FINAL SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT

PROPOSED MASTER PLAN UPDATE

Seattle-Tacoma International Airport

TABLE OF CONTENTS

FINAL SUPPLEMENTAL
ENVIRONMENTAL IMPACT STATEMENT

PROPOSED MASTER PLAN UPDATE

Seattle-Tacoma International Airport

TABLE OF CONTENTS (Continued)

APPENDICES

FINAL SUPPLEMENTAL
ENVIRONMENTAL IMPACT STATEMENT

PROPOSED MASTER PLAN UPDATE
Seattle-Tacoma International Airport

LIST OF TABLES

FINAL SUPPLEMENTAL
ENVIRONMENTAL IMPACT STATEMENT

PROPOSED MASTER PLAN UPDATE

Seattle-Tacoma International Airport

LIST OF EXHIBITS

CHAPTER 1

INTRODUCTION AND SUMMARY

1. INTRODUCTION

In the May of 1996, the Northwest Mountain Region Office of the FAA identified the availability of the fiscal year 1996 Terminal Area Forecast (TAF) for Seattle-Tacoma International Airport (Sea-Tac Airport), prepared by its headquarters Office of Policy and Plans. In December 1996, the FAA Office of Policy and Plans released the fiscal year 1997 TAF. The 1996 and 1997 TAFs show airport activity (passengers and operations) growing at a rate faster than predicted by the Master Plan Update. Aviation demand forecasting is often incorrectly perceived as a science, where all variables are predictable and known. However, as is shown by comparing any forecast to conditions that actually occur during the period that was forecast, forecasting is more an art than a science. As a result, precise forecasting for specific future years, particularly years more than 10 years in the future in the volatile air travel industry, is very difficult.

As airport master plans are conducted, forecasts are the foundation upon which a future plan is built. In the forecasting process, projected air travel demand is assigned to specific time periods. Due to the need to base these assumptions on a number of variables, airport master plan improvements are typically associated with a level of activity instead of a precise year, as was the approach taken in the Sea-Tac Airport Master Plan Update. The Final EIS recognized the difficulty in forecasting and presented three possible scenarios of how growth might differ from the Master Plan Update forecast. Appendix R of the Final EIS (located in Volume 4) identified the possible environmental impacts associated with the three scenarios, which included a slower growth scenario and two faster growth scenarios. The new forecast prepared by the Port of Seattle (hereafter referred to as "the Port") for the year 2010 are slightly higher than was examined for the faster growth scenarios (17.9 million enplanements versus 17.3 million enplanements) contained in the Final EIS.

As a consequence, the Port and FAA evaluated the FAA's TAF data: 1) to determine it's reliability and 2) to examine the impacts of demand growing faster than the Master Plan Update. Based on this review and the development of the new Port forecast, the FAA and the Port then agreed that additional environmental analysis was warranted to assess the impacts of the Master Plan Update improvements relative to the higher passenger and operations forecast.

The purpose of this report is to document the additional data that has arisen since publication of the Final EIS, including new aviation demand forecast information and to identify the resulting environmental impacts from this new data. This report contains the following chapters:

- Chapter 1 - this introduction and summary
- Chapter 2 - Impact on Project Definition and Purpose and Need
- Chapter 3 - Alternatives
- Chapter 4 - Affected Environment
- Chapter 5 - Environmental Consequences

The following sections of this chapter summarize the detailed information presented in Chapters 2 through 5.

The Draft Supplemental EIS was released for agency and public review in February 1997 with a 45-day comment period. Simultaneously, a 30-day comment period was initiated concerning the updated draft air quality conformity analysis; the air conformity comment period was extended until March 31, 1997 to coincide with the overall comment period. The Final Supplemental EIS was prepared reflecting the comments received. **Appendix F** contains a summary of the comments while **Appendix G** contains the comments. **Table F-2** (located in Appendix F) provides an index to the comments.

2. NEW FORECASTS AND IMPACT ON PURPOSE AND NEED

The analysis contained in this additional environmental analysis document reflects an updating by the Port of Seattle of the Master Plan Update forecast. The new Sea-Tac forecast prepared by the Port is 17% greater (in terms of both passengers and operations) than the forecast prepared for the Master Plan Update in 1994.[1/] These new forecasts are anticipated to exceed the operational capability of the existing airfield between 2005 and 2010. Therefore, a review of forecast issues and their relationship to the purpose and needs identified by the Master Plan Update was conducted.

TABLE 1-1

COMPARISON OF DEMAND FORECASTS
(Master Plan Update, FAA TAF, and new Port of Seattle forecast)

	Unconstrained Aviation Demand Forecast Comparison			
	1995	2000	2005	2010
Operations				
Master Plan Update	N/A	379,200	392,500	405,800
FAA 1997 TAF	386,536	433,470	478,050	528,200
New Port of Seattle	386,536	409,000	445,000	474,000
Enplaned Passengers				
Master Plan Update	N/A	11,900,000	13,600,000	15,300,000
FAA 1997 TAF	11,386,000	13,920,000	16,290,100	18,950,000
New Port of Seattle	11,386,000	13,700,000	15,700,000	17,900,000

N/A = Not available

Table 1-1 provides a comparison of the Master Plan Update forecast, the FAA's fiscal year 1997 Terminal Area Forecast, and the new Port of Seattle forecasts. For the year 2010, the FAA's TAF is approximately 10% greater than the Port's operations forecast and 17% greater than the Master Plan Update forecast. The TAF enplanement forecast is also 6% greater than the Port's forecast and 23% greater than the Master Plan Update forecast for the year 2010.

[1/] Chapter II of this report acknowledges a difference between the new Port and fiscal year 1997 FAA TAF forecasts. The Port forecast was reviewed and accepted by the FAA regional office and deemed appropriate for use in planning at Sea-Tac.

A) Aviation Demand and Activity Forecast

In preparing the updated forecast for Sea-Tac Airport, two specific conditions were examined:

- Demand Forecast -- "With Project" forecast: this forecast represents an unconstrained level of demand for air travel within the Puget Sound Region. It represents the total passengers that wish to fly assuming that sufficient facilities are available to accommodate the demand. This level of activity is presumed to occur with the "With Project" alternative;
- Activity Forecast - Constrained "Do-Nothing" forecast -- this forecast represents the level of activity that the existing facilities at Sea-Tac Airport are capable of accommodating due to constraints in the airport system. These constraints could result in less than the total demand being satisfied, if demand exceeds the capability of the system.

In preparing the forecasts, first the demand for air travel was identified. The extent of the constraints associated with the existing airfield, terminal facilities, support facilities, and landside/roadway system were then identified. Then the passengers and resulting aircraft operations forecast were prepared based on the capabilities of the system to serve that level of activity. **Table 1-2** lists the Do-Nothing and "With Project" enplanement and operations forecast.

TABLE 1-2
COMPARISON OF THE NEW PORT OF SEATTLE FORECAST
"With Project" to Do-Nothing

	With Project			Do-Nothing		
Operations	**2000**	**2005**	**2010**	**2000**	**2005**	**2010**
Annual	409,000	445,000	474,000	409,000	445,000	460,000
Peak Month	38,600	41,800	44,000	38,600	41,500	42,100
Peak Month/Avg Day	1,246	1,352	1,423	1,246	1,341	1,360
Avg Annual Day	1,121	1,219	1,299	1,121	1,219	1,260
Peak Hour	78	94	99	78	82	82
Enplaned Passengers						
Annual	13,700,000	15,700,000	17,900,000	13,700,000	15,700,000	17,900,000
Peak Month	1,540,000	1,730,000	1,940,000	1,540,000	1,730,000	1,940,000
Peak Month/Avg Day	49,500	55,700	62,400	49,500	55,700	62,400
Avg Annual Day	37,534	43,014	49,041	37,534	43,014	49,041
Peak Hour	5,210	5,740	6,300	5,210	5,460	5,930

Source: P&D Aviation, December 1996.

Chapter 2 of this report contains a description of the FAA fiscal year 1997 Terminal Area Forecast and the new forecasts prepared by the Port. Because the Port forecasts are prepared at a level of detail that enables the analysis of environmental conditions, they were used to assess the environmental impacts that could result if demand grows as forecast. **Appendix D** identifies likely impacts in the year 2020 based on an extrapolation of activity and impacts in year 2010. The FAA's TAF does not provide the level of detail needed for environmental analysis such as noise impacts or surface transportation conditions. Because the Port's forecast reflects, where appropriate, Sea-Tac specific conditions, and was produced at a detailed level, with information such as the aircraft fleet mix and peak hour conditions, it was used for this Supplemental Environmental Impact Statement analysis.

Because demand would not exceed the maximum annual airfield capability of the Airport until around 2008, Sea-Tac would likely accommodate all of the forecast demand for air travel until that time. By 2005, 94 operations could be accommodated in the peak hour if additional airfield capability were available. Due to the existing constraints, it would likely not exceed 82 operations. In all years, there would likely be a slight difference in aircraft operations levels between what a constrained or unconstrained airfield could accommodate because of the hourly levels of activity. On a peak month average day (PMAD) basis, the constrained operations in 2010 would be about 5% less than the unconstrained (unconstrained at 1,423 operations and 1,360 constrained operations). However, due to an anticipated flattening of the peak, where the peak month average day will look more and more like an average day.

To accommodate the constrained level of activity, a number of congested and inefficient conditions would result:

- Gates would be used for an average of 5.0 to 5.5 flights a day. This type of gate usage would resemble today's PMAD. As is shown by this analysis, without implementation of the Master Plan Update improvements, the peak month is likely to represent a less distinct peak in the future (congested conditions would become more of an everyday condition);
- Some growth in the number of passengers per narrowbody equivalent gates[2/] per year would occur as a consequence of the expected growth in average aircraft size, average load factors, and the number of passengers per gate per day;
- Remote aircraft parking and passenger loading would occur, as is used at locations such as Los Angeles, Dulles, and (until the recent improvements were completed) at Pittsburgh or O'Hare; and
- Much of the terminal space (ticketing, gates, and baggage claims) would operate at levels-of-service F as measured by the International Civil Aviation Organization (where A is the most efficient/least congested and F is the most inefficient/congested). As conditions become constrained, passengers would avoid ticket check-in areas (through advance ticket purchases, and electronic ticketing, etc.), rely on carry-on baggage and/or would arrive at the Airport sooner. It is assumed that ground travel time would increase 25% to 50%. Thus, the time passengers would spend in the terminal area would increase from 30 minutes to 45 minutes.

B) Purpose and Need

The following four purpose and need statements were defined in the February, 1996 Final Environmental Impact Statement:

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

2/ Narrowbody equivalent gate is a measurement system used to account for the difference in sizes between gates that accommodate larger, widebody aircraft versus the smaller, narrowbody aircraft.

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

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

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

The only significant new purpose and need information that has been made available since publication of the Final EIS is the Port's initiation of correcting the Runway Safety Area for 34R (thus, the only remaining corrections are for 16L and 16R) and the new forecasts that show a potential need to accelerate, sooner in time, the terminal and landside facilities.

Relative to the proposed third runway, this analysis evaluated a longer construction schedule in contrast to the accelerated schedule presented in the Final EIS. Therefore, this Supplemental EIS evaluates the commissioning of the third runway in late 2004, with construction hauling occurring between 1997 and 2002.

Increased demand and/or the other new data would not affect the need to bring the runway safety areas up to standard, nor would it affect the proposed extension of Runway 34R.

The proposed Master Plan Update terminal and landside improvements were identified to address growth in passenger, cargo, and aircraft operations up to 19 million annual enplanements. As the updated forecasts now anticipate that 19 million enplanements would be reached soon after 2010 (instead of 2020), the timing of facilities could change, if the growth in activity continues as predicted by the new forecasts. As a result, the projects that were slated to be implemented by 2005, could be needed by 2000. Similarly, projects slated to occur by 2015 could be needed by 2005 and projects slated to occur between 2016-2020 could be needed by 2010.

Three changes in the proposed improvements have been identified. These changes, described in Chapter 2, reflect improvements in parking and surface transportation conditions to address issues associated with airport landside requirements.

3. ALTERNATIVES

The Final EIS examined the alternatives shown in **Table 1-3**. No new significant information has come to light concerning any alternative that has not already been discussed by this Supplemental EIS, such as timing of demand. The new demand forecasts, and operating capability of the existing and future airport facilities would not affect the viability of any alternative considered in the Final EIS. WRONG

As a result of the faster growing air travel demand, and the resulting increased demand for parking at Sea-Tac, a re-examination of alternatives for public, rental car, and employee parking was conducted. This review showed that the parking locations identified by the Master Plan Update continued to represent the preferred location for parking. However, as was discussed earlier, the quantity of new parking in each construction phase would increase to accommodate the higher demand.

Concurrent with its approval of the third runway on August 1, 1996, the Port of Seattle Commission directed Port staff to give additional consideration to use of new technologies to satisfy poor weather operating needs. In response to this request, the Port convened a technology conference at the SeaTac Hilton on September 25, 1996. Speakers at the conference included the Federal Aviation Administration, NASA, Alaska Airlines, Airline Pilots Association, Boeing, Air Transport Association, consultants, and a company developing new technologies. This investigation concluded that technologies, based on the global positioning system (GPS) and flight management system (FMS), will provide aviation system capacity relief in the future. However, no technologies were identified that would alleviate the need for the new runway or change the viability of other closer spaced options due to the 2,500 foot spacing requirement between runways that is attributed to wake vortex conditions.

TABLE 1-3

SUMMARY OF ALTERNATIVES CONSIDERED

(1) Improve The Poor Weather Airfield Operating Capability In A Manner That Accommodates Aircraft Activity with an Acceptable Level of Aircraft Delay.

- Use of Other Modes of Transportation
- Use of Other Airports or Construction of a New Airport
- Activity/Demand Management
- Runway Development at Sea-Tac
- Use of Technology
- Delayed or Blended Alternative
- Do-Nothing/No-Build

(2) Provide Sufficient Runway Length to Accommodate Warm Weather Operations Without Restricting Passenger Load Factors or Payloads For Aircraft Types Operating to the Pacific Rim.

- Extension of Runway 16L/34R
- Extension of Runway 16R/34L
- Development of a new runway with a 12,500 foot length
- Delayed Alternative
- Do-Nothing/No-Build

(3) Provide Runway Safety Areas (RSAs) that Meet Current FAA Standards.

- Use of Declared Distances with displaced runway thresholds;
- Clearing, grading
- Delayed Alternative
- Do-Nothing/No-Build [3/]

(4) Provide Efficient and Flexible Landside Facilities to Accommodate Future Aviation Demand

- Use of Other Modes of Transportation
- Use of Other Airport/Development of A New Airport
- Activity/Demand Management
- Landside Development at Sea-Tac Airport
- Delayed or Blended Alternative
- Do-Nothing/No-Build

3/ Technically, the literal Do-Nothing is not an option for addressing the RSA issues. The Port of Seattle has two options for addressing RSAs, both of which require some action: grade and develop the requisite distance off the ends of the runways or establish declared distance procedures. The Do-Nothing alternative presented in the EIS and this Supplemental EIS analysis reflects the non-development action (declared distances).

4. AFFECTED ENVIRONMENT

Since the issuance of the Final Environmental Impact Statement in early February 1996, a number of actions have been taken within the region related to Sea-Tac Airport. The purpose of **Chapter 4** is to summarize these actions and identify if, or how, the actions affect the Master Plan Update improvements.

Key actions include:

- The final decision of the Expert Panel on Demand/System Management and Noise;
- The PSRC amendment to the Metropolitan Transportation Plan approving the third runway at Sea-Tac;
- The Port of Seattle Commission Approval of the Master Plan Update;
- Port and FAA approval and initiation of the Runway Safety Area for 34R corrections;
- Port of Seattle discussions with Seattle Water concerning the development of the employee lot north of SR 518; and
- Other actions, including local municipal land use actions.

In its final order of March 27, 1996, the majority (two members, with one dissenting opinion) of the Expert Panel on Demand/System Management and Noise concluded that "although the Port of Seattle has scheduled, pursued, and achieved an impressive array of noise abatement and mitigation programs, the Port has not shown a reduction in real on-the-ground impacts sufficient to satisfy the noise reduction condition imposed by Resolution A-93-03." The Panel concluded "that the Port could have done more, and that, had it done so, the additional improvement probably would have made a material difference in real, on-the-ground noise impacts, turned a marginal improvement into a meaningful one, and therefore affected the final outcome of this proceeding." In conclusion, the Panel offered a list of recommended noise reduction measures to be considered.

At its April 25, 1996 meeting, the PSRC's Executive Board agreed to use the recommendations in the Panel's March 27, 1996 Final Decision on Noise Issues as the basis for deciding what additional noise reduction measures should be part of including a proposed third runway at Sea-Tac Airport as an amendment to the Metropolitan Transportation Plan (MTP). Resolution A-96-02, amending the Metropolitan Transportation Plan (MTP) to include a third runway at Sea-Tac Airport with specific noise reduction measures based upon the recommendations of the Expert Panel, was approved by the PSRC General Assembly on July 11, 1996.

A number of actions have been taken by the Port of Seattle since issuance of the Final EIS. Actions related to the Master Plan Update improvements include:

- Issuance of a Mitigated Determination of Non-Significance (MDNS) and Determinations of Non-Significance (DNS) - a MDNS was issued for the 34R RSA and a DNS was issued for the Federal Express facility expansion. Both projects will be completed in 1997.
- Passage of Resolution 3212 - On August 1, 1996 the Port of Seattle Commission approved a resolution that: 1) found the EIS is adequate and meets the requirements of SEPA; 2) adopted the Master Plan Update and Airport Layout Plan (ALP); 3) approved the third parallel runway

and associated improvements; 4) agreed to undertake the PSRC Resolution A-96-02 Section I mitigation; 5) authorized participation in a multi-agency air quality monitoring program and 6) directed staff to monitor and evaluate changes in airport activity and how the changes might affect environmental conditions and mitigation. In addition, the Commission instructed staff to evaluate new technologies to satisfy poor weather operating constraints.

Three primary actions have been undertaken by other parties:

- Hearing conducted by U.S. Congressional Aviation Subcommittee - On March 18, 1996 then Congressman Randy Tate, a member of the House Aviation Subcommittee of the Transportation and Infrastructure Committee, held a hearing at the Des Moines Field House on the proposed third parallel runway at Sea-Tac Airport. Testimony was provided by three panels, each consisting of three individuals. Congressional members of the subcommittee then questioned the panel members.
- Local Land Use Actions - Land use planning activities have continued to be undertaken within the jurisdictions in the immediate airport area. Most notably, the PSRC's MTP will require the local jurisdictions to amend or adopt transportation components of their comprehensive plans that are compatible with the Updated MTP.
- Lawsuits and SEPA Appeals - the Airport Communities Coalition brought a lawsuit against the Port and PSRC concerning the PSRC approval of the MTP. The Airport Communities Coalition and the City of SeaTac also filed appeals under the State Environmental Policy Act (SEPA) challenging the Port Commission approval on August 1, 1996.

5. IMPACT ON ENVIRONMENTAL CONSEQUENCES

Chapter 5 of the Supplemental EIS presents the impacts of the new forecasts and new information on key environmental characteristics that would be affected.

5-1 Surface Traffic Analysis

Continued regional population growth will impact the surface transportation system in the vicinity of Sea-Tac Airport regardless of the improvements undertaken at the Airport. The surface transportation analysis, using the new forecast shows the following:

- Total Airport traffic is expected to increase from approximately 72,500 vehicles per day in 1994, to approximately 114,000 vehicles per day for the Do-Nothing Alternative (Alternative 1) or approximately 113,300 vehicles per day for the Preferred Alternative (Alternative 3) in the year 2010. The differences between the Do-Nothing and the Preferred Alternative traffic volumes relate to the availability of on-site parking available through each alternative an how the availability of parking affects vehicular access to the Airport.
- No significant surface transportation impacts have been identified for the Preferred Alternative in comparison to the Do-Nothing Alternative for any of the evaluated intersections and freeway ramp junctions.
- The Preferred Alternative would generate an additional 95 PM peak hour trips in the year 2010 over the Do-Nothing Alternative.

- Impacts associated with Alternative 2 (Central Terminal) and Alternative 4 (South Unit Terminal) were also considered and showed that the surface transportation impacts of these alternatives would be the same as the Preferred Alternative.
- The transportation improvement project that would have the greatest impact on conditions in the Airport area is the construction of the State Route 509 Extension and South Access.

Appendix C-1 presents a detailed summary of the surface transportation analysis, and **Section 5-4** presents the construction related surface transportation impacts.

5-2 Air Quality

Like the Final EIS, this Supplemental EIS evaluated the air quality impacts associated with the Master Plan Update improvements through a review of:

- Aircraft emissions inventory in tons per year for comparison to the State Implementation Plan;
- Local areawide dispersion analysis of Airport and non-Airport sources for comparison to the Ambient Air Quality Standards (AAQS); and
- A local roadway intersection dispersion analysis for comparison to the AAQS.

This analysis confirmed the results of the Final EIS, which showed that even with a higher demand forecast, that aircraft emissions would be below the 1995 SIP levels regardless of whether the improvements are undertaken at Sea-Tac Airport. The dispersion analysis shows that even with the higher demand forecast that the predominant air pollution source in the Airport environs are surface transportation vehicles.

The intersection dispersion analysis was conducted to examine conditions in the Airport area that would be affected by the proposed improvements. This analysis shows that, with the worst case modeling assumptions, the AAQS for Carbon Monoxide could be exceeded regardless of whether improvements are completed at Sea-Tac Airport due to high volumes of surface traffic on International Boulevard (SR 99). With the higher air travel demand forecast and the changes in the proposed Master Plan Update improvements described in Chapter 2 of the Supplemental EIS, the intersection analysis shows that the improvements associated with any of the "With Project" alternatives would result in pollutant concentrations equal to or less than would occur in the Do-Nothing.

despite 95 PM Hour trips F8

Because the demand forecast has increased and changes were made in the phasing and definition of the proposed improvements, a Final Conformity Analysis was prepared and is available in **Appendix B**. Included in **Appendix B (Attachment A)** are responses to comments concerning the draft air conformity analysis presented in the February, 1996 Final EIS. Comments concerning the February 1997 Updated Draft Conformity Analysis are summarized in **Appendix F**.

