast for the nation, a projection of 22.8 million domestic enplanements for Sea-Tac in the year 2020 resulted (Table 5-2). The relatively high projection under this forecast approach reflects the aggressive nationwide growth projection by the FAA in spite of relatively flat performance over the past seven years, as well as the estimated continuation in the upward trend of the Sea-Tac market share.

Sea-Tac Domestic Enplanement Trends. Under this approach, past trends of domestic passenger enplanements were projected on a straight-line basis to the year 2020. Two trend projections were made: one based on domestic enplanements for the past twenty years and another based on domestic enplanements over the past ten years. The result of this approach is a range of domestic enplanements in the year 2020 from 16.6 million to 19.4 million (Table 5-2).

Forecast Results

The primary forecast approach based on the PSRC projected values was chosen as the mid-range forecast for the Airport Master Plan Update. This approach is based upon population and economic factors forecasted by the Puget Sound Regional Council in 1991 and assumes a slightly greater rate of growth for the Puget Sound population and income than projected using data from Dick Conway and Associates, which considers the current cutbacks

#32

Table 2-3. Summary of Capacity Design Team Recommendations

Airports \ Recommended Improvements	Airfield Improvements	Construct third parallel runway	Construct fourth parallel runway	Relocate runway	Construct new taxiway	Runway extension	Taxiway extension	Angled exits/improved exits	Holding pads/improved staging areas	Terminal expansion	Facilities and Equipment Improvements	Install/upgrade ILSs	Install/upgrade RVRs	Install/upgrade lighting system	Install/upgrade VOR	Upgrade terminal approach radar	Install	Install PRM	New air traffic control tower	Wake vortex advisory system	Operational Improvements	Airspace restructure/analysis	Improve IFR approach procedures	Improve departure sequencing	Reduced separations between arrivals	Intersecting operations with wet runways	Expand TRACON/Establish TCA	Segregate traffic	De-peak airline schedules	Enhance reliever and GA airport system
Richmond						√		√				√	√	√									√		√					
Norfolk						√						√	√	√											√					
Newport News						√		√															√		√					
Washington-Dulles		√			√	√	√		√	√			√	√									√		√				√	√
Seattle-Tacoma		√						√				√								√			√		√				√	
San Juan, Puerto Rico					√		√	√	√	√				√	√				√	√					√					√
San Jose						√		√	√															√						
San Fransisco		√	√			√	√	√	√															√					√	√
San Antonio		√			√	√	√		√			√	√	√				√		√		√	√		√					√
Salt Lake City		√					√	√	√	√		√	√	√			√	√					√		√					√
St. Louis		√					√	√	√			√		√			√			√			√		√				√	
Raleigh-Durham		√	√	√	√			√	√			√	√				√			√		√	√		√		√			
Pittsburgh			√			√				√		√						√				√								
Phoenix		√			√		√	√	√	√		√		√	√								√	√	√			√	√	√
Philadelphia		√		√		√												√				√	√	√						
Orlando			√		√		√		√			√			√		√	√				√	√					√		√
Oakland					√			√	√																					
New Orleans					√										√				√			√	√		√					√
Nashville			√	√	√	√	√		√			√								√		√	√				√		√	√
Minneapolis-Saint Paul		√	√		√	√		√	√	√		√	√	√	√			√				√			√					√
Miami					√		√	√	√			√	√	√			√						√							√
Memphis		√			√	√	√	√				√											√		√				√	
Los Angeles					√	√	√		√	√		√							√			√								
Kansas City		√	√				√	√	√	√		√	√				√						√		√				√	
Indianapolis		√	√	√	√			√	√			√	√	√			√						√		√					√
Houston Intercontinental		√	√		√	√		√	√	√		√											√						√	√
Honolulu		√				√		√	√	√		√																	√	√
Fort Lauderdale					√	√		√	√	√		√			√	√		√		√		√	√		√				√	√
Port Columbus		√	√	√	√	√		√	√	√		√		√			√	√	√			√	√		√				√	√
Cleveland		√		√	√	√	√	√		√		√			√			√					√	√	√					√
Chicago O'Hare				√	√	√		√	√			√											√			√				
Chicago Midway					√	√			√														√		√					
Charlotte-Douglas		√				√	√	√	√			√		√			√	√								√	√			√
Boston					√	√	√	√	√			√								√			√			√				
Atlanta					√			√	√	√		√	√	√		√	√			√					√				√	
Albuquerque					√	√	√	√	√	√		√			√								√		√					√