The analysis contained in this Final Supplemental EIS reflects responses to these comments and a thorough quality assurance review of the data input to the models. While some estimates of future air emissions have changed over the levels presented in the Draft Supplemental EIS, the conclusions of the Draft remain the same and are supported by the revised analysis contained in this Final Supplemental EIS.

5-3 Noise Exposure

Using the new forecasts, noise exposure contours were prepared for the Do-Nothing and Preferred Alternative to show areas impacted by aircraft noise of 60 DNL, 65 DNL, 70 DNL, and 75 DNL (Day-Night Average Sound Level). As was shown in the Final EIS, noise exposure impacts are expected to be less than current impacts, as follows:

	65 DNL and Greater Noise Exposure Impacts		
Year	Population	Housing	Area (sq. mi)
Existing (1994)	31,800	13,620	12.23
Do-Nothing Alternative (Alternative 1)			
2000	11,310	4,820	6.81
2005	10,450	4,450	6.61
2010	11,940	5,060	7.08

	65 DNL and Greater Noise Exposure Impacts		
Year	Population	Housing	Area (sq. mi)
"With Project" (Alternatives 2, 3, and 4)			
2000	11,310	4,820	6.81
2005	10,440	4,400	6.85
2010	13,220	5,520	7.69

Note - the area above includes all land, including airport property within the contours

The 65 DNL and greater noise exposure contours associated with the new forecast are about 12% greater than the noise contours prepared using the Master Plan Update forecast in the Final EIS. The new noise contours for the year 2010 would exceed the boundaries of the Port's existing Noise Remedy Program boundary by several blocks on the northwesterly edge of the Noise Remedy Program Boundary. In addition, a number of residential areas would experience a 1.5 DNL increase in noise (when comparing the "With Project" to the Do-Nothing) in year 2010. **Section 5-6 "Land Use Impacts"** describes the impact of the noise on noise sensitive land uses.

5-4 Construction Impacts

Since publication of the Final EIS, new information has arisen that has lead to construction related changes:

- Third parallel runway haul duration - the Final EIS analyzed a 3-year haul, with the runway being available for use in the year 2000. This Supplemental EIS analyzes a 5-year haul, with the runway available for use in late 2004. Under this new construction schedule, the peak of hauling would occur in year 2000, with the haul complete in 2002. While day-to-day truck traffic levels could vary, the lengthening of the haul duration could reduce the number of average daily truck trips;
- Additional haul routes have been identified - the Final EIS examined the primary haul routes that are anticipated to be used. Based on a further examination of barge/rail transfer opportunities, several additional routes were identified.
- Examination of two temporary interchanges - In addition to the identification of additional haul routes, two temporary, construction-only interchanges were identified: from SR 518 near 20th Avenue South and from SR 509 near South 176th Street.

No changes in the total quantity of fill material have been identified since publication of the Final EIS, yet this Supplemental EIS examines a greater quantity of fill excavated from On-Site Borrow Source 1 and no excavation from On-Site Borrow 5.

Based on the new construction schedule, the minimum use of on-site material option (that maximizes off-site material use and, thus, truck haul), would result in 66 one-way truck trips during the average hour adjusted for peaking, in contrast to the 109 trips examined by the Final EIS. This Supplemental EIS examined the impact of 109 one-way trips on I-5, SR 509, and SR 518 and 66 one-way trips on other possible haul routes. While the Final EIS identified several hours of operation constraints at various intersections along the arterial, this reduced level of truck trips could minimize these effects.

Section 5-4 "Construction Impacts" of this Supplemental EIS summaries the new construction impact evaluation and presents an updated/revised surface transportation analysis, noise, air quality, visual conditions, social impacts, and a detailed listing of overall possible construction best management practices.

5-5 Biotic Communities, Floodplains, and Wetlands

Chapter IV of the Final EIS (located in Volume I) presents the impacts of the Master Plan Update improvements relative to biotic communities (including creeks), wetlands, floodplains. Since the issuance of the Final EIS, information concerning two key areas has been produced:

- Submission of the wetland fill Joint Aquatic Resource Permit Application (JARPA) Section 404 permit application to the U.S. Army Corps of Engineers and further definition of wetland mitigation and Miller Creek relocation mitigation; and
- Survey of raptors in the area of the third runway.

Section 5-5 of this Supplemental EIS contains a discussion of the wetland impacts and a summary of the detailed mitigation plan.

In December 1996, the Port submitted a application to the Army Corps of Engineers for a permit to fill wetlands at Sea-Tac Airport associated with the Master Plan Update improvements in compliance with the Clean Water Act, Section 404. The 404 permit application submitted to the Corps of Engineers includes a completed Joint Aquatic Resources Project Application (JARPA) form, in a report entitled "JARPA Application for Proposed Improvements at Seattle-Tacoma International Airport" dated December 1996.

The Final EIS noted that about 10.4 acres of wetland would be filled in order to complete the proposed improvements. Since issuance of the Final EIS, the Port has refined its evaluation of the projects affecting wetlands, including identification of about 2 additional acres of wetland impacts, and documented its review of in-basin mitigation options, and further defined plans for development of a wetland mitigation site in Auburn.

Based on a refined evaluation of the wetlands, the following impacts were identified:

Project Element	New Data	Final EIS
Runway impacts		
Embankment	5.46	5.48
Borrow Source impacts	1.92	2.38
Runway Safety Areas 16L/R	2.34	Included above
Runway 34R Extension	0.00	0.00
Terminal/Landside		
N. Employee Parking lot	0.81	0.81
Development in SASA	1.70	1.70
Total	12.23	10.40

To mitigate for the unavoidable impacts to wetlands, the Port proposes to create new wetlands on a 47-acre site of an approximately 69-acre parcel located within the city limits of Auburn, Washington. Wetland mitigation at the Airport, within the watersheds where the impacts may occur, is not feasible for three reasons: (1) most of the area surrounding the Airport is developed, and not enough available land exists in the watershed to create compensatory mitigation wetlands without relocation of additional business and residences; (2) the FAA has indicated that "wildlife attractions" within 10,000 ft of the edge of any active runway is not recommended; and (3) wildlife control activities in wetlands near the airport would conflict with wetland habitat mitigation goals. However, the hydrologic functions the wetlands perform would be replaced at the airport site with the proposed storm water management facilities, and relocation of the drainage channels, and relocation of affected portions of Miller Creek.

In addition, the Port performed a follow-up review of the westside of the airfield to determine if raptors (such the red-tailed Hawk) were nesting in the area. This survey indicated that no nests are occurring, but that raptors forage in the airport area.

5-6 Land Use Impacts (Land Use Compatibility, DOT 4(f), Archaeological/Cultural/ Historic Sites)

As is indicated in **Section 5-3**, aircraft noise impacts are expected to be greater with the new (higher) forecasts for both the Do-Nothing and "With Project" alternatives. The greater noise exposure area would result in greater impacts to population, residences, and other noise sensitive facilities, including schools, nursing homes, hospitals, libraries, parks, churches, and historical sites.

As was noted earlier, a comparison of the "With Project" conditions to the Do-Nothing indicates that the Master Plan Update improvements would result in residential areas experiencing 1.5 DNL or greater increases in aircraft noise exposure. The areas that would experience 1.5 DNL or more increases are located in the west side acquisition area or directly under the north and south approach path to the runway for a distance of about 3 miles to the north and a mile and a half to the south of the third runway. Much of this area overlies the existing Noise Remedy Program boundary, where residences are currently in the process of being sound insulated. While impacts in all future years would be less than current exposure, upon commissioning of the third parallel runway, the contours are expected to lie within the boundaries of the existing Noise Remedy Program in 2004/2005. However, as demand for air travel grows, the noise contours would begin to increase in size. By 2010, residential areas outside the existing Noise Remedy Program boundary would be expected to be exposed to 65 DNL and greater noise levels, an increase of 1.5 DNL or greater than levels under the Do-Nothing condition. By 2010, this area would include about 170 residences.

In addition, about 10 noise sensitive facilities (four schools and three locally significant historic sites - one site is both a school and historic site) are within the 65 DNL noise contour and could experience a 1.5 DNL or more increases in noise when comparing the "With Project" to the Do-Nothing. The properties where the use may be incompatible with the forecast noise are:

1. Sea-Tac Occupational Skills Center (S102) would experience an increase of 4.41 DNL in 2010;
2. Woodside Elementary School (S105) would experience an increase of 3.1 DNL in 2010;
3. Sunny Terrace Elementary School (S106) would experience an increase of 5.2 DNL in 2010;

4. Sunnydale Elementary (S21/A16) would experience a 2.8 DNL increase in year 2010
5. Albert Paul House (A57) would experience an increase 3.9 DNL in 2010;
6. Coil House (N16) would experience an increase of 1.9 DNL in 2010; and
7. Bryan House (A29) would experience an increase of 5.0 DNL in 2010.

Section 5-6 presents a detailed description of the noise sensitive facilities. Future noise, with and without the proposed improvements would be less in the future at all of these sites with the exception of the Bryan House.

Because locally significant historic sites could be exposed to greater noise with the proposed improvements a DOT 4(f) evaluation (located in this Supplemental EIS beginning on Page 5-6-12) was performed, and provides a basis for determining that no 4(f) impacts would occur. Section 106 consultation is underway with the State Historic Preservation Officer (SHPO) to determine if these sites are eligible for inclusion in the National Register of Historic Places.

The following land use related mitigation is proposed:

Mitigating Significant Noise Impacts on Public Facilities and Locally Significant Historic Sites - Impacts on the residential and school/educational use facilities will be mitigated by acoustical insulation that would allow their uses to be compatible with increased noise levels. Two of the schools are currently not being used for educational uses, and future plans for these buildings need to be confirmed with the Highline School District. Port Commission Resolutions 3125 and 3212 and the 1993 Update to Sea-Tac's Part 150 Noise Compatibility Program contain Port intentions to expand the Airport's insulation programs for public buildings. The Port has been discussing school insulation with the Highline School District, and through Resolution 3212 has agreed to commit $50 million to the insulation of schools. Depending upon the District's designation of the long-term use of the two impacted schools and on the District's desire to have these buildings insulated, they would undergo insulation treatment as needed for compatibility independent of a formal school or public building insulation program. The residences would be addressed by the existing Noise Remedy insulation program if the owners agree. Because of their historic value, these facilities could require custom treatment to avoid significant alternation of the architectural style. In pursuing sound insulation of these structures, the Port's Noise Remedy Office will work with a historian to preserve such characteristics.

Provide Directional Soundproofing: Residences that were insulated prior to 1992 may need additional directional soundproofing to mitigate noise generated from a new flight path from the operation of the proposed new third runway. To mitigate noise caused by the proposed airport improvements, these facilities would be further insulated. The Port of Seattle estimates that some 60 to 70 houses were evaluated and/or insulated prior to 1992 and could require additional soundproofing at a cost of about $6,000 to $10,000 per residence. The additional sound insulation measures that could be required include new windows, new doors, and thicker walls.

Acquisition in the Approach Transitional Area - In recognition of the fact that the standard Runway Protection Zone (RPZ) dimensions do not always provide sufficient buffer to the satisfaction of nearby residents, the FAA has indicated that funding could be available to airport operators acquiring "up to 1,250 feet laterally from the runway centerline, and extending 5,000 feet beyond each end of the primary surface.[4/] Based on the configuration of current airport land, local streets, and residential development patterns, the approach and

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[4/] FAA Memorandum, Action: Land Acquisition - eligible Runway Protection, Object Free Area and Approach and Transitional Zones, dated April 30, 1991.

transitional area selected for use as a potential mitigation area includes the standard Runway Protection Zone and a rectangular extension of the RPZ outward another 2,500 feet.

The acquisition of properties within the approach transitional areas north and south of the proposed runway may serve as a feasible and appropriate mitigation measure. This measure would involve the acquisition of all residential uses, and any vacant, residentially zoned properties which cannot be compatibly zoned, within selected areas both to the north and the south of the new runway ends. Commercial land uses, which make up most of the eligible area to the south, need not be acquired and may remain in place on both runway ends.

In the northern approach transitional area, 82 single-family residential parcels, 2 apartment buildings (with 28 units), and 2 mobile home parks, with 96 units, would be acquired. To the south, 71 single-family residential parcels and 6 apartment buildings (with 32 units) would be acquired. Based on the current assessed value of these 309 residential homes and multi-family buildings, it is estimated that the cost of acquisition and relocation would be approximately $35 million.

As was noted in the Final EIS, input from the affected residents is necessary to design and initiate an acceptable relocation program. Such input was solicited during the Draft EIS's 90-day public comment period and through display boards, which were created and used at the June 1, 1995 Public Hearing for the express purposes of soliciting feedback from the affected residents concerning this action. As is shown in Appendices R and T of the Final EIS, few comments concerning the program were received. Therefore, as the probable impact of low flying aircraft would not be experienced until the opening of the proposed new parallel runway, this option will receive further consideration during the forthcoming Sea-Tac Airport FAR Part 150 Update, which the Port anticipates undertaking during 1997. It is anticipated that during the Part 150 Update, the Port would further explore this action with the specific residents within the Approach Transition Area, and, if the residents so desire, establish a program including relocation objectives, timing and funding priorities.

<u>Sound insulation of residences affected by 1.5 DNL or greater within 65 DNL noise exposure</u> - Approximately 1,000 residents living in 460 housing units would be impacted by 65 DNL in 2010 as a result of the proposed improvements in comparison to the Do-Nothing alternative. About 170 of these homes within 65 DNL would be exposed to a 1.5 DNL higher noise levels as a result of the proposed improvements and are not already subject to the Port's existing Noise Remedy Program. No residential areas outside the existing Noise Remedy Program boundaries would experience 1.5 DNL increases in year 2005 as a result of the proposed improvements.

Noise Remedy boundary based on ~ 260000 operation

The Port will develop an implementation strategy to sound insulate these 170 additional homes within the 65 DNL noise contours as part of the Part 150 Noise Compatibility Plan study effort that will be initiated in 1997. The purpose of delegating finalization of the implementation approach for this action to determination during the Part 150 is to ensure that consideration is given to the proposed Approach Transition Area acquisition and the relationship of that area to the existing Noise Remedy Program boundary, as well as the westerly expansion of the Noise Remedy Program to accommodate this added insulation.

Port Resolution 3125 dated November 1992 states "Port staff is also directed to develop and implement an plan to insulate up to 5,000 eligible single family residences in the existing noise remedy program included on the waiting list as of December 31, 1993, before commencing construction of the proposed runway. The remaining eligible single family residences on the waiting list are to be insulated prior to operation of the proposed runway. In addition, the Port commits to complete insulation of all single-family residences that become eligible for insulation as a result of actions taken based on the site-specific EIS and are on the waiting list as of December 31, 1997, prior to commencing operations of said runway."

For the purpose of the Resolution, the term "eligible" is all single family properties located within the Noise Remedy Boundary, as established by the Port's 1985 Part 150 Study, with the exception of homes built after appropriate building codes were enacted after the Part 150 Study in 1985. As a result of this resolution and on-going implementation of the Part 150 Study, residents located in the Noise Remedy Boundary have come to expect the Port to complete the program, regardless of future airport facility improvements. Therefore, included as mitigation for implementing the third parallel runway, the Port agrees to insulate these single family residential areas regardless of the existing or future noise exposure.

5-7 Other Environmental Issues

Section 5-7 of the Supplemental EIS summarizes the environmental impacts associated with the remaining environmental issues. The new information, and the new forecasts, are not anticipated to result in a notable change in the impacts in the following areas. As a result, the findings in the Final EIS were summarized in this section.

1. Prime and Unique Farmland,
2. Social Impacts,
3. Human Health,
4. Induced Socio-Economic Impacts,
5. Water Quality,
6. Coastal Zone Management and Coastal Barriers,
7. Wild and Scenic Rivers,
8. Public Services and Utilities,
9. Earth,
10. Solid Waste,
11. Hazardous Waste and Materials,
12. Energy Supply and Natural Resources, and
13. Aesthetics and Urban Design.

Since publication of the Final EIS in February 1996 and the Draft Supplemental EIS in February 1997, two additional studies have been completed concerning water resources in the Airport vicinity. Section 5-7 of the Final Supplemental EIS summarizes the conclusions of these studies and the effects on the analysis presented in the Final EIS and Supplemental EIS.

Numerous appendices are included in this Supplemental EIS. **Appendix A** contains responses to comments on the February, 1996 Final EIS. **Appendix B** contains the final air conformity analysis. **Appendix C** contains a detailed presentation of the technical analysis presented in Chapter 5. **Appendix D** provides an evaluation of year 2020, based on conditions presented in Chapter 5.

As was noted previously, **Appendix F** contains a summary of the comments received on the Draft Supplemental EIS and responses to those comments. **Appendix G** contains the comments received concerning the Draft Supplemental EIS and updated draft air conformity analysis.

CHAPTER 2

IMPACT ON PROJECT DEFINITION AND PURPOSE AND NEED

The need for airport master plan improvements are identified and scheduled based on the relationship of existing and future demand to the level of service afforded by the existing facility. Therefore, if activity levels grow slower than was forecast, facilities could be scheduled before they are needed. Conversely, if demand grows faster than anticipated, facilities could be needed sooner than the schedule indicates. The Master Plan Update improvements for Sea-Tac Airport were identified based on a forecast of aviation activity (enplaned passengers and aircraft operations), in which enplaned passengers were anticipated to grow at a rate of 2.4% per year and operations at a rate of 0.8% per year. Terminal and landside facilities were to be phased-in in a manner that would make facilities available in time to address the demand.

As is shown by the analysis presented in this chapter, aviation demand is forecast to increase above the levels predicted by the Master Plan Update. The new Port of Seattle forecast indicates that aircraft operations are anticipated to reach 474,000 annually by 2010, a level that is about 17 percent greater than the Master Plan Update forecast. Enplaned passengers are anticipated to reach 17,900,000 by 2010 or nearly 5-8 years sooner than was forecast by the Master Plan Update. These new forecasts are based on new information concerning air fares and Puget Sound Region per capita income. As these forecasts exceed the operating capability of the existing airfield, a Do-Nothing forecast of 460,000 annual operations was identified.[1/] These forecasts serve as the basis for evaluating the environmental issues presented in Chapter 5.

Based on the new forecast, the purposes and needs identified by the Master Plan Update were examined. As the Master Plan Update improvements were identified to address specific needs in specific timeframes, the primary effect of this accelerated demand is that terminal and landside facilities could be needed earlier than originally anticipated. The need for the third parallel runway would not be affected by the accelerated demand because its primary purpose is to address existing airport constraints, to reduce delay, and to improve the reliability of the existing airfield during poor weather (a condition that occurs 44% of the year).

This chapter presents:

- New Aviation Demand Forecasts
- Effects of New Aviation Demand Forecasts on Purpose and Need
- Impact of the Forecasts on the Master Plan Update Improvement Projects
- Long-Term Development Capability of Sea-Tac Airport

The environmental impacts of a demand forecast that is higher than predicted by the Master Plan Update is presented in Chapter 5 of this report.

[1/] The Flight Plan Study, referenced by the Master Plan Update Final EIS, identified a maximum operating capability of the existing airfield at 460,000 operations. This Supplemental EIS reaffirmed this constraint.

1. NEW AVIATION DEMAND FORECASTS

Aviation demand forecasting is often incorrectly perceived as a science, where all variables are predictable and known. However, as is shown by comparing any forecast to conditions that actually occur during the period that was forecast, forecasting is more an art than a science. As a result, precise forecasting for specific future years, particularly years more than 10 years in the future in the volatile air travel industry, is very difficult. It is not uncommon for forecasts to show more or less airport activity for a particular year than actually occurs. When forecasts turn out to be different than the subsequent actual experience, it is sometimes the amount of future growth which does not match reality, but much more often is the difficulty in forecasting the precise timeframe in which specified amounts of growth will occur. Although forecasts for near-term years may not match actual experience, typically those differences are relatively small. For more distant years, forecasting is much more uncertain. This uncertainty is inherent in the nature of forecasting and the nature of the air travel industry and cannot be cured by changing forecasting techniques. Multiple forecasts performed at the same time may reach different conclusions, but there is no reliable way of determining which is more likely to be correct than another. The FAA and the Port of Seattle have performed the most reliable forecasts they can, given this uncertainty. Several forecasts performed for different purposes have been compared and their conclusions are within a reasonable range.

This section summarizes the new forecasts that have been prepared since issuance of the Final EIS.

A. Revised Forecasts

In December 1996, the Federal Aviation Administration headquarters Office of Policy and Plans issued its fiscal year 1997 Terminal Area Forecast (TAF) for Seattle-Tacoma International Airport that showed that forecast demand could grow significantly faster than was predicted by the Master Plan Update. In response to these forecasts, and in an attempt to validate the work of the FAA, the Port of Seattle prepared a new (updated) demand forecast. **Table 2-1** contrasts the two demand forecasts. The Port's new forecast, while slightly lower than the FAA's forecast, shows that demand could grow faster than was previously identified, based on several new or updated information.

TABLE 2-1

COMPARISON OF DEMAND FORECASTS
(Master Plan Update, FAA TAF, and new Port of Seattle forecast)

Unconstrained ("With Project") Aviation Demand Forecast Comparison

	1995	2000	2005	2010
Operations				
Master Plan Update	N/A	379,200	392,500	405,800
FAA 1997 TAF	386,536	433,470	478,050	528,200
New Port of Seattle	386,536	409,000	445,000	474,000
Enplaned Passengers				
Master Plan Update	N/A	11,900,000	13,600,000	15,300,000
FAA 1997 TAF	11,386,000	13,920,000	16,290,100	18,950,000
New Port of Seattle	11,386,000	13,700,000	15,700,000	17,900,000

N/A = Not available

The following subsections summarize the methodology and results of the new FAA and Port forecasts.

1) FAA Terminal Area Forecasts

Each year the FAA prepares a Terminal Area Forecast (TAF) for the busier airports in the country. These forecasts are prepared for FAA purposes, such as "developing its program plans and in assessing the level of resources needed to meet anticipated demand for its services."[2/] While FAA also indicates that these forecasts could be used by local airport authorities in airport planning activities, the information is not prepared at a refined level (such as by fleet mix or peak periods) to enable their use in evaluating environmental impacts at a major air carrier airport. In addition, the FAA's TAF does not reflect existing facility constraints or proposed future airport improvements. **Table 2-2** lists the FAA's fiscal year 1997 TAF for Sea-Tac.

TABLE 2-2
FISCAL YEAR 1997
FAA TERMINAL AREA FORECAST

Federal Aviation Administration Terminal Area Forecast

Year	Annual Operations	Enplaned Passengers
1995	386,536	11,386,500
2000	433,474	13,920,000
2005	478,053	16,290,000
2010	528,205	18,950,000

Source: Federal Aviation Administration, December 1996.

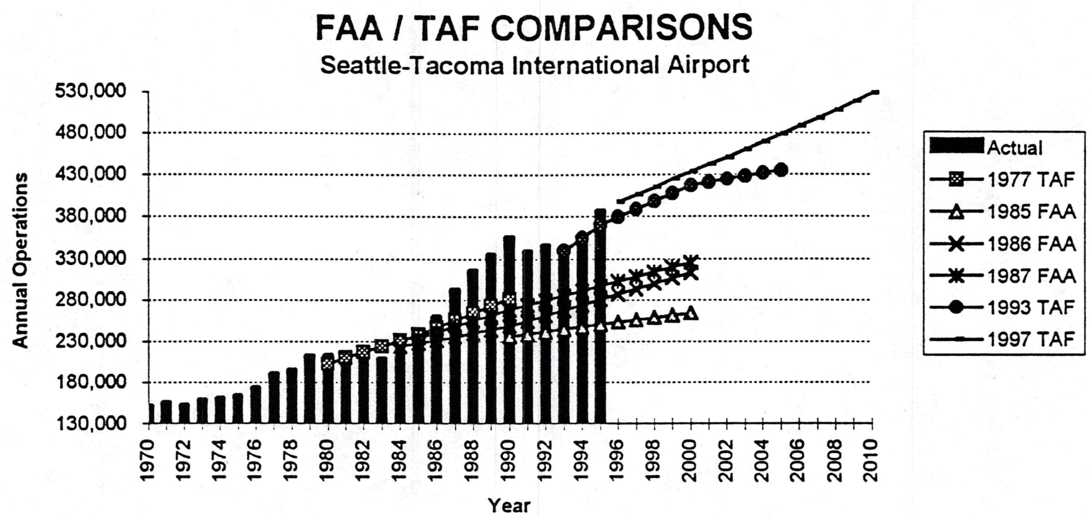
The TAF was prepared using a linear multiple regression technique based on actual data through the year 1995.[3/] The fiscal year TAF for Sea-Tac is predicated on the following:

- Domestic air fares are anticipated to continue to decline at a rate of 1.2% while international airfares are anticipated to increase;
- Domestic air carrier passengers are anticipated to grow at an annual growth rate of 3.4% while international passengers are anticipated to grow at 0.6% per year;
- The domestic air carrier load factor (actual percentage of passenger occupying available seats) was assumed to remain constant at 65.3%;
- Air carrier seats per departure could increase from 153.4 in 1995 to 158.6 in 2010, based on recent year changes at Sea-Tac;
- Commuter passengers were forecast as a function of FAA's forecast of national trends in domestic enplanements;
- Commuter operations could increase at a rate of 3.8% per year, with an average seats per departure increasing from 30 in 1995 to 47.1 in 2010.

2/ *Terminal Area Forecasts - Fiscal Years 1992-2005*, FAA, July 1992, Preface page
3/ FAA internet file: http://api.hq.faa.gov/apo_pubs.htm - table of contents - page 3, Forecast Process

The FAA prepares a Terminal Area Forecast each year, based on the most recent information on how factors that affect the demand for air travel are changing. Thus, it is important to consider how accurate the FAA's TAF process has been in the past at predicting growth in air travel. **Exhibit 2-1** shows a comparison of past TAF forecasts to actual annual aircraft operations. As is shown, TAF forecasts for Sea-Tac during the mid 1980s significantly underestimated actual activity levels.

EXHIBIT 2-1



The graph above compares actual activity with forecasts that were prepared in earlier years. As this chart shows, the actual activity shows a greater deviation from the forecast further out in time, reflecting the inherent difficulties in forecasting.

2) <u>Port of Seattle Updated Forecasts</u>

In preparing updated forecasts for the Airport, the Port examined two specific conditions:

- Demand Forecast -- "With Project" forecast: this forecast represents an unconstrained level of demand for air travel within the Puget Sound Region. It represents the total passengers that wish to fly assuming that sufficient facilities are available to accommodate the demand. This level of activity is presumed to occur with the "With Project" alternative;
- Activity Forecast - Constrained "Do-Nothing" forecast -- this forecast represents the level of activity that the existing facilities at Sea-Tac Airport are capable of accommodating due to constraints in the airport system. These constraints could result in less than the total demand being satisfied, if demand exceeds the capability of the system.

In preparing the forecasts, first the demand for air travel was identified. The extent of the constraints associated with the existing airfield, terminal facilities, support facilities, and landside/roadway system were then identified. Then, the passengers and resulting aircraft operations forecast were prepared based on the capabilities of the system to serve that level of activity. At the point where demand exceeds the capability of a constrained system, a lesser amount of activity could be accommodated by the existing facilities (referred to as the Do-Nothing condition) versus after completion of the Master Plan Update improvements (referred to as the "With Project").

The forecasts analyzed by this Supplemental EIS reflect projected air travel demand of nearly 18 million enplaned passengers that is now predicted to occur by 2010. The Master Plan Update predicted air travel demand and identified terminal and landside improvements to address 19 million enplanements, which was predicted to occur in 2020. It is an important distinction to make that the Master Plan Update improvements were identified to accommodate a *demand*, that was once thought might occur in year 2020. Based on the new forecasts, demand could likely approach 19 million enplanements between 2010 and 2015 (about 7-8 years sooner). As this report demonstrates, greater degrees of uncertainty exist concerning the timing and amount of demand in the outlying years, as the aviation industry appears to be emerging from a decade of high volatility. Because of the uncertainty, this analysis addresses impacts through the year 2010. Appendix D presents an analysis of possible environmental impacts in 2020, based on an extrapolation of conditions in 2010.

A detailed discussion of the preparation of the new Port of Seattle Forecasts are discussed in *Working Paper 1 - Unconstrained Aviation Forecast Update* and *Working Paper 2, Constrained Aviation Forecast Update, Forecast Update, Capacity Analysis and Landside Evaluation for Seattle-Tacoma International Airport*, prepared by P&D Aviation dated January 1997. This report is incorporated by reference and is available for public review during normal business hours at the FAA offices in Renton, Washington, and the Port of Seattle Offices at Sea-Tac Airport. The following summarizes the methodology and results of the two Port forecasts.

(a) <u>Demand Forecast -- With Project Forecast</u>

In updating the prediction of future aviation demand, the variables that affect demand were examined. The following primary characteristics were updated:

- passenger airfares,
- demographics of the Puget Sound Region, including population and per capita income was updated from 1992 PSRC data to 1994 PSRC data; and
- actual airport activity.

In preparing the new demand forecast for Sea-Tac Airport, the same forecast model that was used in the Master Plan Update was used. However, the Master Plan Update model was updated to reflect current activity and current growth tends. To estimate the largest component of passenger activity (domestic passengers), this model relies on two principal variables: personal income in the Puget Sound Region, and average domestic airfares.

The Master Plan Update forecast used projections of per capita income prepared by the Puget Sound Regional Council (PSRC) through the year 1992. In 1994, the PSRC updated the per capita income projection for the region, assuming that it would increase at a slightly slower rate than was previously anticipated. By itself, this new assumption would likely produce less demand for air travel.

During the Master Plan Update, many in the aviation industry anticipated that average air fares would begin to increase as a result of tremendous financial losses and airline consolidations that had been experienced during the late 1980s and early 1990s. However, the Port's new forecasts assume that airfares are likely to continue to decline. In the last several years, there has been an increase in new-entrant, low-cost airlines which has produced greater competition for passenger service. The FAA and other industry forecasters now expect the current trend toward declining airfares to continue. The Port's new forecast assumes that airfares would continue to decline at a rate of 1.2% annually through the year 2007. However, between 2005 and 2010, the Port anticipates that average airfares could decrease but at a slower rate. Based on published reports,[4] average Sea-Tac airfares per passenger mile have declined slightly faster than the average U.S. airfare due to competition created by Southwest Airlines and other low cost operators at Sea-Tac. Current airfares at Sea-Tac are about 17% less than the U.S. average. Thus, it is anticipated that this margin would shrink before 2010, as more eastern U.S. markets are penetrated further by low-cost carriers.

While a slightly slower per capita income assumption would result in slightly less passenger demand, the decreased air fare assumption produces an anticipated increase in demand for air travel. Thus, domestic enplanements are anticipated to increase from 10.6 million in 1995 to 15.7 million in 2010 -- an annual growth rate of about 2.5%. **Table 2-3** summarizes the new "With Project" forecast.

TABLE 2-3

UPDATED DEMAND FORECAST
"With Project" Conditions

	Actual	Forecast		
	1995	2000	2005	2010
Enplaned Passengers:				
Domestic	10,600,000	12,400,000	14,000,000	15,700,000
International	800,000	1,300,000	1,700,000	2,200,000
Total Enplanements	11,400,000	13,700,000	15,700,000	17,900,000
Origin and Destination EPS	7,900,000	9,450,000	10,800,000	12,250,000
Aircraft Operations:				
Air Carrier	222,000	262,000	298,000	328,000
Air Taxi/Commuter	138,000	116,000	114,000	110,000
All-Cargo	16,000	20,000	22,000	25,000
Gen. Aviation/Military	11,000	11,000	11,000	11,000
Total Operations	387,000	409,000	445,000	474,000
Tons of Cargo	408,000	509,000	621,000	732,000
Average Day Operations	1,060	1,121	1,219	1,299
Peak Month/Average Day	1,198	1,246	1,352	1,423
Peak Hour Operations	75	78	94	99

EPS = Enplanements

Source: Port of Seattle and P&D Aviation. The Demand forecast represents the unconstrained demand seeking air travel from Sea-Tac. However, as the new parallel runway would not be completed until 2005, the year 2005 peak hour and peak month average day reflect constrained demand.

Because this projection represents an unconstrained level of activity, which could be accommodated efficiently with the proposed Master Plan Update improvements, it was used to assess the impacts of the "With Project" condition presented in Chapter 5.

[4] For example, the General Accounting Office GAO/RCED-96-79 "Airline Deregulation: Changes in Airfares, Service, and Safety at Small, Medium-sized, and Large Communities" April 1996.

(b) Activity Forecast -- Do-Nothing Forecast

The 1996 Final EIS indicated, based on the 1992 Flight Plan Study evaluation, that the annual service volume of the existing airfield is approximately 380,000 operations, but that a greater level of activity could be accommodated assuming users are willing to withstand greater inefficiencies (i.e., delay). The Flight Plan found that the capacity of the existing airfield could be expanded to about 460,000 annual operations as hourly peaks are spread (either through delay or flight scheduling). Using the Master Plan Update forecasts, demand was not projected to be high enough to exceed this constraint [The Master Plan Update forecast 19 million annual enplanements carried on 441,000 operations in year 2010]. However, based on the unconstrained demand identified by the new forecasts, the existing airfield is not capable of accommodating more than 460,000 annual aircraft operations, which is now anticipated to occur by the year 2008.

The review of activity constraints first focused on the individual capability of the airfield and the terminal/landside. As is shown in the following summary, the airfield has hourly operating constraints, which are higher than the constraints of the terminal and landside system. As a result, it is believed that passenger behavior would evolve as congestion mounts, without a loss in demand until the maximum airfield operating capacity is exceeded. Such an evolution would result in passengers incurring additional time accessing the Airport (either through congestion on the roadway system, difficulty in finding parking at the Airport, waiting in ticket check-in lines, etc.). This is the historical trend of busy, congested airports throughout the world. As a result, airfield capacity represents the greatest constraint in accommodating passenger demand.

This analysis identified an activity forecast that would likely occur if no improvements were made in the existing airport facilities, based on the following information concerning Sea-Tac Airport constraints:

Airfield Constraints - Based on the updated forecast, a review of the constraints of the existing airfield was performed.[a] This review considered: delay, airline scheduling flexibility, and passenger demand for air travel. Early studies conducted concerning Sea-Tac's existing capacity, identified 380,000 operations as the annual service volume of the Airport. This level of activity has been interpreted as an ultimate limit on the level of activity that could be accommodated by the two parallel runways. However, as is shown by current actual activity levels, demand for air travel at Sea-Tac produced nearly 387,000 operations in 1995 and 395,200 in 1996. The 380,000 annual service volume represents the threshold where inefficiencies in the airfield operating system become highly visible. As activity has exceeded the annual service volume, delay has increased.

During the FAA's 1995 Capacity Enhancement Update, delay during various operational modes was evaluated. That study confirmed the earlier capacity study, that found significant delays occur at Sea-Tac Airport during poor weather due to the close spacing between the existing parallel runways. **Table 2-4** lists projected delay associated with two forecast activity levels evaluated by the 1995 FAA Capacity Enhancement Update.

The 1992 Flight Plan Study Environmental Impact Statement found that the maximum theoretical capacity of the existing airfield is 460,000 operations, assuming that operations are extended into the late evening and early morning, and

[a] *Working Paper 2, Constrained Aviation Forecast Update, Forecast Update, Capacity Analysis and Landside Evaluation for Seattle-Tacoma International Airport*, P&D Aviation, January 1997.

that greater levels of delay would be experienced. As the demand for air travel is now forecast to exceed this maximum capacity, the issue of maximum capacity was reconsidered as part of this Supplemental EIS. As is shown by the following paragraphs, the Flight Plan Study maximum capacity analysis was reaffirmed as 460,000 annual operations.

TABLE 2-4

AVERAGE ALL-WEATHER DELAY

Operations	Arrival	Departure	Estim. Taxi	Average Operation
	Average Delay (minutes) Existing Airfield			
345,000	7.7	1.3	0.1	4.5
425,000 *	22.2	2.6	0.2	12.4
525,000 *	63.7	11.6	0.4	37.7

ARRIVAL DELAY

Operations	VFR1	VFR2	IFR1	IFR2/3	IFR4	All-Weather
	Average Arrival Delay (minutes) Existing Airfield					
345,000	1.0	11.4	21.7	21.7	333.2	7.7
425,000 *	1.6	41.8	71.2	101.0	524.5	22.2
525,000 *	3.1	163.6	181.3	219.4	711.9	63.7

Source: FAA Capacity Enhancement Update, Data Package No. 12, June, 1995.
* Assumes full implementation of the 2.5 nautical mile separation.

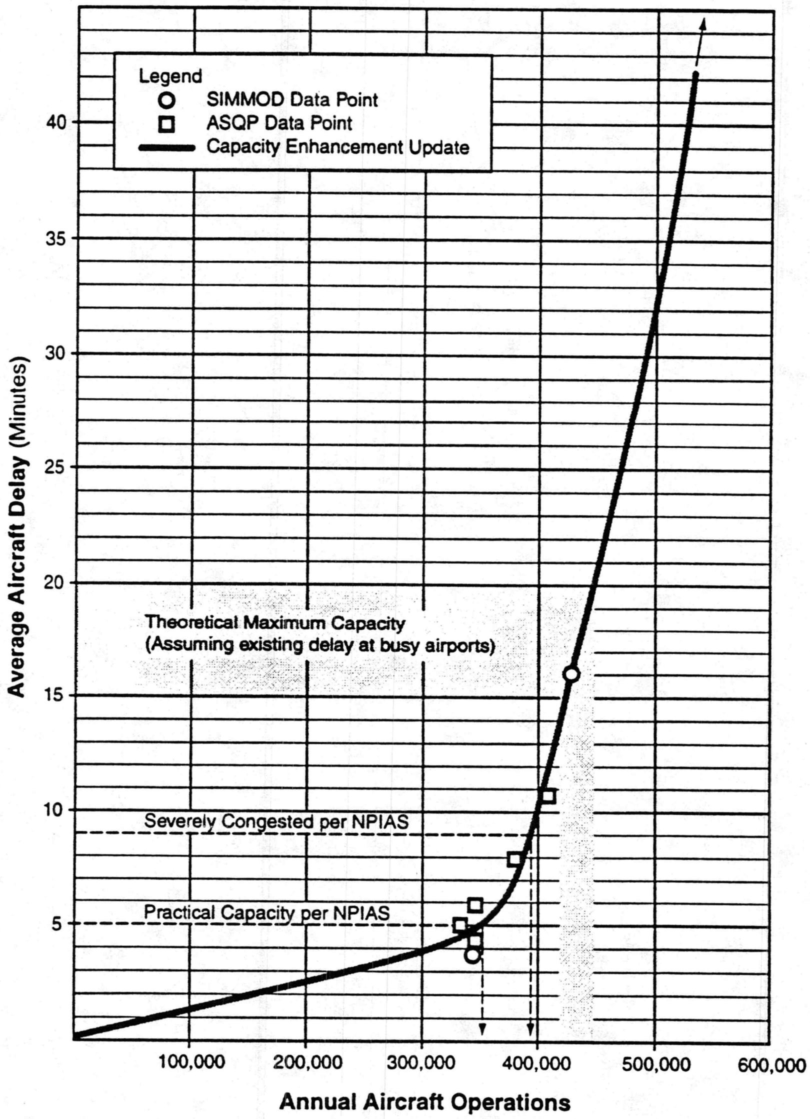
Exhibit 2-2 contrasts the results of the 1995 Capacity Enhancement Plan Update with actual current delay data, as reported by the FAA's Airline Service Quality Performance (ASQP) data. The ASQP is data collected by the airlines and reported to the FAA as a measure of the airline's on-time performance. As is shown, the computer model (SIMMOD) predicted levels of delay (identified by the curve) correspond to the actual delays reported by the ASQP data. Also shown on this chart are three ranges of activity-to-delay relationships, based on the existing fleet mix: 1) practical capacity as defined by the National Plan of Integrated Airports System (NPIAS) at 4-6 minutes of delay; 2) severely congested delay, as identified by the NPIAS at 9 minutes; and 3) a theoretical maximum capacity, assuming a constant fleet mix, based on delay actually that occurred at the busier airports.

To identify a more realistic maximum capacity level, delay at busier U.S. airports was examined. It is reasonable to assume that if delay could reach these extreme levels at other capacity constrained busier airports, that it could also reach those levels at Sea-Tac. Using the FAA's Airline Service Quality Performance (ASQP) data, the average total delay (in minutes) experienced at 10 of the busiest U.S. airports was considered. During the first eight months of 1996, the greatest levels of delay were experienced at two of the New York area airports (Newark and JFK) with 16.79 and 17.24 minutes of total average delay. The corresponding delay level at Sea-Tac was 10.72 minutes. As is evidenced by the New York airports, where demand exceeds capacity (and JFK where a Federally imposed rule caps peak hour activity), demand has grown; with the growth in activity, delay has increased. Assuming that airlines chose to satisfy the demand at Sea-Tac, delay would increase commensurably with the present airfield. Activity levels at Sea-Tac could range from 425,000 to 450,000 based on the existing fleet mix and demand profile, assuming that 15-20 minutes of delay experienced at these other U.S. airports.

Based on data produced during the FAA's Capacity Enhancement Plan, the average weather weighted level of hourly operations that could be accommodated by Sea-Tac's existing airfield was calculated as 82.5 operations (arrivals plus departures) per hour. This hourly capacity would be higher during VFR1 conditions and lower during VFR2 and IFR conditions. To calculate an extreme capacity of the existing airfield at Sea-Tac, this hourly capacity could be multiplied by the number of hours in a day, and days in the year. Theoretically, 481,800 operations would be accommodated, reflecting that air travel demand is typically concentrated into a 16 hour period (6 am to 9 p.m.) based on today's fleet mix and passenger demand profile.

EXHIBIT 2-2

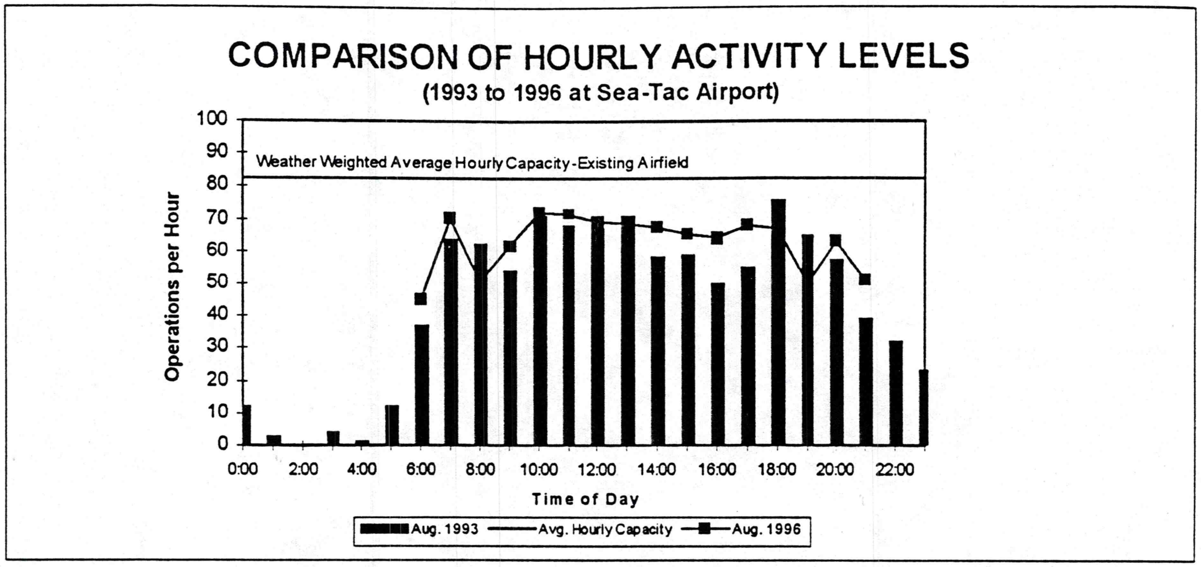
Delay Curve for Existing Airfield



During Visual Flight Rule conditions, about 99 operations an hour can be accommodated on the existing airfield. However, when weather worsens to

VFR2,[6] the operating capacity decreases 43% to 57 operations an hour. When weather further worsens to IFR 1/2 conditions, the hourly capacity decreases to about 50 operations (a decrease of 50% from VFR1). **Exhibit 2-3** shows the existing hourly activity levels relative to the all-weather existing hourly capability.