* #33

AVIATION DAILY---Current Issue---2/6/1995

Airports Rates And Charges Policy Supports Peak Pricing

DOT and FAA retained, with one modification, language in its airports rates and charges policy to *allow peak pricing at airports* despite objections raised by airline and general aviation user groups (DAILY, Feb. 1). The agencies said that the concept stated in the policy is *adopted from the Dec. 22, 1988, order and opinion on the Massachusetts Port Authority landing fee increase* and represents no change in existing department policy.

The final policy states, *"A properly structured peak pricing system that allocates limited resources using price during periods of congestion will not be considered to be unjustly discriminatory. An airport proprietor may, consistent with the policies expressed in this policy statement, establish fees that enhance the efficient utilization of the airport."* The only change from the proposal is substitution of "maximize" with "enhance." DOT and FAA said peak pricing is included in the policy statement to clarify that the new policy language on unjust discrimination does not affect the existing policy on peak pricing.

The National Air Transportation Association said last week it continues to have concerns over the peak-hour pricing language, saying the policy "is confusing in this area and could result in local proposals to implement excessive fees on general aviation and non-scheduled air charter operations." NATA did support several elements of the policy, however. The policy endorses use of adding arbitration and mediation clauses in airport leases and encourages alternate dispute resolution, NATA said. Also, DOT and FAA added language clarifying that federal law does not require each obligated airport to be self-sustaining. "We were very concerned that language in the proposal would have resulted in every airport receiving federal funds not having the option to support their airport if it could not generate the revenues for its operations," said NATA President James Coyne.

#34

3.5 Improved Operations on Parallel Runways Separated by Less Than 2,500 Feet

Current procedures consider parallel runways separated by less than 2,500 feet as a single runway during IFR operations. Simultaneous use of these runways for arrivals and departures is prohibited. This imposes a significant capacity penalty at numerous high-density airports. A recent analysis determined that airports such as Boston Logan International and Philadelphia International could achieve delay savings of over 80,000 hours per year if they were able to run dependent parallel arrivals. Table 3-4 lists airports that are candidates to conduct improved operations on parallel runways separated by less than 2,500 feet.

The FAA's Wake Vortex Program has been redefined to focus directly on the safety requirements for arrival and departure operations to parallel runways separated by less than 2,500 feet. It is anticipated that, among other things, the program will provide evidence supporting a reduction in the 2,500 foot requirement under most meteorological conditions.

Table 3-4. Candidate Airports for Improved Operations on Parallel Runways Separated by Less Than 2,500 Feet

Candidates Among Top 100 Airports		
Atlanta	Long Beach	Palm Beach
Boise	Los Angeles	Philadelphia
Boston	Memphis	Phoenix
Chicago Midway	Midland	Pittsburgh
Cincinnati	Milwaukee	Providence
Cleveland	Nashville	Raleigh-Durham
Dallas-Ft. Worth	New Orleans	Reno
Des Moines	New York (JFK)	San Antonio
Detroit	Newark	San Francisco
El Paso	Norfolk	San Jose
Houston Hobby	Oakland	Santa Ana
Houston Intercont'l	Oklahoma City	Seattle-Tacoma
Islip	Omaha	St. Louis
Knoxville	Ontario	Tucson
Las Vegas	Orlando	Washington Dulles

#35

continue to be emphasized so that projects will continue to be planned, funded, and built to keep pace with the projected demand. This has been the work of the Airport Capacity Design Teams, which is described in more detail in this chapter.

For the few delay-problem airports, renewed emphasis must be given to finding innovative solutions, with a view toward developing regional airport systems to serve the expanding air transportation needs.

For the few delay-problem airports in the Northeast, in California, and elsewhere, renewed emphasis must be given to finding innovative solutions. New airports, expanded use of existing commercial-service airports, civilian development of former military bases, and joint civilian and military use of existing military facilities—these options and more must be explored systematically with a view toward developing regional airport systems to serve the expanding air transportation needs of these large metropolitan areas.

An FAA report to Congress, *Long-Term Availability of Adequate Airport System Capacity* (DOT/FAA/PP-92-4, June 1992), describes the probable extent of airport congestion in the future, given current trends. The three assessment techniques used in the study all point to a persistent shortfall in capacity at some of the busiest airports in the country as airport development lags behind the growing demand for air travel. The report acknowledges that some of the shortfall may be corrected by such things as improvements in technology and demand management. However, a significant gap in airport capacity will probably remain, and a major increase in the rate of airport development may be needed, together with measures to maximize the efficient use of existing capacity, and, in the longer term, to supplement air transportation with high-speed ground transportation. High-speed ground transportation will be discussed further in Chapter 6, Marketplace Solutions. Development of new airports and options to maximize the efficiency of existing airports will be discussed in this and subsequent chapters.

2.2 New Airport Development

The largest aviation system capacity gains result from the construction of new airports.

The largest aviation system capacity gains result from the construction of new airports. The new Denver International Airport, for example, will increase capacity and reduce delays not only in the Denver area but also throughout the aviation system. However, at a cost of over $2.9 billion for a new airport like Denver, it will remain a challenge to finance and build others. In addition, the development of new airports faces environmental, social, and political constraints. Scheduled to be operational in 1995, Denver International Airport is the only major new airport currently under construction. Bergstrom AFB is currently the only major military airfield being converted for civilian use, designed to replace Austin Robert Mueller Airport. Table 2-1 summarizes other major new airports that have been considered in various planning studies by state and local government organizations.

#36

6.4.5 Developing a Regional Airport System

The ultimate challenge for many delay-problem airports in the country in their efforts to implement capacity-enhancing improvements is the availability and expense of additional land. With no room to build independent parallel runways or new taxiways, commercial cargo and maintenance facilities, access roads, or parking facilities, an airport is faced with steadily increasing delays and severe constraints on growth in air traffic. Taking into account the characteristics of the market involved, airport authorities with delay-problem airports may need to look to development of a regional airport system.

In a regional airport system, various airports are identified to serve different roles and functions within the region. For example, one airport in the region may handle all or most of the international and long-haul traffic, while other airports handle the domestic and short-haul demand.

There are variations of a regional airport system in use in many of the major metropolitan areas, including New York, Chicago, Dallas-Fort Worth, Houston, Los Angeles, San Francisco, and Washington, D.C. This same concept has also been suggested in Boston and Seattle, with each proposing to introduce limited air carrier or commuter service at another airport in the area, Laurence G. Hanscom Field in Bedford, MA, and Snohomish County Paine Field in Everett, WA.

One study in Massachusetts demonstrated that development of scheduled air carrier service at the existing Hanscom Airport could be almost as effective as building a new airport in terms of relieving Boston-Logan. However, there is strong local opposition to this initiative, and consequently, there are no current proposals to develop scheduled, air carrier service at Hanscom. Current efforts are focusing instead on measures to enhance the role of existing air carrier airports servicing the outlying portions of the Logan market. Since the State has abandoned efforts to land bank a site for a new air carrier airport, creating a more effective regional airport system is critical to meeting the future forecasted need for air travel in the greater Boston market area.

International Airport, Port Columbus International Airport, Sacramento Metropolitan Airport, and Oklahoma City Will Rogers World Airport.

#37

6.4.2 Expanded Use of Existing Commercial Service Airports

Expanded use of nearby airports that already have commercial service can ease congestion in a particular market.

This offers an ideal strategy for airlines providing short-haul, regional service, particularly for an airline emphasizing point-to-point service.