EXHIBIT 2-3



The unconstrained forecast indicates that over the next 10-15 years the average seat size of aircraft operating at Sea-Tac would increase from 155 seats in 1993 to 161, 166, and 170 seats per aircraft in 2000, 2005, and 2010, respectively. The percentage of aircraft with 170 seats or more is anticipated to increase from 32.2% in 1993 to 42% by 2010. Because there would be more larger aircraft in the fleet in the future, requiring greater separation, capacity would be reduced. Based on the 481,800 maximum capacity, the greater separation requirements of larger aircraft would likely result in a three to four percent reduction in capacity. The reduced separation standard, due to B757 wake vortex issues, was enacted in mid 1996,[7] and is not reflected in the hourly capacity of 82.5 operations per hour. FAA anticipates that this rule would reduce existing hourly capacity by about two percent.

Adjusting the maximum hourly operations capacity at Sea-Tac for fleet mix and traffic separation requirements, places the hourly weighted operations capacity between 456,000 and 464,000. Therefore, the mid-point of 460,000 reflects a revalidated maximum existing airfield capacity. This level of aircraft operations would translate to about 17.8 million enplanements. The ability to accommodate more than 460,000 annual operations with the existing airfield is limited by the traveling public's desire to fly at certain times. These phenomenon are discussed in detail in Appendix R of the Final EIS.

<u>**Terminal/Landside Constraints**</u> - As was noted in the Final EIS, the terminal and landside facilities represent less of a constraint than the existing airfield. Terminal and landside facilities, similar to the airfield, can deteriorate with lower levels of service, and still service the traveling public. Passenger trip behavior would

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6/ VFR2 or worse weather (IFR) occurs 44 percent of the year. Source of hourly operating capacity, FAA Capacity Enhancement Study

7/ "Wake Vortex Analysis Preliminary Results (Annotated Slides)" CAASD by Mitre Corporation, July 1996.

evolve, as has occurred in the past at other busy airports, where efficient terminal and landside facilities are not available.

In evaluating the terminal/landside constraints at Sea-Tac, focus was placed on several components: gate usage, passenger check-in/ticket space, baggage claim, terminal drives, and parking. In 1995, Sea-Tac's 75 gates served an average of 253,330 passengers per narrow body equivalent gate (NBEG).[8] In comparison, Los Angeles International Airport (LAX) accommodated 358,170 passengers per gate and San Diego accommodated 366,970 passengers per gate. Other airports, such as Pittsburgh and O'Hare, before their current/most recent improvements, processed passengers per gate significantly higher than theses rates, closer to 430,000 - 450,000 passengers per NBEG. In addition, airports achieve these levels through the use of remote aircraft parking or hardstands, such that passengers are bussed from a central terminal to a remote aircraft parking location, using existing pavement. When air travel demand at Sea-Tac reaches 19 million enplanements (now forecast to occur after the year 2010), the average NBEG would reach 422,200 passengers/NBEG. Clearly, by comparing Sea-Tac to conditions at other airports prior to recent expansion programs is an indication that severely congested gate and terminal conditions are not sustainable over a long period. Thus, constraints at the gates and terminal would likely prevent this level from being reached. With remote hardstanding (a paved aircraft parking area where passengers are bussed from the terminal to the aircraft) of aircraft, it is assumed that 398,000 passengers per NBEG would be served at Sea-Tac. This would correspond to about 17.9 million enplanements.

The capacity of the terminal is also a function of the passenger ticketing or check-in areas. Variability in passenger check-in space is a function of check-ins that occur at the terminal curbside, check-in at the gates and airline clubs, security requirements on check-in, as well as the most recent inauguration of electronic ticketing. In 1995, about 4,600 peak hour enplanements, with 3,200 originating passengers, occurred at Sea-Tac and were served in about 29,000 square feet of lobby space. This would translate to 13 square feet per originating passenger. This equates to a level-of-service of D (adequate level of service, condition of unstable flow, unacceptable delay for short periods; adequate level of comfort),[9] based on International Civil Aviation Organization terminal guidelines. When Sea-Tac reaches 17.9 million enplanements, about 6,300 peak hour enplanements or 4,410 originating enplanements, are expected to occur. This would translate into 6.6 square feet per passenger -- or LOS F (inadequate level of service, severe congestion). As a likely result, increased pressure would occur for passengers to check-in at locations other than the terminal lobby, such as at the gate locations. While the use of other existing check-in locations would increase the passenger per square footage of lobby space, the conditions would likely still produce a LOS F. As a consequence, the delays and length in the ticket counter queues would increase such that the total travel time (time the passengers leave their home/hotel/office until they board a flight) would increase, resulting in passengers having to plan to arrive earlier at Sea-Tac in order to avoid missing their flights. This would not produce significant changes in travel behavior, but would continue to flatten the peaking characteristics of passenger access to Sea-Tac. Baggage claim space requirements are typically less of a constraint to capacity as delays in obtaining baggage do not result in passengers missing flights. However, like the ticket check-in process, passenger total travel time would increase as they await

[8] The NBEG is a measure of gates which normalizes the number of gates reflecting the differences in sizes between a widebody gate and a narrowbody gate, using a 150 seat aircraft as a reference.

[9] The scale of level-of-service ranges from LOS A, which is the most efficient/least congested, to LOS F, which is most congested/least efficient.

baggage on return trips. In turn, passengers using Sea-Tac would be more likely to carry bags on-board flights rather than wait in line to check bags.

In the future, the regional roadway system is anticipated to continue being congested regardless of the improvements at Sea-Tac Airport, as was shown in the Final Environmental Impact Statement. The Airport and regional roadway system are already operating at congested levels of service during peak operating periods. The Airport's existing curbside roadway system would reach critical capacity between noon and 1 p.m. when Sea-Tac reaches 14 million enplanements (around the year 2000), with the upper roadway system being at capacity first. When the Airport's curbside reaches capacity, passenger behavior would likely change. This could include: passengers and visitors arriving earlier for flights; passengers driving directly to the parking garage, instead of being dropped-off at the curbfront; checking-in passengers may have visitors drop them off at the deplanement level (lower level) curbfront; passengers would use off-site parking facilities and drop-off features; and visitors may not accompany passengers to the Airport.

As a result, passengers would be likely to spend an even greater quantity of time in the airport system, as roadway and parking travel time uncertainty increases. The landside modeling assumed that existing mean arrival and departure times for Sea-Tac passengers and visitors is about 30 minutes. With increased congestion in the terminal and landside system, this was assumed to increase to 45 minutes. More simply stated, to ensure that passengers do not miss their flights, they would be likely to leave their origination location earlier to assure that time is allowed in the roadway system and that sufficient time exists to park and get to the gate.

One question raised by the increasing level of terminal/landside congestion and lower level of service, is how this might affect passenger desires to drive versus fly. As is shown in the Final EIS (Page II-1 through II-5), other modes of transportation are not a feasible alternative, even with increasing roadway congestion, because less than 5% of passengers are traveling to locations within a reasonable driving distance. In addition, the amount of delay incurred on the regional roadway system would not likely be offset by the difference in the overall travel time of driving versus flying.

The passenger forecast noted in this analysis represents the number of people who are seeking air travel. As this forecast represents the demand for travel, passengers would likely increase their ground trip travel time by 15 minutes or less because of a less efficient airport system in the Do-Nothing condition. This would reduce the peak hour number of passengers accessing the Airport, from 6,300 in an unconstrained demand to 5,930 passengers with facility constraints.

Based on these constraints, a Do-Nothing forecast was prepared, as shown in **Table 2-5.**

As is found when comparing the unconstrained forecast ("With Project") to the constrained forecast (Do-Nothing), Sea-Tac is anticipated to accommodate the entire annual passenger demand for air travel assuming the levels of activity currently forecast to occur through the year 2010. While the annual demand for air travel would be accommodated, because demand would exceed the operating capabilities of the Airport system, peak hours of aircraft operations would begin to flatten and during peak hours, the hourly demand would not be satisfied. Instead, slight shifting of flights and passengers would occur, especially as demand approaches the airfield constraint of 460,000. **Table 2-6** presents the comparison of the Unconstrained ("With Project") demand to the Constrained (Do-Nothing) activity levels for the peak hour, peak month/average day (PMAD), peak month, and for the year.

Because air travel demand would not exceed the maximum annual capacity until around 2008, Sea-Tac would likely accommodate all of the forecast demand for air travel until that time. It is important to note that the peak hour of demand is being affected today by the constraints of the existing airfield. As is shown in **Table 2-6**, 88 operations could be accommodated during the peak hour if additional airfield capability were available. However, due to the constraints, it would likely not exceed 78 operations. In all years, there would likely be a slight difference in the aircraft operations levels during the peak month between what a constrained or unconstrained airfield could accommodate, because of the hourly levels of activity. Peak hour operations, if unconstrained by facilities, could reach 99 operations an hour by 2010. However, if constrained by airport facilities, peak hour operations would not exceed the present airfield capability of 82 operations per hour. On a peak month average day (PMAD) basis, constrained operations in 2010 would be about 5% less than the unconstrained (unconstrained at 1,423 operations and 1,360 constrained operations). Based on the estimated spreading of operations during the PMAD, peak hour enplanements in 2010 are projected to decrease from 10.1% of PMAD enplanements to 9.5%.

TABLE 2-5

UPDATED ACTIVITY FORECAST
"Do-Nothing" Conditions

	Actual	Forecast		
	1995	2000	2005	2010
Enplaned Passengers:				
Domestic	10,600,000	12,400,000	14,000,000	15,700,000
International	800,000	1,300,000	1,700,000	2,200,000
Total Enplanements	11,400,000	13,700,000	15,700,000	17,900,000
Origin and Destination EPS	7,900,000	9,450,000	10,800,000	12,250,000
Aircraft Operations:				
Air Carrier	222,000	262,000	298,000	320,000
Air Taxi/Commuter	138,000	116,000	114,000	104,000
All-Cargo	16,000	20,000	22,000	25,000
Gen. Aviation/Military	11,000	11,000	11,000	11,000
Total Operations	387,000	409,000	445,000	460,000
Tons of Cargo	408,000	509,000	621,000	732,000
Average Day Operations	1,060	1,121	1,219	1,260
Peak Month/Average Day	1,198	1,246	1,341	1,360
Peak Hour Operations	75	78	82	82

Source: Port of Seattle & P&D Aviation. This forecast represents the demand that could be accommodated by the current airport facilities - which, due to the constraint, is less than the total demand.
EPS = Enplanements

To accommodate the constrained level of activity, a number of congested and inefficient conditions would result:

- Gates would be used for an average of 5.0 to 5.5 flights a day. This type of gate usage would resemble today's peak hour, which would be expected to occur more frequently, as more hours of the day approach the current peak conditions;

- Some growth in passengers processed by each narrowbody equivalent gates per year would occur as a consequence of the expected growth in average aircraft size, average load factors, and increased number of departures per gate per day;
- Remote aircraft parking and passenger loading would occur, as is used at locations such as Los Angeles, Dulles and (until the recent improvements were completed) at Pittsburgh or O'Hare.
- Much of the terminal space (ticketing, gates and baggage claims) would operate at levels-of-service F. As conditions become constrained, passengers would avoid ticketing, through advance ticket purchases, electronic ticketing, rely on carry-on baggage and/or would arrive at the airport sooner. It is assumed that ground travel time would increase 25% to 50%. Thus, the time passengers would spend in the terminal area would increase from 30 minutes to 45 minutes.

The Northwest Mountain Region Office of the FAA has reviewed the new Port forecasts and underlying assumptions and accepted them for use in local planning activities, such as this additional environmental analysis. Because the Port forecasts were prepared at a detailed level (peak period, peak hour, fleet mix, etc.), these forecasts were used to assess the environmental impacts associated with the higher level of aviation demand.

TABLE 2-6

COMPARISON OF DO-NOTHING TO "WITH PROJECT" ACTIVITY LEVELS

	With Project			Do-Nothing		
Operations	**2000**	**2005**	**2010**	**2000**	**2005**	**2010**
Peak Hour	78	94	99	78	82	82
Peak Month/Avg Day	1,246	1,352	1,423	1,246	1,341	1,360
Peak Month	38,600	41,800	44,000	38,600	41,500	42,100
Annual	409,000	445,000	474,000	409,000	445,000	460,000
Avg Annual Day	1,121	1,219	1,299	1,121	1,219	1,260
Enplaned Passengers						
Peak Hour	5,210	5,740	6,300	5,210	5,460	5,930
Peak Month/Avg Day	49,500	55,700	62,400	49,500	55,700	62,400
Peak Month	1,540,000	1,730,000	1,940,000	1,540,000	1,730,000	1,940,000
Annual	13,700,000	15,700,000	17,900,000	13,700,000	15,700,000	17,900,000
Avg Annual Day	37,534	43,014	49,041	37,534	43,014	49,041

Source: P&D Aviation, Working Papers #1 and #2, January, 1997.

Year 2000 "With Project" reflects the Do-Nothing activity levels, as the third parallel runway would not be available.

It is important to note that airport master plans are typically undertaken every 7-10 years; for airports with faster than average growth, master plans are often undertaken every 3-5 years. Therefore, it is anticipated that the Port of Seattle would likely undertake a new master plan for Sea-Tac near the year 2000. Because the Master Plan Update did not identify demand greater than 38 million annual passengers (MAP), facilities to accommodate a greater level of demand were not identified. However, to visualize how the proposed facilities could accommodate a greater level of demand, the final section of this report discusses the longer-term development capability of Sea-Tac. Included in this discussion are the likely constraints of the Master Plan Update improvements on future demand. **Appendix D** contains an evaluation of impacts in year 2020, based on an extrapolation of conditions in 2010.

B. Comparison of Forecasts

As this chapter describes, a number of forecasts have been prepared to date for Sea-Tac Airport. **Table 2-1** contrasts the 1996 and 1997 TAF, the Master Plan Update forecast and the new Port of Seattle forecasts. Comparison of the results and methodologies used in developing the forecasts shows that key assumptions concerning per capita income, air fares, and the costs associated with air fares, such as fuel prices have a dramatic effect on demand for air travel. If ticket prices were to increase, demand would not grow as quickly as now predicted and the forecasts prepared by the Master Plan Update would likely be more representative of that condition. However, more recently, aviation forecasters anticipate that competition would likely keep airfares low over the foreseeable future. Assuming consistent assumptions regarding per capita income, lower air fares would generate greater demands for air travel, making the forecasts prepared for this analysis probable.

To facilitate a review of the forecasts prepared for this analysis, a detailed comparison of the new forecasts was made relative to the FAA's 1997 Terminal Area Forecast and to the forecasts prepared for the Master Plan Update.

Exhibits 2-4 and 2-5 compare the Master Plan Update forecasts with the new Port forecasts and to the FAA's 1997 Terminal Area Forecast. For the year 2010, the FAA's TAF is approximately 10% greater than the Port's unconstrained operations forecast and 17% greater than the Master Plan Update forecast. The TAF enplanement forecast is also 6% greater than the Port's unconstrained forecast and 23% greater than the Master Plan Update for year 2010.

The primary differences between these forecast are:

- Differences between the Master Plan Update and the new Port of Seattle forecasts are:
  1. Personal income, as forecast by the Puget Sound Regional Council (PSRC) is now expected to be about 1.8% less than was forecast at the time the Master Plan projections were prepared for the year 2010.
  2. Domestic airfare per passenger mile was assumed by the Master Plan Update to increase from 12.27 cents (1993) to 14.28 cents by 2010. The new Port forecasts, based on FAA and industry assumptions, is anticipated to decrease from 10.34 (1995) to 9.63 cents per passenger mile by 2010.
  3. The Master Plan Update forecasts were prepared in 1994, based on actual activity levels through 1993. The new Port forecast reflects activity through mid-1996. From 1993 to 1995, annual activity at Sea-Tac increased 21% as measured by enplanements, or 14% as measured by aircraft operations. In 1996, activity continued to increase at the same rate.

EXHIBIT 2-4
OPERATIONS FORECAST COMPARISON

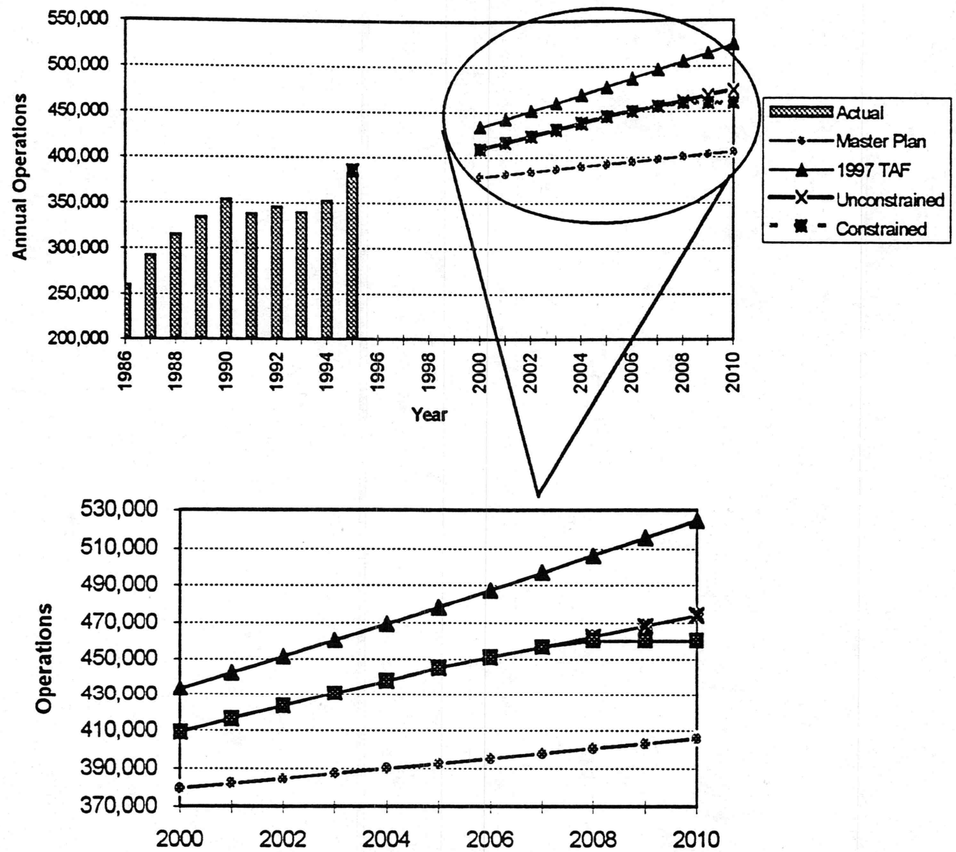
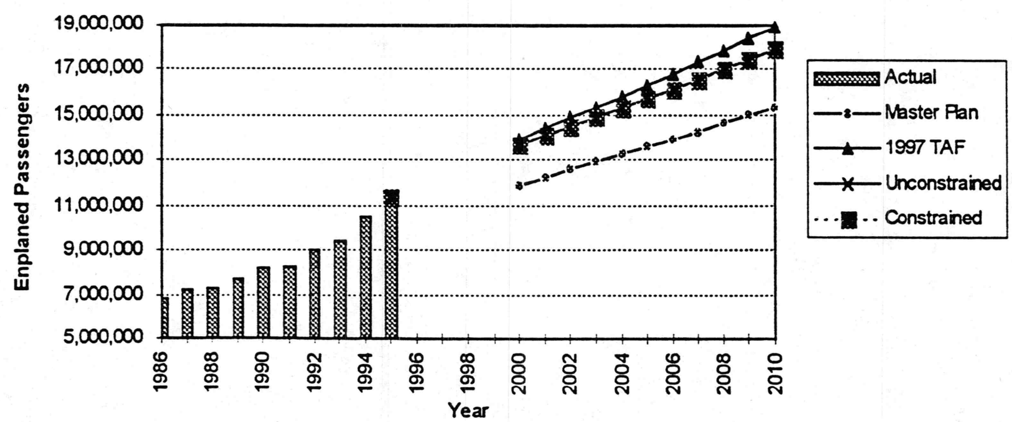


EXHIBIT 2-5
ENPLANEMENT FORECAST COMPARISON



4. These forecast assumptions result in an increase in passenger demand forecasts from 11.9 million in 2000 to 13.7 million enplanements and from 15.3 million to 17.8 million enplanements by 2010. Aircraft operations were forecast by the Master Plan Update to reach 379,200 operations by 2000 and 405,800 by 2010. The updated forecast are 8% greater (409,000) than the Master Plan for 2000 and 17% greater (474,000) for the year 2010.