Expanded use of nearby airports that already have commercial service can ease capacity problems at primary hub airports by spreading commercial aircraft operations among additional airports near the primary airport. In contrast to new hubs, the expanded use of existing commercial service airports is primarily intended to relieve congestion in a particular market, not to constitute a market of its own.

This offers an ideal strategy for airlines providing short-haul, regional service, particularly for an airline emphasizing point-to-point service rather than feeding passengers to the major carriers at the hub airports. The regional carrier can move into a nearby underutilized airport, where they can operate at lower cost, avoid the congestion and costly delays caused by overcrowding, and avoid direct competition with the major carriers.

For each of the 23 current delay-problem airports, a preliminary list of airports located in the vicinity and served by commercial air traffic, was compiled. This is shown in Table 6-1. A number of military airports and airports not currently served by commercial air traffic have been added to the list. As congestion becomes greater at the delay-problem airports, passengers may choose to travel to the alternative airports. This traffic diversion would tend to decrease delays at the delay-problem airport.

#37, cont.

Table 6-1. Preliminary List of Airports Located Near the 23 Delay-Problem Airports

Delay-problem Airport†		Supplemental Airport
Atlanta Hartsfield	ATL	Athens
		Macon
		Columbus (100 mi)
		Chattanooga, TN (100 mi)
Boston	BOS	Manchester, NH
		Portland, ME
		Portsmouth, NH
		Providence, RI
		Worcester, MA
		Bedford, MA
		Ashville (100 mi)
Charlotte	CLT	Hickory
		Greensboro (90 mi)
		Greer, SC (90 mi)
		Winston-Salem (60 mi)
		Columbia, S.C. (100 mi)
Chicago O'Hare	ORD	Aurora
		Chicago Midway
		Meigs Field
		Rockford
		Waukegan
		West Chicago (Du Page)
		Wheeling
		Gary, IN
		NAS Glenview
Dallas-Ft. Worth	DFW	NAS Fort Worth, Joint Reserve Base (formerly Carswell AFB)
		Dallas-Love Field
		Denton
		Fort Worth Alliance
		Fort Worth Meacham
		McKinney
		Mesquite
		Waco (80 mi)
Denver	DEN	Colorado Springs (80 mi)
Detroit	DTW	Detroit City
		Flint
		Pontiac
		Lansing (80 mi)
		Toledo, OH (60 mi)
		Selfridge ANG
		Willow Run
		Windsor, Ontario, Canada
Honolulu	HNL	Kailua
Houston	IAH	Corpus Christi
		Ellington
		Galveston
		Houston Hobby
Los Angeles	LAX	Burbank
		Long Beach
		Ontario
		Oxnard
		Palmdale
		San Bernardino
		Santa Ana
Miami	MIA	Ft. Lauderdale
		West Palm Beach
Minneapolis	MSP	St. Paul (Downtown)
		Mankato (60 mi)
		Rochester (77 mi)
		Eau Claire, WI (85 mi)
		St. Cloud (70 mi)
New York	JFK	Farmingdale
		Islip/Long Island
		Stewart/Newburgh (60 mi)
		White Plains
Newark	EWR	Trenton
		Stewart/Newburgh, NY (60 mi)
		White Plains, NY
		Atlantic City, NJ
		Morristown
		Essex County
		Teterboro
Orlando	MCO	Daytona Beach
		Ft. Pierce (100 mi)
		Gainsville (100 mi)
		Melbourne (60 mi)
		Tampa (70 mi)
		Vero Beach (90 mi)
Philadelphia	PHL	Allentown
		Lancaster (70 mi)
		Reading (60 mi)
		Willow Grove NAS
		Trenton, NJ
		Atlantic City, NJ
		Wilmington, DE
Phoenix	PHX	Prescott (80 mi)
		Williams Gateway
		Tucson (110 mi)
Pittsburgh	PIT	Johnstown
		Latrobe
		Morgantown, WV (60 mi)
San Francisco	SFO	Concord
		Oakland
		San Jose
		Santa Rosa
		Moffett Field NAS
		Hamilton Field
St. Louis	STL	Scott AFB
Seattle	SEA	Everett/Paine Field
		McChord AFB
Washington	DCA	Baltimore, MD
		Hagerstown, MD (60 mi)
		Charlottesville, VA (100 mi)
		Richmond, VA (100 mi)
		Andrews AFB
Washington	IAD	Baltimore, MD
		Hagerstown, MD (60 mi)
		Charlottesville, VA (100 mi)
		Richmond, VA (100 mi)
		Andrews AFB

† Airports having greater than 20,000 hours of delay for 1993 as reported by FAA Office of Policy and Plans.

#38

Puget Sound Regional Council
PSRC

FINAL DRAFT

Metropolitan Transportation Plan

The Transportation Element of VISION 2020, the Region's Adopted Growth and Transportation Strategy

Recommended to the Executive Board for Approval by:

Transportation Policy Board
Growth Management Policy Board
March 9, 1995 Joint Meeting

Metropolitan Transportation Plan

MTP

multiple benefits, including freight mobility. The Action Package cannot be limited to infrastructure investment actions alone. It also must include operational, institutional and private sector actions necessary to achieve the goals of VISION 2020. Further, the MTP demonstrates consistent with federal and state requirements by suggesting a strong need to continue efforts to fully integrate freight mobility needs into the metropolitan transportation planning process. The need for collaborative strategies between public agencies and the freight-transport industry will increase in the future.

AVIATION PROGRAM

The region will meet its long-term commercial air transportation needs consistent with the Puget Sound Regional Council General Assembly's Resolution A-93-03 (Appendix F) by...

- *Pursuing a third runway for Sea-Tac provided the project meets the independent evaluations of noise reduction and demand/system management conditions and satisfies Federal Aviation and the Port of Seattle environmental impact review and permit processes.*

- *Working with the state to enact legislation allowing for substantial and equitable incentives and compensation for communities impacted by the proximity of essential public facilities.*

- *Cooperating with the state and local jurisdictions to implement a comprehensive process for evaluating all options to meet the State of Washington's long-term air travel and inter-regional ground transportation needs including high speed rail.*

The first regional aviation plan was completed in the late 1960s and has been updated periodically. The *1988 Regional Airport System Plan* (RASP), adopted by the Puget Sound Council of Governments (PSCOG—forerunner to the Puget Sound Regional Council), looked at the components of the regional airport system, and offered a detailed series of recommendations regarding commercial aviation and general aviation. The *1988 RASP* recommended that planning be conducted to address commercial aviation needs and then, if needed, adjustments could be made to general aviation capacity at airports that might potentially be impacted by the conclusions and recommendations from the commercial aviation studies.

As with other elements of the Metropolitan Transportation Plan, the Regional Council's consideration of aviation needs is addressed in federal law (the Intermodal Surface Transportation Efficiency Act), state law (the Growth Management Act), and in the Interlocal Agreement signed by all Regional Council members. The intermodal philosophy of the ISTEA emphasizes the need to ensure linkages among various modes of transportation. Access to airports (along with access to other important intermodal terminals) must be considered as part of the planning process. The land based transportation planning contained throughout this

#38, cont.

document takes into account aviation improvements proposed in the region in terms of their potential impact on surface transportation needs. Under state law and the Interlocal Agreement, the Regional Council has a more direct planning role regarding airports. The Growth Management Act requires regional transportation planning organizations (such as the Regional Council) to "adopt, and periodically update a regional transportation plan that ... identifies existing or planned transportation facilities, services, and programs, including but not limited to major roadways ..., transit and non-motorized services and facilities, multimodal and intermodal facilities, marine ports and airports, railroads, noncapital programs" (RCW 47.80.030(1)). The Interlocal Agreement also specifies that the RTP will address airports. (Interlocal Agreement, § VII, A.1.)