- Differences between the new Port forecast and the FAA TAF are:

1. The FAA TAF assumes that domestic air fares nationwide would continue to decline at a rate of 1.2% while international airfares are anticipated to increase. While the new forecasts assume that airfares are going to continue to decline, research shows that Sea-Tac airfares have been declining faster than the US average. The Master Plan Update assumed that because Sea-Tac's fares had already been affected by the lower cost operators, that the decrease would not be as great between 2005 and 2010 as the US average.
2. Consistent information was used concerning per capita income of the region.
3. As was indicated earlier, the FAA TAF for 2010 is 10% greater than the new Port forecast for operations and 6% greater for enplanements. The Port's forecast reflects a greater growth in air carrier seats per departure than the FAA's TAF, accounting for the primary difference between the two forecasts of aircraft operations. The Port's forecast uses 1 seat per departure increase per year, whereas the FAA's uses 0.35 seats per departure. The Port's seat per departure forecast reflects a review of airline acquisitions/order information for the airlines using Sea-Tac, FAA national forecast assumptions, as well as forecasts prepared by McDonnell Douglas.
4. The FAA TAF assumed that the air carrier load factors would remain at 65.3%, while the Port forecast assumed that the load factor would increase from 65% to 66% by 2010.
5. The FAA TAF assumed that commuter seats would increase from 30 seats per departure to 47.1 seats by 2010. The FAA TAF commuter forecast reflects national assumptions concerning commuter activity. Based on discussions with Horizon and United Express, the Port's new forecast assumes that commuter seats would grow from 30 to 39 by 2010. The Port's forecast reflects Horizon's orders for aircraft that would be classified as air carrier, and thus would exceed the seat classification used for the commuter designation. As a result, these larger Horizon aircraft would contribute to the seat assumptions for domestic air carriers, which operate aircraft with 60 seats or more. This commuter assumption difference results in a greater number of aircraft operations in the TAF relative to the number of enplaned passengers.

Despite these differences, the FAA Northwest Mountain Region has reviewed and accepted the Port's new forecast for local planning purposes.

2. PROJECT PURPOSE AND NEED

The following four purpose and need statements were defined in the Final Environmental Impact Statement:

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

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

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

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

Each of these purpose and need statements were formed based on particular issues that were identified by the Master Plan Update. Upon examination, each of these needs were found to have separate utilities -- as the needs were separate and distinct.

Relative to the new forecasts and any new information that has come to light since the publication of the Final EIS, the purpose and need was reviewed and are discussed in the following sections.

A. Improve the poor weather airfield operating capability in a manner that accommodates aircraft activity with an acceptable level of aircraft delay.

No new information concerning weather conditions has arisen since the Final EIS was published. Sea-Tac Airport continues to operate in an inefficient manner during poor weather conditions, defined as VFR2 (Visual Flight Rule Conditions, where ceiling is between 2,500 feet and 4,999 feet and visibility is more than 3 miles) and IFR (Instrument Flight Rule conditions - where ceiling is less than 2,500 feet or visibility is less than 3 miles). Poor weather occurs 44 percent of the year, reducing the arrival acceptance rate from 60 arrivals in good weather to 48 arrivals in VFR2 or 24 arrivals in IFR2, 3 or 4.

The Final EIS presented eight actions that had been undertaken by the FAA to reduce delay between 1989 and 1996. Thus, the preferred alternative is the development of a new 8,500-foot long runway, located about 2,500 feet west of existing Runway 16L/34R. As described in the Final EIS, a number of ways exist to quantify delay, based on the purpose of the quantification. One measure identified in the EIS, is the FAA's Air Traffic Operations Measurement System (ATOMS). This measurement quantifies the number of aircraft operations that experience 15 minutes or more of delay in any one of the four air traffic operating segments. For Sea-Tac, data through August 1996, confirms that ATOMS measured delay has substantially decreased since 1989 and has stabilized. As is described in on Pages II-12 through II-17 of the Final EIS, delay has been reduced as far as it can through other non-development actions.

The airlines also measure the efficiency of their operation at various airports by an on-time performance, and is referred to as the Airline Service Quality Performance (ASQP) measure. For Sea-Tac, while the number of aircraft operations delayed over 15 minutes have declined over the 7 year period, the airlines average on-time performance record has continued to worsen. ASQP data for Sea-Tac between 1994 and 1996 shows a steady degradation in the on-time performance by the reporting airlines. In 1994, over 80% of the arrivals to Sea-Tac were on time. By 1996 (January-September), average on-time performance had declined to about 69%. The ASQP data, while it does not identify the cause of the delay, is consistent with the FAA's evaluation during the Capacity Enhancement Update, which projected delay to continue to increase as aircraft operations increase.

B. Provide sufficient runway length to accommodate warm weather operations without restricting passenger load factors or payloads for aircraft types operating to the Pacific Rim.

No new information concerning the length of runway needed to serve the Pacific Rim during warm weather periods has arisen. Based on the projected demand, the runway extension would be needed after 2010. For evaluation purposes, this project was assumed to be available in year 2010.

C. Provide Runway Safety Areas (RSAs) that meet current FAA standards.

Since the issuance of the Final EIS, the FAA has issued a record of decision for correcting the runway safety area for Runway end 34R. Upon approval, construction was initiated during the summer of 1996 and the embankment will be completed in August 1997.

Because of the need to relocate 154/156th Street South around the end of these runway safety areas and because the westerly alignment of the road would depend upon approval of the third parallel runway, the alignment of the road was evaluated in several manners:

- RSA Option 1: Alignment shown in the Final EIS (relocated around 16L, 16R and new runway 16X)
- RSA Option 2: Alignment just around 16L and 16R, and connecting back to the present alignment as soon as operationally feasible

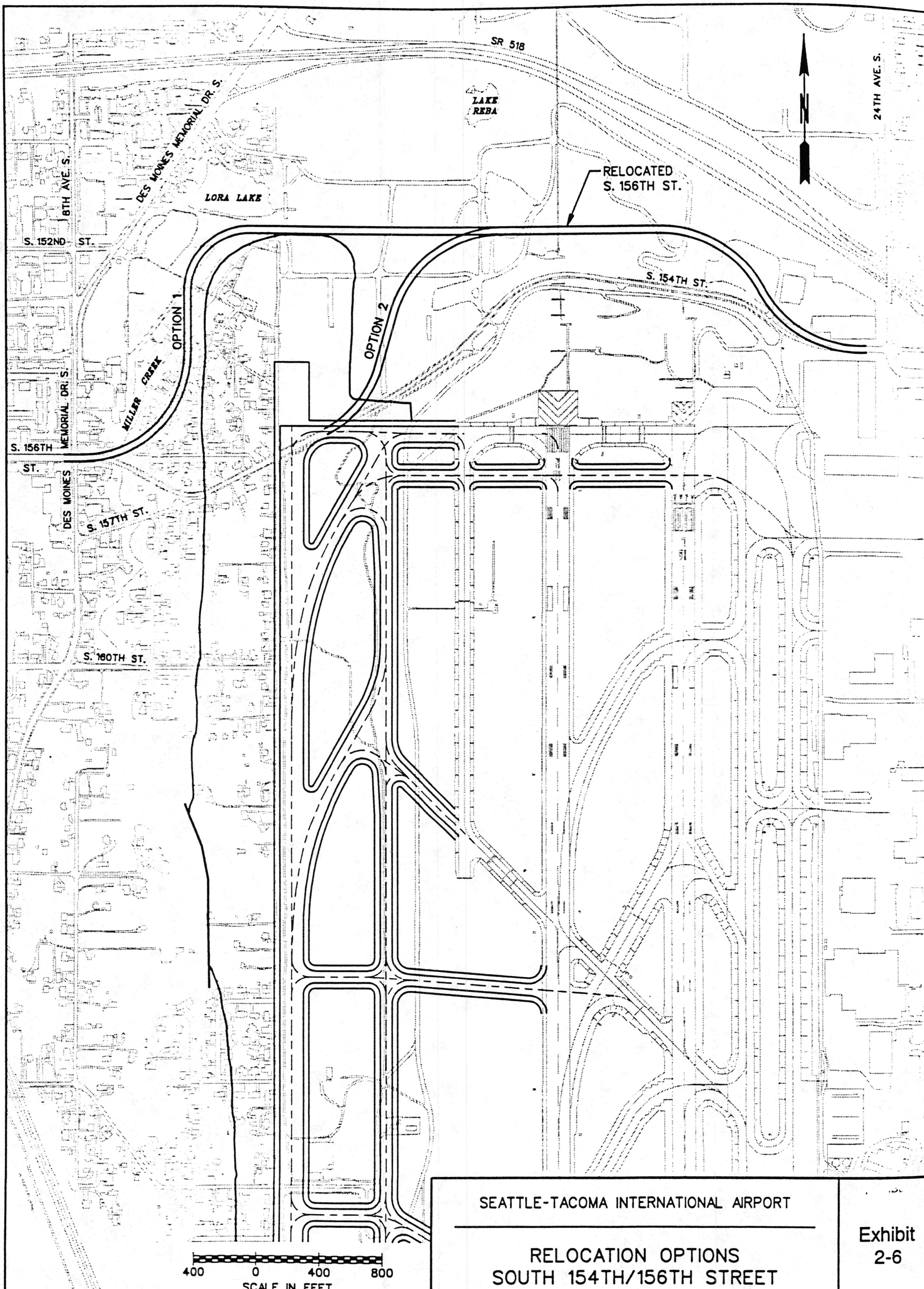
Exhibit 2-6 shows the alignments of these options. Option 1 would serve as an interim alignment until the third parallel runway is undertaken. Chapter 5 of this report summarizes the environmental consequences of these alternatives.

D. Provide efficient and flexible landside facilities to accommodate future aviation demand.

No new significant information concerning the terminal and landside facilities needed to accommodate the forecast growth in air travel was identified, with the exception of additional parking needs in the later phases of the Master Plan Update. One of the assumptions of the Master Plan Update is that facilities would be built just-in-time to accommodate growth that occurs. As a result, the timing in which several facilities would occur would be altered, which is described in the following section.

3. IMPACT OF NEW FORECAST ON THE MASTER PLAN UPDATE

During the Master Plan Update, the construction of new or expanded facilities were identified to address specific needs. The third parallel runway is proposed to address an existing operational constraint that exists during poor weather -- the limitation to a single arrival stream during poor weather. Likewise, the upgrades in the Runway Safety Areas (RSAs) are proposed to bring these areas up to current FAA safety standards. The 600 foot extension of Runway 34R and the proposed terminal and landside improvements were proposed to address growing air travel



SEATTLE-TACOMA INTERNATIONAL AIRPORT

RELOCATION OPTIONS
SOUTH 154TH/156TH STREET

Exhibit 2-6

demand. As a result, if demand were to grow faster than forecast by the Master Plan, or an updated forecast, additional terminal and landside facilities could be needed sooner.

Table 2-7 lists the individual elements of the Master Plan Update, by purpose and need, as they were assessed in the Final Environmental Impact Statement and indicates the assumptions of this additional analysis.[10] The additional environmental analysis, while primarily focusing on how the higher levels of aircraft and passenger traffic affect environmental conditions, also must reflect the following:

- Changes in the timing in which the Master Plan Update improvements would be needed, based on faster growing demand; and
- Changes in the projects, reflecting refinements in the proposed improvements.

The following section summarizes these effects.

A. Changes in the Phasing/Timing of Facilities

As was noted in the Final Environmental Impact Statement, projects were identified to address the purpose and need. Similarly, the discussion of purpose and need also identified the timing of the need being addressed.

- Improve the poor weather airfield operating capability in a manner that accommodates aircraft activity with an acceptable level of aircraft delay. As was identified in Chapter I of the Final EIS, the disparity between good weather operating capability and poor weather operating currently occurs. The Final EIS identified that the third runway could be operational in 2000. This operational schedule was predicated on a 2.5 year construction haul to place the 17 million cubic yards of fill, with a 4 year embankment construction. Upon re-examination, Port staff now recommend that the third runway be operational by 2005. This schedule reflects a 1 year initiation of acquisition, hauling of fill for 5 years, a 1 year for the fill to settle, and 1 year to construct the runway.

  Reconsideration of the completion date of the new runway is a reflection of the examination of financial resources in light of accelerated need for terminal/landside facilities in addition to the runway. As this document identifies, as passenger demand increases, terminal and landside improvements will be necessary at Sea-Tac. For most passengers, their first experience with the airport system, is in the terminal and landside portions of the system. Whereas today, inefficiencies occur due to the poor weather related airfield system, in the future it would be the entire passenger system and sooner than was predicted by the Master Plan Update. Recognizing the terminal and landside needs, and the competition that could exist between funding for the runway and these other improvements, a slower runway construction schedule was examined. Based on these issues, Port of Seattle staff developed construction phasing plans that balance the terminal/landside facility requirements and funding issues, with the timing of completion of the runway.

  The five-year delay in the commissioning of the third parallel runway would cause significant inconvenience to the traveling public and additional costs to airport users. As described in the February, 1996 Final EIS, poor weather delay costs travelers time and aircraft operators incur additional operational costs. Delay at Sea-Tac in 1993 resulted in

[10] All "With Project" alternatives would require the Phase 1 development shown in Table 2-7. All differences in later phases would depend on the terminal configuration (i.e., North Unit Terminal, South Unit Terminal).

TABLE 2-7
Seattle-Tacoma International Airport
Supplemental Environmental Impact Statement

MASTER PLAN UPDATE IMPROVEMENTS - PHASING

Project	Changes in Phasing or Projects Definition
New Parallel Runway and associated operational procedures and taxiways	
Acquisition of land for the new parallel runway	*1996-2000 As the runway moves to the 2nd phase, acquisition is now separately identified*
Relocation of ASR and ASDE	*1996-2000*
Relocation of S.154/156th around 16X end	*1996-2000* *Not previously separately identified*
Temporary construction interchange off SR-509 and SR-518	*Previously assumed* *Not previously separately identified*
Construction of the new parallel runway	*1997-2004 First year of operation 2005*
Extension of Runway 34R by 600 feet	*2010*
Clearing and Grading For the Runway Safety Areas	
Development of the RSA embankments	*1996-2000*
Relocation of S.154/156th around 16L and 16R RSAs	*1996-2000* *Not previously separately identified*
Terminal and Landside Improvements **1996-2000 (Phase I)**	
Expansion of Concourse A, *including expansion of Main Terminal at A*	No Change - *clarification of action*
Improvements to the Main Terminal roadway and recirculation roads, *including a partial connection to the South Access Roadway and a ramp roadway from the upper level roadway to the airport exit*	No Change - *clarification of action*
Overhaul and/or replacement of the STS	No Change
Expansion of the main parking garage to the South,. *North and East*	*Phase II and III expansion of the main garage was moved to this phase.*
Construct first phase parking lot north of SR 518 for employee use (3500 stalls).	*Moved from Phase III (2006-2010) to Phase 1 (1996-2000*
Construction of the overnight aircraft parking apron	*Not previously separately identified*
Construction of the new air traffic control tower/TRACON	No Change
Removal of the displaced threshold on Runway 16L	*Not previously separately identified*
Relocation of Airborne Cargo due to new Control Tower	No Change
Expansion or redevelopment of the cargo facilities in the north cargo complex	No Change
Development of a new snow equipment storage facility between RPZ and 34L and 34X	No Change
Site preparation at SASA site for displaced facilities	No Change
Removal of the Northwest Hangar - replacement in SASA	No Change
Development of a ground support equipment location at SASA	*Previously assumed, but not separately listed*
Development of GA/Corporate aviation facilities in SASA or north airfield location	*Previously listed as 2001-2005*
Development of a new airport maintenance building *and demolition of existing facility*	*Moved from Phase II (2001-2005) to Phase I (1996-2000)*
Development of on-airport hotel	No Change
Development of the Des Moines Creek Technology Campus	No Change

TABLE 2-7

Sea-Tac International Airport
Supplemental Environmental Impact Statement

MASTER PLAN UPDATE IMPROVEMENTS PHASING

2001-2005 (Phase II)	
Dual taxiway 34R	No Change
Improved access and circulation roadway improvements at the Main Terminal, *provide upper roadway transit plaza at Main Terminal*	No Change *Plaza moved from Phase III (2006-2010) to Phase II (2001-2005)*
Additional expansion of the main parking garage	No Change
Expansion of the north employee parking lot (North of SR518) to 6,000 stalls *including improvements to the intersection of S. 154th/24th Ave. S.*	*Added intersections improvements to address this lot and the ramps associated with the North Unit Terminal at 24th Ave. S. at SR 518*
Construction of second phase of overnight apron	*Was assumed completed in Phase I*
Development of the first phase of the North Unit Terminal (south Pier), *development of the ramps off SR-518 near 20th Ave. S. and intersection improvements to S. 160th St. to address surface transportation issues associated with the closure of S. 170th Street to through traffic.*	*Moved from Phase III (2006-2010) to Phase II (2001-2005, identified the ramps separately, and added surface transportation improvements at S. 160th Street/International Blvd.*
Construct first phase of the North Unit Terminal parking structure for public and rental cars	*Moved from Phase I (1996-2000) to Phase II (2001-2005)*
Development of the North Unit Terminal Roadways	*Moved from Phase III (2006-2010) to Phase II (2001-2005)*
Interchange near 20th/SR-518 for access to cargo complex	*Previously included in the project above, now for clarity, separately identified*
Relocate ARFF facility to north of the North Unit Terminal	*Moved from Phase III (2006-2010) to Phase II (2001-2005)*
Additional improvements to the South Access Roadway connector	*Moved from Phase III (2006-2010) to Phase II (2001-2005)*
Relocation of the United Maintenance complex to SASA	*Not previously separately listed*
Continued expansion of the north cargo facilities	No Change
2006-2010 (Phase III)	
Expansion of North Unit Terminal (North Pier)	*First phase is now in Phase II*
Additional taxiway exists on 16L/34R	*Moved from Phase IV(2011-2020) to Phase III (2006-2010)*
Complete connectors to South Access Roadway (to eventual SR 509 Extension and South Access)	*Now separately identified*
Additional expansion of main parking garage	*New Project*
Additional Expansion of north employee lot to 6,700 stalls	No Change
Further expansion or redevelopment of north cargo complex	No Change
Expand North Unit Terminal parking structure for public parking	No Change
2011-2020 (Phase IV)	
Development as needed to accommodate growth in demand	No change
SR 509 Extension/South Access	*Not previously listed / part of Do-Nothing and With Project*

nearly 26,000 hours of delay, with a cost of $42 million. As activity levels have increased nearly 16% between 1993 and 1996, continuing the increase in passenger inconveniences and delay.

Poor weather related arrival delay would not be resolved and as activity levels grow, delay levels would be expected to increase. The Final EIS and Table 2-4 summarize the delay conditions that will occur as demand increases. By 2000, when activity is now anticipated to reach 409,000 annual operations, average all weather delay levels will have increased to about 11 minutes. By 2004, activity would reach 437,000 operations annual which would result in average all weather delay levels of over 23 minutes. Thus, the during the period in which the runway is not available, the growth in air travel demand is expected to result in an increase in total average all weather delay by about 155%.

However, as a practical matter, the third parallel runway cannot be completed much sooner than 2004. Obstacles exist to fast-track development of the third runway including: limitations on financial resources and the short time available to acquire and relocate residences and businesses. Thus, the new phasing plan represents a compromise, which among other things, will sacrifice considerable bad-weather airfield reliability and service for several years.

The year 2005 could be the first full year of operation of the third parallel runway. The differences between the shorter construction period presented in the Final EIS, and the construction phasing of this additional analysis bracket the likely conditions that could occur in building the runway.

- <u>Provide sufficient runway length to accommodate warm weather operations without restricting passenger load factors or payloads for aircraft types operating to the Pacific Rim.</u> The extension of 34R was identified as needed between 2015 and 2020. Based on the updated forecasts, the same levels of activity are now likely to occur by 2010.

- <u>Provide Runway Safety Areas (RSAs) that meet current FAA standards</u>. As was identified in the Final EIS, the Port has entered into grant assurances that require it to bring these RSA's into compliance. To date, only 16L and 16R require action to bring these runway ends up to meeting the current RSA standard. Thus, upon environmental approval, these improvements would be anticipated. As a result, they would remain in the first phase (1996-2000) as was identified in the Final EIS.

- <u>Provide efficient and flexible landside facilities to accommodate future aviation demand</u>. The proposed terminal and landside improvements were identified to address growth in passenger, cargo, and aircraft operations up to 19 million annual enplanements. As the updated forecasts now anticipate that 19 million enplanements could be reached soon after the year 2010 (instead of 2020), the timing of facilities was altered. As a result, the projects that were slated to be implemented by 2005, have now been scheduled to occur by 2000. Similarly, projects slated to occur by 2015 were accelerated in the schedule to occur by 2005 and projects slated to occur between 2016-2020 were accelerated to 2010.

B. <u>Changes in the Project Definition/Location</u>

The following refinements were made in the Master Plan Update improvements:

- <u>Improve the poor weather airfield operating capability in a manner that accommodates aircraft activity with an acceptable level of aircraft delay</u>. No changes were made in the third runway project. However, to clarify the various elements of this project that were assessed in the Final EIS, the relocation of S. 154th/S. 156th has now been separately identified, as well as the relocation of the navigation aids, and the possible construction of a temporary interchange off SR-509 and SR-518 to enable haul vehicles to directly exit these roads onto airport property.

- Provide sufficient runway length to accommodate warm weather operations without restricting passenger load factors or payloads for aircraft types operating to the Pacific Rim. No changes were made in this project.

- Provide Runway Safety Areas (RSAs) that meet current FAA standards. No changes were made in the RSA projects. However, to clarify the various elements of the 16L and 16R RSA projects that were assessed in the Final EIS, the relocation of S. 154th/S. 156th has now been separately identified.