Commercial Aviation: Planning History. For commercial aviation planning, the *1988 RASP* recommended that the PSCOG, in cooperation with the Port of Seattle as the operator of Seattle-Tacoma International Airport, should complete a detailed evaluation of the region's long-term commercial air transportation needs. This resulted in the *Flight Plan Project* (1989-92) and subsequent decision processes and studies. The *Regional Growth and Transportation Strategy* (VISION 2020) adopted by PSCOG in 1990 recognized the 1988 RASP as the interim air transportation element of the RTP "until a new plan is adopted." (PSCOG Resolution A-90-01). This action was reaffirmed by the Regional Council in 1991 through approval of the "Interlocal Agreement for Regional Planning of the Central Puget Sound Area" dated September 30, 1991.

The Flight Plan Project was concluded in 1992. After studying the conclusions of that report and environmental review documents, and in an effort to find the best method of meeting the region's long-term commercial air transportation needs, the Regional Council General Assembly in April 1993 adopted *Resolution A-93-03* (see Appendix F), which called for the region to pursue a flexible dual-track approach. The General Assembly directed the region to pursue both a major supplemental airport and, subject to conditions, a third runway at Sea-Tac International.

These conditions were: (1) the feasibility of a major supplemental airport and whether it could be put into service in time to eliminate the need for a third runway; and (2) implementation of noise reduction objectives; and (3) feasible demand and system management actions. The major supplemental airport was subsequently defined as being of sufficient size to accommodate two parallel runways capable of independent operations. The noise reduction objectives and demand and system management actions were to be independently evaluated. A determination of whether these conditions were satisfied is to be made no later than April of 1996.

In October 1994, at the end of Phase I of the supplemental airport feasibility assessment, the Executive Board adopted *Resolution EB-94-01* (see Appendix F). By this resolution, the Executive Board concluded that no feasible sites for a major supplemental airport could be found within the four-county region and ceased further airport studies to identify such potential sites. That resolution marked satisfaction of the first of the three conditions for authorization of the third runway in Resolution A-93-03. Authorization of the third runway at Sea-Tac International is still subject to satisfaction of the second and third conditions in Resolution A-93-03 (relating to noise reduction and demand and system management actions). The Regional Council, utilizing an independent Expert Arbitration Panel, is continuing with its efforts to

→

#38, cont.

determine whether the second and third conditions for authorization of the third runway have been satisfied by the April 1996 date established by Resolution A-93-03. The third runway is also dependent upon completion of the Port of Seattle's environmental impact review and permit processes.

In addition, to Resolution EB-94-01, the Executive Board recommended working with the State Legislature to establish cooperative regional and state procedures to enact legislation allowing for substantial and equitable incentives and compensation for communities impacted by the proximity of essential public facilities. The Executive Board further recommended cooperative actions by the state, local governments and regional transportation planning organizations to examine and seek implementation of options for air and ground travel within the Northwest that could address long-term air travel and inter-regional ground travel needs, with such options including consideration of high speed rail (See policy 8.27 in Chapter III).

The 1988 RASP includes other elements beyond long-term commercial air transportation needs. These other aspects of the 1988 RASP may be reviewed and amended in the future as a result of further planning.

Commercial Aviation: Trends and Forecasts. Forecasted regional needs at Sea-Tac International, which serves most of the commercial passenger and cargo aviation needs for the region and much of the state, have been subsequently updated in the Port of Seattle *Master Plan Update* (Technical Report #5, April 12, 1994).

Table 3 shows that projected annual passenger volumes for the region are expected to *double* between 1993 and 2020. However, during the same period, the number of aircraft operations that are forecasted to handle these passengers (the measure most directly related to *runway* capacity) are forecast to increase by about 30 percent. This more moderate trend in the growth in aircraft operations is largely due to the expected replacement of smaller aircraft, especially commuter aircraft, with larger aircraft.

#38, cont.

Table 3. Aviation Trends and Forecasts*
Four-County Puget Sound Region–All Airports

Forecast Measure	Current and Forecast Period			
	1993	2000	2010	2020
Air Passenger Activity				
Total Annual Passengers (millions)	18.8	23.8	30.6	38.2
Annual Aircraft operations	339,459	379,200	405,800	441,600
Air Cargo Activity (annual metric tons)				
Sea-Tac International	381,541	510,000	680,000	880,000
Boeing Field	(1990) 22,199	35,249	—	78,734

*Sources: *Master Plan Update, Technical Report No. 5,* April 12, 1994, Port of Seattle; *Project II Report,* October 1992, A-1, Washington State Air Transportation Commission.