- Provide efficient and flexible landside facilities to accommodate future aviation demand. The majority of changes in the terminal and landside related to earlier timeframes for these projects. To clarify projects that were assessed in the Final EIS, several other terminal and landside projects were separated from a larger project and are now listed individually in the table (e.g., overnight parking apron, development of a ground support equipment facility, etc.). Several changes in the project definition are reflected in the table. First, additional expansion of the Main Parking Garage would occur in the 2006-2010 timeframe over what was examined in the Final EIS, which reflects additional flexibility in how parking demand could be satisfied. Second, in expanding the North Employee Parking Lot (North of SR 518) between 2001-2005, improvement to the intersection of S. 154^{th}/ 24^{th} Avenue S would be needed. These improvements would include construction of dual northbound left-turn lanes, an additional westbound departure lane, construction of a southbound right-turn lane and construction of a right turn lane, as well as changes in the signalization. Finally, the development of the North Unit Terminal (in Phase II 2001-2005) at S. 170^{th} Street would cut off access through Airport property from eastern SeaTac to western SeaTac, as public traffic uses S. 170^{th} Street/Air Cargo Road/S. 154^{th} Street. As a result, the completion of the North Unit Terminal would include improvements to S. 160^{th} Street to address additional traffic through this intersection that would have used S. 170^{th} Street. Improvements include: construction of dual northbound turn lanes, construction of a high capacity eastbound right-turn lane, and signalization changes. Such improvements at S. 154^{th}/24^{th} Avenue South and International Blvd./S. 160^{th} Street are reflected in the City of SeaTac Transportation Improvement Plan.

The changes in the timing of proposed improvements, in accordance with changes in forecast demand, as well as the refinements in the projects, were reflected in the additional environmental analysis documented in Chapter 5.

4. LONG-TERM DEVELOPMENT CAPABILITY

One of the predominant comments made by opponents of the proposed runway and Master Plan Update improvements is that the improvements have a short life; that a new airport would be needed in the future to serve the air travel demand of the Region. The Master Plan Update improvements were developed to accommodate a forecast demand for air travel of 19 million enplanements or 38 million annual passengers (enplanements and deplanements). Therefore, the capabilities of the future airport facilities were examined relative to their longer-term capability; key elements of airport facilities were examined to determine how many passenger and/or aircraft operations could be served.

(A) Airfield Capability With A Third Parallel Runway

Based on the same evaluation methodology used in assessing the operating constraint associated with the existing airfield, the operating capability of a third runway airfield was assessed. The 1995 FAA Capacity Enhancement Plan Update did not identify a weighted hourly operations for a third runway airfield. Therefore, no extrapolations can be prepared using that methodology. Instead, the following three conditions were considered: 1) practical capacity as defined by the National Plan of Integrated Airports System (NPIAS) at 4-6 minutes of delay; 2) severely congested delay, as identified by the NPIAS at 9 minutes; and 3) a Theoretical Maximum Capacity, assuming a constant fleet mix, based on delay at the busier airports.[11]

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Exhibit 2-7 contrasts the delay curve of the existing airfield with comparable delays if a third runway were available. Also shown on the exhibit are the three delay conditions. As is shown, with a third runway, Sea-Tac would reach its theoretical maximum capacity at 600,000 to 630,000 annual operations. Using a linear extension of the updated forecasts, this would likely occur after the year 2030. With improvements in technology (air traffic technology and video conferencing) that are anticipated to occur around the year 2020, this could likely extend the operating capability of Sea-Tac well beyond 2030.

(B) Terminal Capability With the Master Plan Update Improvements

As is described in Master Plan Technical Report 7A, the Master Plan Update terminal facilities were anticipated to accommodate a forecast of 19 million enplanements or 38 million annual passengers. With the proposed terminal facilities identified by the Master Plan Update, the airport's narrowbody equivalent gates (NBEG) would increase from 90 to about 120 NBEG. The gate use per passengers would reach 317,000 passengers per NBEG which is greater than today's gate usage. As activity levels grow beyond 19 million enplanements, levels of service would decline. Beyond 19 million enplanements, either additional gates could be necessary or remote parking locations would be needed to accommodate passengers during peak periods. To achieve the gate use assumed by the Do-Nothing/constrained forecast (396,000 passengers/NBEG), enplanements would reach 23.7 million (48.4 MAP). Assuming a linear extension of the new Port forecasts, this could occur by 2024. However, to maintain an efficient terminal/landside operation, it would not be preferable to allow the level-of-service to deteriorate.

As a consequence, it would be anticipated that additional terminal and landside facilities could be necessary between 2010 and 2020, well before additional airfield capability would be needed, if demand were to continue to grow at the current rate. In examining terminal options, several issues became apparent. First, the preferred concept (the North Unit Terminal), could be expanded beyond the footprint identified by the Master Plan Update. This expansion would come at the cost of displacing adjoining cargo and support facilities currently located along Cargo Drive. Expansion in this fashion could result in the addition of one or more pier like concourses in a northerly direction from the new terminal. If this were not desirable, the option of pursuing continued expansion from the Main Terminal in a southerly direction, similar to the Master Plan Update's South Unit Terminal expansion might be possible. A future Master Plan for Sea-Tac would be expected to examine and identify any terminal improvements to accommodate more than 19 million enplanements.

(C) Landside Capability With the Master Plan Update Improvements

As is described in the Master Plan Update and Final Environmental Impact Statement, the roadway system in the immediate airport vicinity currently operates at a very low level of

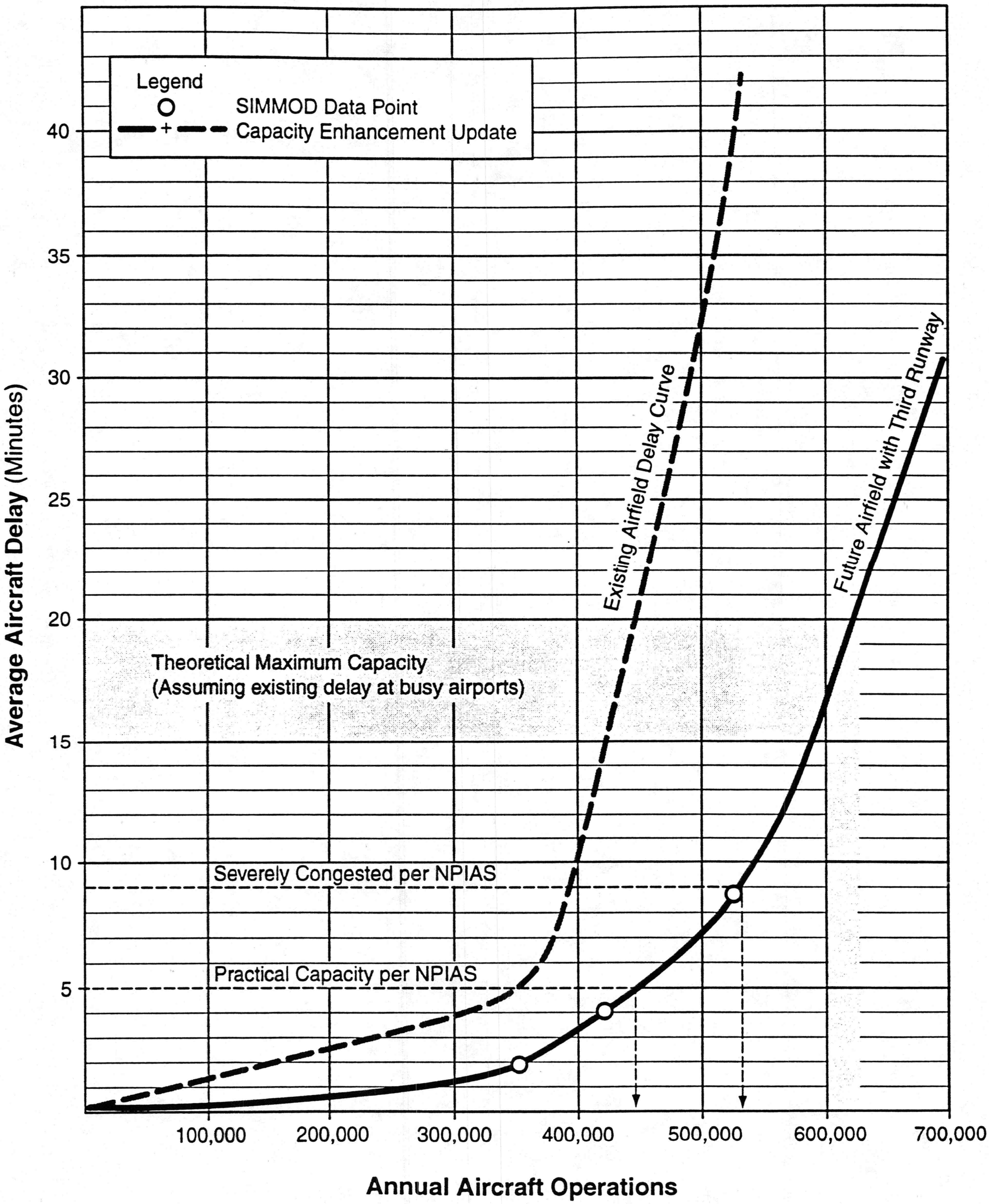
[11] *Working Paper 1, Unconstrained Aviation Forecast Update, Forecast Update, Capacity Analysis and Landside Evaluation for Seattle-Tacoma International Airport*, P&D Aviation, January 1997.

service and is expected to continue to operate at a low level of service. As airport activity is anticipated to grow in proportion to the growth in population and per capita income, a similar or greater growth is anticipated in use of regional roadways by non-airport related traffic. By 2020, the Final EIS (and this Supplemental EIS as well as regional planning documents) anticipate that most of the intersections along International Blvd. (SR 99) in the immediate airport vicinity would operate at Levels of Service D or F, regardless of whether improvements are undertaken at Sea-Tac. As the region continues to grow, and greater demands are placed on the conventional roadway travel system, greater and greater roadway related delays would be anticipated. Therefore, in the long-run, surface transportation is likely to serve as the greatest constraint to the long-term development of Sea-Tac Airport.

Recognizing the significance of congestion on the regional roadway system, the region has had under consideration various initiatives, such as the Regional Transit Authority (RTA) plan. Additional surface travel relief would be anticipated as a result of the Region's approval of the RTA plan to develop a light rail system. Current plans for the light rail would connect Sea-Tac Airport with downtown Seattle and portions of north Seattle. The RTA plan was included in the 1995 Metropolitan Transportation Plan for the Puget Sound Region and is anticipated to be complete by 2010. As a result, it was reflected in the Final EIS as well as this additional environmental analysis. Such a system could serve passengers and employees using the Airport. It is anticipated that the RTA's availability between 2010 and 2020 would reduce the pressures on the regional and airport roadway network.

EXHIBIT 2-7

Delay Curve for Future Airfield



CHAPTER 3

ALTERNATIVES

The February, 1996 Final EIS contains a detailed presentation of the alternatives available to address the Master Plan Update needs and purpose. The EIS identified five to seven categories of options (alternatives for each individual need discussed in Chapter 2), as shown in **Table 3-1**. As the airport functions as a system, options that would satisfy the need were then examined relative to the overall airport system; individual options were grouped into alternatives. The following alternatives (and their key facets) were found to address the underlying need:

- Alternative 1 - Do-Nothing/No-Build (while this alternative would not satisfy the needs, it is an alternative required by the State and National Environmental Policy Act);
- Alternative 2 - Central Terminal Development with a third runway having a length up to 8,500 feet;
- Alternative 3 (Preferred Alternative) - North Unit Terminal with a third runway having a length up to 8,500 feet; and
- Alternative 4 - South Unit Terminal with a third runway having a length up to 8,500 feet.

Exhibits 3-1 through 3-4, located at the end of this chapter, show these alternatives.

The following sections summarize the alternatives and show that no new significant information has arisen that would alter the finding associated with the alternatives.

1. Improve The Poor Weather Airfield Operating Capability In A Manner That Accommodates Aircraft Activity with an Acceptable Level of Aircraft Delay.

Seven option categories were identified to address this airfield need. As is shown in the following sections, two changes in the information underlying these alternatives have occurred due to the new forecasts and additional information. However, this information does not alter the conclusions concerning the reasonableness or feasibility of any alternative.

(A) Use of Other Modes of Transportation Alternatives

Alternative modes of transportation were evaluated in terms of their capability to divert passengers and cargo from Sea-Tac by offering alternative modes of transport. Of critical importance to the evaluation are such factors as trip characteristics and travel needs of freight shippers and air passengers and the feasibility of using alternative modes. While demand is growing faster than predicted, the relative levels of activity generated by cities that could be served by these other modes has not altered (i.e., less than 5% of passengers are demanding air service to locations which could be served by alternative modes).

- **Bus and Automobile Modes** - A review of the trip characteristics of air travelers who utilize the Airport indicates that a majority (95%) begin or end their trip at a point more than 500 miles from the Puget Sound Region. Beyond 250 air miles or 500 roadway

TABLE 3-1
Page 1 of 2

Seattle-Tacoma International Airport
Supplemental Environmental Impact Statement

SUMMARY OF ALTERNATIVES CONSIDERED

(1) Improve The Poor Weather Airfield Operating Capability In A Manner That Accommodates Aircraft Activity With An Acceptable Level of Aircraft Delay

Alternative	Evaluation
A. Use of Other Modes of Transportation	Not considered further, as this alternative would not address the poor weather operating issues at Sea-Tac. Less than 5% of passengers using Sea-Tac are traveling to distances where surface transportation is efficient and cost effective.
B. Use of Other Airports or Construction of a New Airport	Not considered further. Regional consensus has been established through PSRC EB-94-01 as: 1) there is no sponsor or funding for a new airport; 2) Extensive studies of these alternatives indicate that there are no feasible sites. The FAA and Port have independently concluded that a new airport would not satisfy the needs addressed by the Master Plan Update EIS and this additional environmental evaluation.
C. Activity/Demand Management	Not considered further, as these actions would not eliminate Sea-Tac Airport's poor weather operating needs.
D. Runway Development at Sea-Tac	To be considered further: Runway lengths from 7,000 feet to 8,500 feet (the preferred alternative is an 8,500 foot long runway located 2,500 west of 16L/34R) were considered.
E. Use of Technology	Not considered further. No technologies currently exist, or are planned, to address the poor weather operating constraint at Sea-Tac.
F. Delayed or Blended Alternative (Combination of other modes, use of existing airports, and activity/ demand management)	The net result of this alternative would be a delay in the implementation of the Master Plan Update alternatives. As is shown by this analysis, the Port staff recommends a balance between the needs of the airport with available financing. As a result, the analysis addressed by this Supplemental EIS reflects a delayed opening of the runway and a slower construction schedule.
G. Do-Nothing/No-Build	Was considered in detail by the EIS and this additional environmental analysis.

(2) Provide Sufficient Runway Length to Accommodate Warm Weather Operations Without Restricting Passenger Load Factors or Payloads For Aircraft Types Operating to the Pacific Rim

Alternative	Evaluation
A. Extension of Runway 16L/34R to 12,500 feet	Was considered in detail by the EIS and this additional environmental analysis, as this is presently the longest runway.
B. Extension of Runway 16R/34L to 12,500 feet	Not considered further due to the cost of addressing impacts to S. 188th Street.
C. Development of a new 12,500 ft long runway	Not considered further due to substantial community disruption and unnecessary cost that would result.
D. Delayed Alternative	Not considered further, as it would not address the needs of Sea-Tac
E. Do-Nothing/No-Build	Was considered in detail by the EIS and this additional environmental analysis.

TABLE 3-1
Page 2 of 2

Seattle-Tacoma International Airport
Supplemental Environmental Impact Statement

SUMMARY OF ALTERNATIVES CONSIDERED

(3) Provide Runway Safety Areas (RSAs) that Meet Current FAA Standards

Alternative	Evaluation
A. Displaced Threshold/Declared Distance Procedures	Considered as the Do-Nothing/No-Build in detail by the EIS and this additional environmental analysis.
B. Clearing, grading and development of areas for 1,000 feet beyond the existing pavement	Was considered in detail by the EIS and this additional environmental analysis. This additional analysis clarifies the independent issues associated with relocating S. 154th/156th.
C. Clearing, grading for 1,000 feet including the 600 ft extension to 34R	Was considered in detail by the EIS and this additional environmental analysis.
D. Delayed Alternative	Not considered further, as it would not address the RSA requirements. However, this would be the same as the Do-Nothing.
E. Do-Nothing/No-Build	Was considered in detail by the EIS and this additional environmental analysis. It reflects the declared distances option.

(4) Provide Efficient and Flexible Landside Facilities to Accommodate Future Aviation Demand

Alternative	Evaluation
A. Use of Other Modes of Transportation	Not considered further, as less than 5% of the future passengers using Sea-Tac are traveling to distances where surface transportation is efficient and cost effective and likely to be used.
B. Use of Other Airports or Construction of a New Airport	Not considered further. Regional consensus has been established through PSRC EB-94-01 as: 1) there is no sponsor or funding for a new airport; 2) Extensive studies of these alternatives indicate that there are no feasible sites.
C. Activity/Demand Management	Not considered further, as these actions would not reduce demand.
D. Landside Development at Sea-Tac	Was considered in detail by the EIS and this additional environmental analysis. Three primary alternatives to be considered further: Central Terminal Development, North Unit Terminal Development and South Unit Terminal Development.
E. Delayed or Blended Alternative (Combination of other modes, use of existing airports, and activity/demand management)	The net result of this alternative would be a delay in the implementation of the Master Plan Update terminal and landside development. Because there is no commitment to any individual or combination of other alternatives and because aviation activity levels are currently growing at a rate higher than forecast by the Master Plan Update, this alternative was not considered further.
F. Do-Nothing/No-Build	Was considered in detail by the EIS and this additional environmental analysis.

Source: Landrum & Brown and Synergy Consultants, Inc.

miles, alternative modes of transportation become less desirable. Further making this alternative less desirable is the winter road conditions which can make road access between eastern-western Washington cities undependable because of snow in the mountains. Thus, it can be concluded that bus and automobile modes are not a feasible alternative to accommodating forecast air traffic demand or in addressing the existing poor weather operating needs at Sea-Tac.

- **Rail Technology** - The feasibility of rail as an alternative is contingent upon the ability of rail service to successfully compete with air transportation in markets within 500 miles of Sea-Tac. Three rail alternatives offering different levels of service were reviewed and evaluated: (1) High Speed Rail Service, with speeds over 150 mph; (2) Conventional Rail Service, with maximum speeds of 125 mph; and (3) Current Rail Service, with maximum speeds of 79 mph. Based upon the review and evaluation performed for the Final EIS and the activities of the 1996 PSRC Expert Panel on Demand/System Management and Noise, it was concluded that rail service improvements would not have a substantial effect on the level of operations at Sea-Tac International Airport before 2020. Factors leading to this determination include: (1) air passengers traveling to markets within 500 miles of the Airport comprise less than 5% of all passengers at Sea-Tac, so the potential impact of diversions is limited; (2) the potential for current or improved conventional rail service to divert a significant number of passengers from air is low, since travel times and frequency of service are not competitive with air travel; (3) true high speed rail service that could compete with air transportation will not be implemented until after 2020; (4) increases in rail ridership are projected to continue to come from the pleasure and discretionary travel markets; and (5) funding for needed rail improvements is not committed beyond the two year appropriation by the State. The accelerated demand at Sea-Tac would not be expected to alter the scheduling of investments or reverse this conclusion.

- **Telecommunications and Video Conferencing** - Video technology has been around for almost 30 years, and offers (with service improvements) the potential to serve a portion of the air travel market throughout the country. With technology that has been developed but available in limited quantities, video conferencing and collaborative computing could serve as an alternative mode of satisfying the need for air travel.

  Applying the findings of telecommunication studies to the situation at Sea-Tac, less than 5% of air travel demand could be satisfied by communication technologies by the year 2010 (when data and video-conferencing is expected to be available on a limited basis within most companies). By 2020, when such technology is expected to be widespread (on most desks - similar to the availability of desktop computers today), it would reduce air travel by less than 9%. The accelerated demand at Sea-Tac would not likely alter the timing of nationwide development and use of innovative technology.

(B) Use of Other Airports or Construction of a New Airport Alternatives

The development of a new airport (either a replacement or a supplemental airport) would not address the poor weather conditions at Sea-Tac or serve the demand for air travel in the Puget Sound Region for the following key reasons:

1. There is no sponsor, identified source of funds, or acceptable site for a new airport;
2. Extensive study of this issue resulted in the consideration of all alternatives for addressing air transportation capacity issues in this Region. Based on this process, the Puget Sound Regional Council (PSRC) adopted Resolution A-93-03 and EB-94-01 confirming that no feasible sites exist. The Port of Seattle and the FAA have reviewed the regional planning studies and have independently concluded that a supplemental airport would not satisfy the needs addressed by the Final EIS and this additional environmental analysis; and

3. Neither the lack of a sponsor, nor the conclusion of the PSRC process appears to depend on the level of anticipated demand for air travel in the region; and
4. If a supplemental airport site could be identified, market forces would not enable it to successfully compete with Sea-Tac until regional origin and destination air travel demand exceeds 10 million enplanements annually. Using the new forecasts, Sea-Tac is anticipated to accommodate 10 million origin & destination annual enplanements around the year 2005, about 5 years earlier than identified in the Final EIS due to the accelerated demand. As is noted in the Final EIS, air carriers typically find that to initiate operations at a new facility requires demand for 20-30 operations per day. This would amount to about 1 million enplanements a year or 10% of Sea-Tac's enplaned passengers. As described on Page II-10 of the Final EIS, when origin & destination enplanements are less at one competing facility, competition entices traffic to stay at the facility with the greater level of service. As a result, a supplemental airport site would not off load sufficient demand to address the current poor weather operating constraints at Sea-Tac. Therefore, the increased demand would not alter the conclusions concerning this alternative.

(C) <u>Activity or Demand Management Alternatives</u>

The primary objective of activity management alternatives is to increase airport efficiency by the airport operator's establishment of pricing or regulatory actions, thereby delaying or eliminating the need for future airport development. The Flight Plan Study concluded that "... demand management measures will at best delay for a few years the need for capacity improvements. For purposes of this analysis, therefore, it was assumed the maximum demand management set of measures will delay capacity improvements for five years." This conclusion has been supported by the PSRC Expert Panel on Noise and Demand/System Management in their December 8, 1995 final order on system/demand management. The updated forecast shows that demand is growing faster and as a result a higher level of demand for air travel would not be expected to reverse their finding.

(D) <u>New Runway Development Alternatives At Sea-Tac Airport</u>

This category of alternatives was determined in the Final EIS to be the only reasonable and feasible alternative. Chapter 2 of this Supplemental EIS contains a detailed description of how the new forecasts affect the need to address poor weather operating constraints at Sea-Tac. None of the runway alternatives were rejected for activity level reasons, rather they were rejected for not addressing the need or due to infeasibility. As a result, the higher demand levels now forecast would not alter the conclusions concerning the feasibility of alternative airfield options.

(E) <u>Use of Technology Alternatives</u>

A number of technology opportunities exist to reduce delay during poor weather. However, as was shown in the Final EIS, none of these issues would address the entire poor weather operating constraint at Sea-Tac. Alternatives considered include:

- Airport Surface Capacity Technology
- Terminal Airspace Capacity Technology
  - Terminal Air Traffic Control Automation
  - Precision Runway Monitor
  - Microwave Landing System (MLS)
  - Traffic Alert and Collision Avoidance System (TCAS) Applications

  - Wake Vortex Avoidance/Advisory System
  - Localizer Directional Aid (LDA) Approaches
  - Global Positioning System (GPS)
  - Flight Management Systems (FMS)
- Enroute Airspace Capacity Technology
- System Planning, Integration and Control Technology
- Vertical Flight Performance

Of the technology listed above, the Precision Runway Monitors (PRM) and Wake Vortex Avoidance/Advisory System have application to addressing the poor weather issues at Sea-Tac. It is expected the PRM will be used at Sea-Tac if the runway lateral separation testing shows that such technology could be applicable to runways with a separation of 2,500 feet or less. However, the primary issue that would remain is the wake-vortex condition. The FAA continues to evaluate wake vortex conditions. However, there are no plans or technological developments underway or envisioned to reduce the wake vortex standards or to reduce below 2,500 feet the separation between parallel runways.

In its August 1, 1996, approval of the Master Plan Update, the Port of Seattle Commission directed Port staff to give additional consideration to use of new technologies to satisfy poor weather operating needs. This review concluded that technologies, based on the global positioning system (GPS) and flight management system (FMS), will provide aviation system capacity relief in the future. However, no technologies were identified that would alleviate all of the poor weather constraint because no technologies exist to address the 2,500 foot spacing requirement between runways that is attributed to wake vortex conditions.

One of the findings of the technology conference is that sometime in the future, the runway spacing requirements to enable independent parallel approaches may be reduced from 3,400 feet to 2,500 feet. As a result, with the preferred alternative location of the third parallel runway at Sea-Tac, airport users may be able to take advantage of future technology to enhance the operating capability of the airfield and extend the long-term operating capability of a third runway airfield.

(F) Blended or Delayed Alternative

WAC 197-11-440 (5)(vii) states that an EIS must:

> "Discuss the benefits and disadvantages of reserving for some future time the implementation of the proposal, as compared with possible approval at this time. The agency perspective should be that each generation is, in effect, a trustee of the environment for succeeding generations. Particular attention should be given to the possibility of foreclosing future options by implementing the proposal."

If other alternatives (non-construction actions), independently or in combination, were implemented and used, the needs would not arise as quickly at Sea-Tac, and thus, implementation of the proposed Master Plan Update improvements could be delayed.

None of the non-construction actions individually would satisfy the need for the proposed airport improvements. In addition, no actions exist to address the poor weather constraint that exists at Sea-Tac other than the development of a new parallel runway with a separation of 2,500 feet or more. Thus, if a blend of non-development related actions were used to satisfy the poor weather needs at Sea-Tac, the Do-Nothing alternative as presented in the EIS and additional environmental analysis would result.

As a result, the Port of Seattle staff recommended refinements in the implementation of the Master Plan Update improvements which would: (1) balance airside and terminal and landside improvement needs, and (2) better manage the availability of financial resources. This Supplemental EIS reflects a longer construction process for the third parallel runway, resulting in it being available for use by 2005 versus the year 2000, as examined in the Final EIS. Therefore, this alternative (delaying the commissioning of the runway and extending the construction period) is recommended by the Port of Seattle staff.

The five-year delay in the commissioning of the third parallel runway would cause significant inconvenience to the traveling public and additional costs to airport users. As described in the February 1996 Final EIS, poor weather delay costs travelers time and aircraft operators incur additional operational costs. Delay at Sea-Tac in 1993 resulted in nearly 26,000 hours of delay with a cost of $42 million. As activity levels have increased nearly 16% between 1993 and 1996, and as a result, delay and delay cost have increased. A new parallel runway would have saved the airlines $24 million annually if it had been available for use in 1994. Based on Capacity Enhancement Update data, the Final EIS found that delay saving were expected to grow to around $59 million per year when aircraft operations reached 370,200 (which occurred in 1995), and $146 million annually when activity reaches 425,000 operations (now forecast to occur around 2002). Thus, each year that the runway is expected to be delayed beyond completion in late 2004, would cost airport tenants in excess of $150 million annually.

However, as a practical matter, the third parallel runway cannot be completed much sooner than 2004. Limitations on financial resources, time associated with acquisition and relocation, and the environmental impacts of concentrating an over-the-road haul in a short time period are major obstacles to fast-track development of the third parallel runway. Thus, the new phasing plan represents a compromise, which among other things, will sacrifice considerable bad-weather airfield reliability and service for several years.

(G)Do-Nothing/No-Build Alternatives

The Do-Nothing alternative would result in Sea-Tac Airport remaining as it is today. Although this alternative may not be prudent, it is feasible, and therefore, is one of the alternatives considered throughout the Environmental Impact Statement and by this Supplemental EIS.

2. PROVIDE SUFFICIENT RUNWAY LENGTH TO ACCOMMODATE WARM WEATHER OPERATIONS WITHOUT RESTRICTING PASSENGER LOAD FACTORS OR PAYLOADS FOR AIRCRAFT TYPES OPERATING TO THE PACIFIC RIM.

As is described earlier in this chapter, future aviation needs at Sea-Tac include a 12,500-foot long runway to enable service to Hong Kong, the primary economic and trade hub of the Pacific Rim. The following alternatives were considered:

- Extension of Runway 16L/34R
- Extension of Runway 16R/34L

- Development of a new runway with a 12,500 foot length
- Delayed Alternative
- Do-Nothing/No-Build

Since the issuance of the Final EIS, no new information has arisen that would result in new alternatives to this need, nor would it affect the issues leading to the identification of the extension of 34R as the preferred alternative.

3. PROVIDE RUNWAY SAFETY AREAS (RSAS) THAT MEET CURRENT FAA STANDARDS.

Since publication of the Final EIS, the Port of Seattle has completed the grading for the Runway End 34L RSA and will complete the 34R RSA corrections in 1997, per the issuance of SEPA Determinations of Non-Significance and NEPA Categorical Exclusions. Therefore, 16L and 16R are the runway ends where the RSA's do not meet FAA standards. The following alternatives exist to address this need:

- Declared Distances/Displace the runway threshold
- Clearance, grading, filling and development of the requisite areas for 1,000 feet beyond the existing pavement end
- Clearance, grading, filling, and development of the requisite area including the 600-foot extension of Runway 34R
- Delayed Alternative
- Do-Nothing/No-Build [1/]

The correction of the RSA's for 16L and 16R would require the relocation of S. 154th/S. 156th, which was assessed in detail in the Final EIS. However, this additional analysis presented a clarification of the impact of the relocation of this road to identify the independent issues associated with the RSA's versus those of the third runway, or other elements of the Master Plan Update improvements. The alignment of the road was evaluated in several manners:

- RSA Option 1: Alignment shown in the Final EIS (relocated around 16L, 16R and new runway 16X) reflecting the alignment addressing the RSA compliance and the new runway;
- RSA Option 2: Alignment just around 16L and 16R, and connecting back to the present alignment as soon as operationally feasible. This alignment would occur if the new runway was not built;

Exhibit 3-6 shows the alignments of these options. This additional environmental analysis identifies these impacts.

1/ Technically, the literal Do-Nothing is not an option for addressing the RSA issues. The Port of Seattle has two options for addressing RSAs, both of which require some action. The Do-Nothing alternative presented in the Final EIS, and this additional environmental analysis, reflects the non-development action (declared distances).

4. Provide Efficient and Flexible Landside Facilities to Accommodate Future Aviation Demand

The following summarizes the issues associated with each of the alternatives to terminal and landside facility improvements.

(A) Use of Other Modes of Transportation Alternatives

No new information, other than discussed on page 3-1 and 3-2 of this report have arisen concerning alternative modes of transportation. This category of alternatives would not satisfy the need for terminal and landside improvements at Sea-Tac.

(B) Use of Other Airports or Development of a New Airport Alternatives

As was described beginning on page 3-2, an extensive study of the development of a replacement or supplemental airport was conducted by the Puget Sound Regional Council. This study found: "The Executive Board concludes that there are no feasible sites for a major supplemental airport within the four-county region and that continued examination of any local sites will prolong community anxiety while eroding the credibility of regional governance."[2] While O&D demand is anticipated to grow faster, possibly making a supplemental airport competitive with Sea-Tac in the 2005 timeframe (instead of in 2010 as predicted by the Final EIS), the consensus of the region is that this alternative is not viable. Neither the lack of a sponsor, nor the conclusion of the PSRC process appears to depend on the level of anticipated demand for air travel in the region

(C) Activity/Demand Alternatives

As was described in a preceding section (starting on page 3-3), activity alternatives would not reduce demand such as to prevent the need for improvements at Sea-Tac Airport. No new information has arisen that would alter this conclusion.

(D) Landside Development at Sea-Tac Airport Alternatives

This category of alternatives was identified in the Final EIS to be the only reasonable and feasible alternative. Chapter 2 of this document contains a detailed description of how the new forecasts affect the terminal and landside improvements. As is shown in Chapter 2, the primary effect of accelerated demand would be the need to accelerate the time in which these facilities would be available.

As is discussed in Chapters 1 and 2, the accelerated demand for air travel would produce accelerated uses of and need for parking facilities at Sea-Tac. Because of these constraints, additional consideration was given to other alternative sites for parking, yet no changes in location were identified over the sites presented in the Final EIS. In all cases, parking facility locations were identified using residual lands available after satisfying the requirements for passenger terminal, airfield accessible needs for functions supporting aircraft operations, and

[2] PSRC Executive Board Resolution EB-94-01.

cargo and key support facilities. Alternatives for public parking, rental car parking, and employee parking include:

1. Public Parking

Currently, the primary on-airport public parking facility is the Main Parking Garage, with additional long-term parking provided at the Doug Fox Parking lot, located off S. 170th Street west of International Blvd. As was identified by the Master Plan Update, additional passenger demand is anticipated to require 5,000 additional stalls for public parking. The primary criteria for siting public parking is close proximity to ticket check-in locations and convenient accessibility. Alternative sites for public parking include:

- *Expansion of the Main Parking Garage* - The existing main parking garage could be expanded in nearly all directions to provide about 7,600 additional stalls. Eight floors could be added to the north (section AA, adding about 1,800 stalls), to the south (section E adding about 3,000 stalls) and to the east (adding about 1,900 stalls) and three floors could be added to section D (about 1,200 stalls). No impacts to natural resources (i.e., wetlands, floodplains, sensitive biotic communities) would occur to expand the Main Parking Garage. However, expansion of the garage would affect the adjoining employee surface lot to the south, and displace the rental car quick-turn-around facilities to the north. This option represents the preferred location for public parking, in addition to the development of parking to support the North Unit Terminal, as it provides the greatest level of service to the traveling public.
- *Development of a parking structure at the Doug Fox Lot* - this site could be developed to accommodate all of the long-term parking needs. However, the Master Plan Update calls for development of the new North Unit Terminal on portions of this site because it is airfield accessible. Included in the North Unit Terminal development would be a supporting parking garage with about 4,000 stalls of parking. Development of parking beyond that required to support the new terminal would create an imbalance and produce additional unnecessary vehicular travel of the airport roadway system, transporting passengers between the new terminal/garage and the existing main terminal. No natural resource impacts would occur, as the site is presently owned by the Port and is used as airport parking under a lease to Doug Fox. To prevent an imbalance, the preferred alternative calls for the development of supporting public parking with the North Unit Terminal at this site.
- *Move rental cars out of the Main Parking Garage to free space for public use* - Currently, two floors of the Main Parking Garage are used by rental cars. Relocation of the rental car function to another location at the Airport would enable about 1,350 parking stalls for public use. While no natural resource impacts could occur for the public use stalls, the development of replacement rental car stalls could result in such impacts; rental car alternatives are discussed in the next section. Relocation of the rental car functions would decrease the level of service afforded to the traveling public, as shuttle busses for rental car users would likely be required. This alternative was not considered further at this time due to the desire to afford the highest level of service to the air passenger.
- *Convert S. 160th Street employee lot to public use* - Currently, about 1,150 stalls are provided at the S. 160th street employee lot, located west of International Blvd. This parking lot could be converted to public use, with employees displaced to alternative locations discussed in a following section. Public parking users would be bussed from this site to the terminal. No natural resource impacts would occur for the public use stalls, but the replacement employee lot could result in such impacts. Currently, the S. 160th/SR 99 intersection operates at LOS C (congestion during peak periods) today and by 2000 at LOS D. It is expected to degrade to LOS F (severe traffic congestion) by year 2010. It is presumed that access to this site would be from SR 518 to

International Blvd (SR 99) to S. 160th. Presently, the eastbound freeway ramp at SR 518/SR 99 operates at LOS D and the westbound SR518/SR 99/S. 154th operates at LOS B. The addition of the employee parking traffic through these roadways would likely require development of additional turn-lanes and possibly an additional freeway ramp. Because this alternative would produce a lower level of service for public parking needs because of the bussing, it was not considered further.

- *Development of land west of the third parallel runway for parking* - As was shown in the Final EIS, land is proposed for acquisition as mitigation for construction impacts associated with the third parallel runway. Some of this land, paralleling Des Moines Memorial Drive, is not proposed for development as part of the Master Plan Update, but would likely be developed in the long-term for airport compatible uses. The construction of the third parallel runway embankment would require the filling of about 6 acres of wetland (not including the borrow source wetland impacts). The impacts associated with the runway do not include other wetlands in this area that would be affected by airport compatible uses. Therefore, development of public parking west of the third runway would likely result in natural resource impacts, including disruption of vegetative cover and additional filling of wetlands. Access to a parking lot is this general area could be provided off SR 509 (from an existing interchange at S. 160th Street or a new interchange) or from SR 518 to Des Moines Memorial Drive. Passengers would be required to be bussed from the remote location to the passenger terminal, creating added inconvenience. Because of the low level of service due to the bussing and impacts from this alternative, it was not considered prudent at this time.

- *Development of land north of SR 518 for public parking* - During the 1980s and early 1990s, the Port purchased noise impacted residential property north of SR 518. This land, located under the approach path to the existing runways, could be used for airport parking. A surface lot accommodating about 6,000 stalls could be developed or a garage accommodating a greater number of stalls could be developed. Development of public parking north of SR 518 would result in natural resource impacts, including disruption of vegetative cover and filling of wetlands (about 1 acre). Access to a parking lot is this general area could be provided off SR 518 through new interchange/ramps or from SR99 to S. 154th/24th Avenue. Passengers would be required to be transported (bussed) from the remote location to the passenger terminal, creating added inconvenience. Because of the low level of service and impacts from this alternative, it was not considered prudent at this time.

- *Purchase additional land for public parking* - A substantial quantity of off-site parking exists in the City of SeaTac. Existing parking facilities could be acquired by the Port or other land could be purchased and new parking developed. Passengers would be required to be transported (most likely bussed) from the remote location to the passenger terminal, creating added inconvenience and offering a lower level of service. If an existing lot was acquired that commercial enterprise would likely be displaced and would result in its replacement in the general airport vicinity. Such facilities would likely result in other business and/or residential relocation and potential impacts to natural resources. Because of the low level of service and impacts from this alternative, it was not considered prudent at this time.

As was noted in the Final EIS, the Preferred Alternative for public parking needs at Sea-Tac Airport would result in the development of all public parking facilities being constructed in close walking distance to the passenger terminal(s). This would include the development of about 3,000 public parking stalls through the expansion of the Main Parking Garage and the development of about 2,190 stalls at the North Unit Terminal location.

2. Rental Car Parking

As was noted in the previous section, rental car operations occupy two floors of the Main Parking Garage, and provide about 1,000 rental car stalls in addition to support facilities. Within the next five years, space requirements to accommodate rental car (RAC) functions is needed to nearly double, and by year 2010, nearly double again. As a result, a long-term rental car site located outside the parking garage is needed. Similar to public private vehicle parking criteria, siting criteria for rental cars focused on close proximity to the terminal or ease in air traveler access for remote locations. The following alternatives were identified:

- *Conversion/expansion of the South 160th Street employee lot for RAC usage* - Much of the environmental impacts associated with this option would be dependent upon where the employee functions are relocated. However, impacts of the rental cars would be primarily surface transportation issues and associated air quality impacts. Currently, the South 160th/SR 99 intersection operates at LOS C today and by 2000, at LOS D. It is expected to degrade to LOS F by year 2010. It is presumed that access to this site would be from SR 518 to International Blvd (SR 99) to S. 160th. Presently, the eastbound freeway ramp at SR 518/SR 99 operates at LOS D and the westbound SR518/SR 99/South 154th Street operates at LOS B. The addition of the rental car activities on these roadways would likely require development of additional turn-lanes and possibly an additional freeway ramp. Coupled with commercial development, which is the use identified in the City of SeaTac's Comprehensive Plan, this site could feasibly address airport parking needs as well as address the city's desired International Blvd interface. However, no specific commercial development options have been identified. Because of these constraints, this site was not considered further.
- *Conversion/Re-development of commercially developed land at 16th Avenue South, south of South 188th Street* - This area would fall within the FAA's Runway Protection Zone (RPZ) for the third parallel runway. The RPZ area consists of 88 commercially developed (primarily warehouses) and 3 vacant commercial properties. Acquisition of this area and relocation of the commercial properties could result in a loss of tax revenue to the City of SeaTac. The Master Plan Update EIS found that if these businesses were removed, that the City of SeaTac could loose an estimated $180,000 annually in real property tax receipts. An additional $457,000 in sales taxes would be lost along with the 577 jobs provided by these businesses. If they were relocated to other areas within the City, no impacts would occur and it is possible that tax revenue in the City would also increase due to the rental car activities. The Final EIS assessed these impacts assuming that full acquisition and relocation of these businesses occurred. Subsequent relocation planning has indicated that few of the businesses desire relocation and few require relocation due to incompatibilities with aircraft overflight. As a result, the Port of Seattle staff recommends the pursuit of easements from these property owners. To enable rental car use, acquisition and relocation of these businesses would be necessary, at a cost of about $24 million. In addition, the rental car business activity would be expected to replace the lost economic impacts caused by removal of the existing businesses.

  This general area contains a few wetlands associated with the west branch of Des Moines Creek that, depending upon the location and layout of a rental car complex, might require mitigation. Development of a rental car facility at this location would likely fill some of these wetland. As the site is commercially developed, it is possible that some hazardous materials could be found in removing the facilities, ranging from asbestos to contaminated earth/soils.

Like all other sites, surface transportation issues and air quality impacts could be expected. Assuming public access to the site was focused on SR 509, impacts to the South 188th/International Blvd intersection (currently at LOS F) would likely be minimized. Returns to the terminal are assumed to follow the current bus route at 28th Avenue/South 188th Street which operates at LOS B (if International Blvd./South 188th Street were used significant impacts and mitigation would be expected). A westbound left turn lane on South 188th Street at 28th would likely be required. Because of traffic congestion as well as cost to acquire the businesses, this site was not considered further.

- *Use of SASA site lands* - The Master Plan Update calls for the replacement of displaced maintenance/support and cargo facilities in the area known as the South Aviation Support Area (SASA). As an interim alternative, the Port could develop portions of the site for rental car use. Impacts at this site would be similar to the commercially developed 16th Street South site. Development of the SASA properties would require filling of about 2 acres of wetlands. Assuming access were to occur like that discussed for the commercially developed South 16th site, the same impacts would be expected. However, this site would seem to make S. 188th Street a more probable access point, increasing the need to address the LOS F issues at this intersection and the likely air quality impacts. Because of other site development needs and the resulting impacts, this alternative was not considered further.

- *Doug Fox lot* - The Master Plan Update preferred alternative includes the development of a parking garage at this site for as many as 4,000 vehicles to support the new terminal. Included in this site, as the preferred alternative, is the assumption that additional rental car facilities would be developed to accommodate the rental requirements (about 885 stalls of the 4,000 at Doug Fox would be used for RAC, with an 2,190 stalls would be available for RAC in the expanded main garage). Access would continue from South 170th Street, as it exists today until some future period when the North Unit Terminal is developed. Development of a rental car parking facility only at the Doug Fox lot could be undertaken, or a shared facility, as identified by the Master Plan, could occur. Because a dedicated rental car facility at this site would create unnecessary vehicular travel on the airport roadway system to transport passengers to the Main Terminal, it was not considered further.

- *Borrow Source Area 3 (16th Avenue South/South of 200th Street)* - This area consists of about 60 acres of land that was residential, but was acquired by the Port as part of the Noise Remedy Program. Moderate to steep slopes exist in the south-central portions of this area. To construct the proposed third parallel runway, as much as 2.9 million cubic yards of fill may be excavated from this site. Upon excavation, the site could be developed for rental car facility development. If excavation did not occur for fill for the runway, the site could also be developed, but some site preparation would be require to provide the necessary grades for parking uses. The site contains about 1.25 acres of wetland that are identified for filling to enable excavation of fill for the runway, if on-site borrow source use is maximized.