The capacity and current efficiency of the airfield at Sea-Tac International is determined by the rate at which aircraft can arrive and depart using the two existing runways, in one hour. This rate is then annualized using a level of acceptable delay for each arriving or departing operation that is based on local weather conditions and the daily operational demand profile experienced at the airport. Using this method, the efficient annual capacity is calculated to be about 380,000 operations (arrivals and departures).

Forecasts suggest that Sea-Tac International will reach its efficient operational capacity around the year 2000. The airport's capacity is greatly affected and reduced by regional weather conditions. Poor weather, which occurs about 40-45 percent of each year, affects the air traffic safety procedures and reduces the airport from operating two streams of arriving aircraft to one stream. This occurs because the two existing runways are too close together (800 feet between centerlines) to both be used for landing aircraft during these periods of poor weather. A third runway appropriately separated from the existing runways would help eliminate this problem and provide capacity to land aircraft in poor weather.

In addition to runway and airspace capacity, airport capacity is also bounded by airport terminal capacity and ground access capacity. These three constraints (airspace, runway, and terminal/ground access) are being addressed in the Port of Seattle's airport *Master Plan Update*, with the ground access issues also being addressed in the highway, transit and freight and goods elements of the updated regional MTP.

General and Military Aviation: Inventory and Trends. In addition to Seattle-Tacoma International Airport, the regional aviation system includes a large number of general aviation airports and two military airports. Non-military airports of national significance in the central

#38, cont.

Puget Sound region are listed as part of the *National Plan of Integrated Airport Systems (NPIAS)*. The NPIAS is maintained by the Federal Aviation Administration (FAA) and includes the inventory from the *Washington State Continuous Airport System Plan,* 1993 (Figure 1-6). Airports in this classification are: Auburn Municipal Airport, King County International Airport (Boeing Field), Snohomish County Airport (Paine Field), Renton Municipal Airport, Bremerton International Airport, Tacoma Narrows Airport, Arlington Municipal, Crest Airpark, Harvey Airfield, Pierce County Airport (Thun Field), Vashon Island, and two seaplane bases (Lake Washington and Lake Union). Other smaller scale general aviation airports that are open to the public were generally listed in the *1988 Regional Airport System Plan* (*RASP*, Table 1).

Two military airports within the region are located in Pierce County: McChord Air Force Base and Gray Army Airfield (Fort Lewis). In addition, the Air National Guard has a renewable lease (currently good until 1998) for the use of Paine Field in Snohomish County.

Since 1988, national forecasts and recent trends have shown little or no growth in general aviation needs. General aviation is expected to grow by about one percent per year at Paine Field and Boeing Field (*Project II Final Report: Air Transportation Demand, Aviation Industry Trends, and Air Capacity in Washington Through 2020*, Washington State Air Transportation Commission). With regard to potential future helicopter and tiltrotor issues and opportunities, the Regional Council has a modest coordinating role to work with the WSDOT Aviation Division and inform local city or county land-use agencies about any possible operational or siting issues that might result from options being examined in this area by the WSDOT.

SUMMARY DESCRIPTION OF METROPOLITAN TRANSPORTATION SYSTEM IMPROVEMENTS

The following table summarizes the range of systemwide actions, projects and programs in various stages of development, designed to enhance the efficiency and capacity of the Metropolitan Transportation System.

Table 4. Summary Description of Metropolitan Transportation System Improvements

SYSTEM PRESERVATION AND MANAGEMENT	
Component	**Description**
Maintenance and Preservation of existing MTS	Maintain safety, efficiency, aesthetic quality of the Metropolitan Transportation System. Extend life of existing system through broader preservation programs. Seek opportunities to incorporate the retrofit of transit and nonmotorized facilities and connections into appropriate roadway maintenance and preservation projects.