  Access to the site for rental car use is uncertain. With current roadway structures, access from International Blvd at South 200th Street would seem most likely until the completion of the SR 509 Extension/South Access. The International Blvd/South 200th Street intersection presently operates at LOS D while the I-5 exit at South 200th/Military operates at LOS B. By year 2000, these intersections are both anticipated to operate at LOS F and D, respectively. With the addition of rental car traffic through these intersections surface transportation conditions would worsen and air pollution increase. In addition, the development of the SR 509 Extension/South Access could affect, both positively and negatively the long-term development of the site for rental cars. As a result, this alternative was not considered further.

- *Development of land north of SR 518 for rental car user* - During the 1980s and early 1990s, the Port purchased noise impacted residential property north of SR 518. This land, located under the approach path to the existing runways, could be used for airport parking. A surface lot accommodating about 6,000 stalls could be developed or a garage accommodating a greater number of stalls could be developed. A surface lot would not be sufficient to accommodate the long-term rental car requirements. Development of rental car parking north of SR 518 would result in natural resource impacts, including disruption of vegetative cover and filling of wetlands (about 1 acre). Access to a parking lot is this general area could be provided off SR 518 through new interchange/ramps or from SR99 to South 154th/24th Avenue. Passengers using rental cars would be required to be bussed from the remote location to the passenger terminal, creating added inconvenience. Because of the low level of service and impacts from this alternative, it was not considered prudent at this time.

- *Development of land west of the third parallel runway for rental car use* - As was shown in the Final EIS, land is proposed for acquisition as mitigation for construction impacts associated with the third parallel runway. Some of the acquired land, paralleling Des Moines Memorial Drive, is not proposed for development as part of the Master Plan Update, but would likely be developed in the long-term for airport compatible uses. The construction of the third parallel runway embankment would require the filling of about 6 acres of wetland (not including the borrow source wetland impacts). Additional filling of wetlands could occur to accommodate development on the construction mitigation land. Access to area could be provided off SR 509 (from an existing interchange at South 160th Street or a new interchange) or from SR 518 to Des Moines Memorial Drive. Passengers using rental cars would be required to be bussed from the remote location to the passenger terminal, creating added inconvenience. Because of the low level of service and impacts from this alternative, it was not considered prudent at this time.

- *Purchase additional land for rental car use* - A substantial quantity of off-site parking exists in the City of SeaTac. Existing parking facilities could be acquired by the Port or other land could be purchased and new parking developed. Because passengers would be required to be bussed from the remote rental car location to the passenger terminal, creating added inconvenience and offering a lower level of service. If an existing lot was acquired that commercial enterprise would likely be displaced and would result in its replacement in the general airport vicinity. Such facility could result in business, or residential relocation and potential impacts to natural resources. Because of the low level of service and impacts from this alternative, it was not considered prudent at this time.

A permanent, consolidated location for rental car functions is desired, but is not currently available. None of the alternatives that has been determined feasible would minimize passenger disruption/maximize convenience. Because the need can not be met in a consolidated public rental car facility, either on or off airport, the preferred option would result in two on-airport rental car locations in the passenger terminal garages. Rental car functions would be satisfied by an expansion of the Main Garage to provide rental car space for a total of 2,190 cars, and the development of 885 stalls at the North Unit Terminal parking garage.

3. Employee Parking

The preferred alternative would displace existing employee parking due to support facility development (such as development in the area known as SASA and cargo expansion) and expansion of public and rental car parking. As a result, about 6,000 stalls for employee parking would be required to compensate for displaced existing stalls and increased employment related requirements. Alternatives for employee parking are the same as noted for the public and rental car parking. The Preferred Alternative provides for consolidated employee parking at one large lot north of SR 518. Such consolidation would reduce operating costs and in general improve overall employee parking services. While some employees would have lower levels of service, particularly those currently parking in the Main Garage and in Lot 5 (south of the garage), the average employee would experience increased levels of service due to frequent bus service to a consolidated location.

Of the alternatives considered for public and rental car use, the expansion of the Main Garage and Doug Fox lots would not be available, as these are the preferred sites for the public and rental car uses. Thus the following locations would be alternatives:

- Expansion of South 160th Street Employee Lot - issues associated with this lot are discussed in the preceding section.
- Expansion of the existing South Employee Lot - this site is presently on the site of the proposed airfield accessible support facilities in the area known as the South Aviation Support Area. As a result, the existing lot will be displaced upon the site preparation of this area.
- Development of land west of the third parallel runway - issues associated with this lot are discussed in the preceding section. About 6 acres of wetlands would be filled in this area.
- Development of land north of SR 518 - issues associated with this lot are discussed in the preceding section. About 0.81 acres of wetland would be filled by a lot in this area.
- Purchase of additional land for employee parking - issues associated with this lot are discussed in the preceding section.
- Use of the Borrow Source Area 3 - issues associated with this lot are discussed in the preceding section. About 1.25 acres of wetlands would be filled by the development of parking in this location.

Because the majority of the existing employee parking is located north of the existing Main Terminal, and already uses bussing to transport employees, the preferred operational mode would consolidate the bussing activity. Therefore, two options exist: expansion of South 160th Street lot and development of the lot north of SR-518. Because of congestion along International Boulevard and because employee parking lots typically have high entry/exit during shift changes (versus a more even usage as public or rental car use), the South 160th Street lot expansion was identified as likely to result in significant surface transportation issues and resulting air quality impacts, making it undesirable. Therefore, the preferred alternative for employee parking is the development of a large employee lot north of SR 518.

(E) Delayed/Blended Alternative

As was discussed earlier, the only new significant information that has arisen concerning the terminal and landside is the time frame in which the facilities would be needed. Because demand is anticipated to increase faster (Master Plan Update improvements could be needed sooner), terminal and landside facilities could be needed sooner. Therefore, the Delayed or Blended alternative would result in a Do-Nothing condition resulting until the time in which the facility development was initiated. As a result, the increases in demand would not make this a reasonable alternative.

(F) Do-Nothing/No-Build Alternative

The Do-Nothing alternative would result in the Airport remaining as it is today. This alternative was continued throughout the additional environmental evaluation to facilitate the comparison of the "With Project" alternative.

CHAPTER 4

AFFECTED ENVIRONMENT ISSUES

Since the issuance of the Final Environmental Impact Statement in early February 1996, a number of actions have been taken within the region related to Sea-Tac Airport. The purpose of this chapter is to summarize these actions and identify if or how the actions affect the Master Plan Update improvements.

Key actions include:

- The final decision of the Expert Panel on Demand/System Management and Noise
- The PSRC amendment to the Metropolitan Transportation Plan approving the third runway at Sea-Tac
- The Port of Seattle Commission Approval of the Master Plan Update
- Port and FAA approval and initiating of correcting the Runway Safety Area for 34R
- Port of Seattle discussions with Seattle Water concerning the development of the employee lot north of SR 518
- Congressional Field Hearing - then Representative Randy Tate, a member of the House Aviation Subcommittee, sponsored a hearing on March 18, 1996 concerning the third runway

The following summarize these actions and their relationship to the Master Plan Update.

1. PUGET SOUND REGIONAL COUNCIL AND RELATED ACTIONS

In April of 1993, the Regional Council General Assembly adopted Resolution A-93-03, which called for the region to pursue both a major supplemental airport[1/] and, subject to conditions, a third runway at Sea-Tac International Airport. "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 noise reduction objectives and demand and system management actions were to be independently evaluated. A determination of whether these conditions were satisfied was to be made no later than April 1, 1996.

Resolution A-93-03 was followed by PSRC Executive Board action adopting specific Implementation Steps for carrying out the resolution's requirements. Among the provisions of the Implementation Steps was the establishment of expert panel(s) to perform the independent evaluations of demand/system management and noise issues. The noise issues to be analyzed were limited to impacts associated with the existing facilities at Sea-Tac and did not include any analysis of noise impacts related to a possible third runway.

[1/] In October of 1994, the Regional Council Executive Board adopted Resolution EB-94-01 which concluded that no feasible sites for a major supplemental airport could be found in the four-county region.

An Expert Arbitration Panel was appointed in June 1994 by the Secretary of the Washington State Department of Transportation (WSDOT) to make findings on the satisfaction of the Demand/System Management and Noise conditions. The panel consisted of three members residing outside the State of Washington: an attorney, an economist and an engineering professor.

In a series of written orders on Demand System Management Issues, concluding with its final order in December of 1995, the Expert Panel found that congestion pricing, gate controls, high-speed rail and more readily achievable improvements in existing rail service could not reasonably be relied upon as a justification for obviating or deferring the construction of the new runway at Sea-Tac.

In its final order of March 27, 1996, the majority of the Panel (two members, with one dissenting opinion) concluded that "although the Port of Seattle has scheduled, pursued, and achieved an impressive array of noise abatement and mitigation programs, the Port has not shown a reduction in real on-the-ground impacts sufficient to satisfy the noise reduction condition imposed by Resolution A-93-03." The Panel concluded "that the Port could have done more, and that, had it done so, the additional improvement probably would have made a material difference in real, on-the-ground noise impacts, turned a marginal improvement into a meaningful one, and therefore affected the final outcome of this proceeding." In conclusion, the Panel offered a list of recommended noise reduction measures to be considered.

As a result of the Expert Panel's findings, the PSRC Executive Board met several times to consider possible directions. After a series of deliberations, the Executive Board determined that recommendations of the Panel could be incorporated into the amendment to the MTP, and with the noise mitigation recommendations that the intent Resolution A-93-03 would be satisfied. At its April 25, 1996 meeting, the PSRC's Executive Board endorsed use of the recommendations in the Panel's March 27, 1996 Final Decision on Noise Issues as the basis for deciding what additional noise reduction measures should be part of including a proposed third runway at Sea-Tac Airport as an amendment to the Metropolitan Transportation Plan (MTP). The Board directed staff to initiate the process to include a third runway at Sea-Tac and "...provide for (a) additional noise reduction measures, based on the recommendations of the Expert Panel; (b) establishment of a plan for implementation of such noise mitigation measures, including milestones; (c) monitoring compliance with such implementation plan; and (d) an agreement between the PSRC and the Port of Seattle for implementation of such plan..."

Resolution A-96-02, amending the Metropolitan Transportation Plan (MTP) to include a third runway at Sea-Tac Airport with specific noise reduction measures based upon the recommendations of the Expert Panel, was approved by the PSRC General Assembly on July 11, 1996. **Table 4-1** lists the noise mitigation measures included in the resolution. Thus, considering the purpose of 49 USC 74106(a)(1), the FAA believes that the PSRC gave adequate consideration to the function of the Expert Panel, its findings, and reasonable ways of addressing the issues raised by the Expert Panel.

2. PORT OF SEATTLE ACTIONS

A number of actions have been taken by the Port of Seattle since issuance of the Final EIS. Actions related to the Master Plan Update improvements include:

- Issuance of a Mitigated Determination of Non-Significance (MDNS) and Determinations of Non-Significance (DNS)[2/]
- Passage of Resolution 3212

Several determinations under the Washington State Environmental Policy Act (SEPA) have been made by the Port since issuance of the Final EIS. The Port of Seattle issued a Mitigated Determination of Significance (MDNS) for the correction of the 34R runway safety area (RSA) on April 11, 1996.[3/] In early spring, the Port selected a contractor to build the embankment for the 34R RSA, which is anticipated to be completed in 1997. Also on November 25, 1996, the Port issued a Determination of Non-Significance (DNS) for the expansion of the Federal Express building located in the north cargo complex. Construction is expected to begin in January 1997 and be completed before the end of the year. In August 1996, the Port issued a DNS for the excavation and removal of gasoline affected soils located at the site of a former underground storage tank associated with the localizer for Runway 16R. This project was completed in 1996. All of these projects, if considered separately under the National Environmental Policy Act, are categorically excluded from environmental analysis (or NEPA was determined by the FAA as to not apply). Their cumulative impacts are described in the Final EIS and this Supplemental EIS.

Following the PSRC approval of the MTP with the third runway, the Port of Seattle approved Resolution 3212 on August 1, 1996. In resolution 3212, the Commission:

1. Found that the EIS for the proposed Master Plan Update development actions, including the PSRC issued EIS addendum, is adequate and meets the requirements of SEPA;
2. Adopted the Airport Master Plan Update, as documented Technical Reports 1 through 8, and the Airport Layout Plan;
3. Approved the development of a new 8,500-foot dependent air carrier runway with its centerline located no further than 2,500 feet west of the centerline of runway 16L/34R and development of taxiways, navigational aides, and other associated facilities;
4. Agreed to undertake the additional noise reduction measures called for by PSRC Resolution A-96-02 Appendix G, Section I (as shown in **Table 4-1**);
5. Authorized participation in the air pollutant monitoring program with the Department of Ecology, US Environmental Protection Agency, and Puget Sound Air Pollution Control Agency; and
6. Directed staff to monitor and evaluate changes in airport activity, and how the changes in airport activity might affect environmental conditions and the need for mitigation.

This additional analysis has been completed in keeping with the Port Commission's direction noted above.

[2/] FAA issued a categorical exclusion for 34R and 34L RSA corrections.

[3/] "Mitigated Determination of Non-Significance (MDNS) for Seattle Tacoma International Airport Runway 34R Safety Area Improvements", Port of Seattle, April 11, 1996.

Appendix F, response to comment 4-B, of the Supplemental EIS provides a summary of the status of the Port's implementation of its commitments to additional noise mitigation in response to the PSRC and Expert Panel.

Concurrent with its approval of the third runway on August 1, 1996, the Port of Seattle Commission directed Port staff to give additional consideration to use of new technologies to satisfy poor weather operating needs. In response to this request, the Port convened a technology conference at the SeaTac Hilton on September 25, 1996. Speakers at the conference included the Federal Aviation Administration, NASA, Alaska Airlines, Airline Pilots Association, Boeing, Air Transport Association, consultants, and a company developing new technologies. This investigation concluded that technologies, based on the global positioning system (GPS) and flight management system (FMS) or other technologies, will provide aviation system capacity relief in the future. However, no technologies were identified that would alleviate the need for the new runway or change the viability of other closer spaced options due to the 2,500 foot spacing requirement between runways that is attributed to wake vortex conditions.

3. ACTIONS BY OTHERS

Three primary actions have been undertaken by other parties:

- Hearing conducted by U.S. Congress Aviation Subcommittee
- Local Land Use Actions
- Lawsuits and SEPA Appeals

The following sections summarize these actions.

(A) Aviation Subcommittee Hearing March 1996

On March 18, 1996 then Congressman Randy Tate, a member of the House Aviation Subcommittee of the Transportation and Infrastructure Committee, held a hearing at the Des Moines Field House. Chaired by Congressman Duncan (Tennessee), other Congressional attendees included: Rep. Jack Metcalf (Washington), Rep. William Clinger (Pennsylvania), Rep, Tim Hutchinson (Arkansas), Rep,. Andrea Seastrand (California), Rep. Rick White (Washington), Rep. Robert Cramer (Alabama) and Rep. Randy Tate (Washington). Testimony was provided by Mayor Skip Priest (Federal Way), Steve Hockaday (consultant to the Airports Communities Council), Dr. Lynn Micheaus (Economist living in the airport area), Gina Marie Lindsey (Port Aviation Director), Robert Wallace (Greater Seattle Chamber of Commerce), Ed Merlis (Air Transport Association), Jane Rees (Washington Alliance of Taxpayers and Travelers), Robert Drewel (Snohomish County Executive and PSRC President), and Kathy Parker (Regional Commission on Airport Affairs).

The hearing was attended by approximately 200 residents from throughout four county region, elected officials from the region, community leaders, and interested parties. Because the room was small, about 50 to 75 area residents gathered outside to hear testimony that was carried over a loudspeaker.

Representative John Duncan called the meeting to order and indicated that the Subcommittee was responding to Representative Tate's request to review issues surrounding the proposed third runway. He then introduced Representative Tate (Washington) who provided a presentation concerning issues he has with the proposed runway: need for the runway, and concerns with costs and funding sources, etc. Representative Duncan noted that three panels of speakers would provide testimony, and that each speaker would be limited to five minutes of testimony. Follow-up questions would then occur after all of the panels were heard. He urged anyone else to submit their comments in writing for consideration by the Subcommittee.

The first panel consisted of Skip Priest, Steve Hockaday, and Dr. Lynn Micheaus. Mayor Priest noted that the proposed runway would be disruptive and that the rights of the minority must be balanced against the greater good. He indicated that the proposed runway has little value, a large cost of $3.3 billion and will result in great loss in property values to area residents. Dr. Steve Hockaday indicated that the project fails to meet its intended need. He cited three reasons: 1) Poor weather is less frequent than reported by the Port; 2) Increased costs at Sea-Tac will divert operations to Paine Field; 3) Airspace constraints between Sea-Tac and Boeing Field with the third runway will divert general aviation traffic to Sea-Tac. Mr. Hockaday indicated that the Localizer Directional Aid (LDA) would address the need through the year 2020 and he expressed safety concerns with the third runway due to runway incursions. Dr. Lynn Micheaus indicated that the issue is one of pricing. He indicated that airport facilities are not properly priced to address demand and do not reflect the real costs. He calculated that the return on the investment of the third runway would be less than 1 percent, making it an unwise investment. He also noted that federal funds should not be used to address a need identified at a local level -- that local funds should be used.

The second panel consisted of Gina Marie Lindsay, Robert Wallace, and Ed Merlis. Ms. Lindsay summarized the operational needs for a third runway, the cost of the new runway at $405 million plus $50 million in mitigation, and the cumulative work and moneys that the Port has already spent on noise mitigation. Mr. Wallace reported that the proposed runway is the best and most cost effective solution. He also noted the importance of Sea-Tac in the infrastructure of the region. Mr. Merlis commented on the cost of the project, the cost of delay to the airlines, the availability of federal funds. He indicated that the airlines are concerned with the cost.

The third panel consisted of Jane Rees, Robert Drewel, Kathy Parker. Ms. Rees, a Magnolia resident, indicated her concern with the financing of the project and the possibility of taxes being raised. Mr. Drewel summarized the background leading to the PSRC General Assembly decision. He noted that 88% of the elected officials of the region supported the selected approach. Ms. Parker, a resident of Burien, cited Sydney Australia as an example where the public has grounds to oppose a project because the EIS did not adequately consider impacts. She expressed similar concerns with aircraft noise, and impacts that would be experienced during construction of a new runway at Sea-Tac.

Representative Duncan then initiated the questions. Questions from all members of Congress were offered to each panel. Questions of the first panel consisted of how a multiple airport system would work, if there was confidence in the mitigation cost estimates and the overall cost estimates. Mayor Priest indicated that he felt that the mitigation costs were too low. Mr. Hockaday indicated that the LDA would be $1 million. He also noted the Colorado Springs Effect of the new Denver airport. He reported that as the cost to operate at Denver grew, airlines transferred their operations to Colorado Springs. Representative Tate cited the Master Plan Update report which indicated that the Port has an option of raising property taxes to fund development at Sea-Tac. Questions of panel 2 consisted of financial feasibility and the possibility of a tax increase. Representative Tate requested that the Port commit to not raising tax rates to fund the proposed project. He requested that if a tax increase were to be needed that a public vote should be necessary before the Port proceed. Questions of panel 3 focused on the public process. Ms. Rees and Ms. Parker indicated that the public process was not inclusive, that the Port undermined the process or "rolled over" the public desire.

(B) Local Land Use Actions

Chapter IV, Section 2 "Land Use Impacts" of the Final EIS for the Master Plan Update improvements presents a detailed assessment of the impact of the the proposed improvements on local land use and summarizes the compatibility of the alternatives with relevant local and regional land use plans available through December 1, 1995. Discussed are: City of SeaTac Comprehensive Plan; adopted and interim comprehensive plans, elements and code amendments for Des Moines, Normandy Park and Burien; the Tukwila Comprehensive Plan; The King County Comprehensive Plan; The King County Countywide Planning Policies; VISION 2020: Growth and Transportation Strategy for the Central Puget Sound Region, Puget Sound Council of Governments (1990); and the 1995 Update of VISION 2020 and 1995 Metropolitan Transportation Plan; applicable resolutions of the PSRC[4/] including the PSRC's Multi-County Framework Policies under GMA. The following summarize the status of these plans as of December 31, 1996.

PSRC Vision 2020 Plan and Metropolitan Transportation Plan - In May 1995, the Puget Sound Regional Council adopted the Vision 2020 Update, which has not been amended since. However, as is noted earlier, the PSRC adopted Resolution A-96-02 in July, 1996, to amend the Metropolitan Transportation Plan (MTP) to include a third runway at Sea-Tac Airport with additional noise reduction measures. The PSRC sent a letter to the local jurisdictions alerting them to the amendment and to the need to assure, effective August 2, 1996 (the date that the resolution became effective), that their comprehensive plans are consistent with the MTP as amended. Specifically, "transportation strategies should reflect the need to provide for safe and efficient access and connections to the Sea-Tac Airport as its role as a regionally significant transportation facility continues to increase".

Prior to this requirement, PSRC had certified that the transportation elements of the Comprehensive Plans for SeaTac, Des Moines, Normandy Park, and Federal Way were consistent with the MTP. The Tukwila transportation plan element is scheduled for consistency review in January 1997. The Tukwila plan, as well as other amendments by local jurisdictions, will be required to be consistent with the Updated MTP.

King County Comprehensive Plan and Countywide Planning Policies - The King County Comprehensive Plan was amended in November 1996. The amendments passed since issuance of the February 1996 Final EIS address land use issues in rural King County.

City of SeaTac - The City of SeaTac's Comprehensive Plan was adopted in December 1994 and amendments to the plan occurred in December 1995, and December 1996. One of these amendments was the redesignation of about 13 acres of land on the west side of Sea-Tac Airport (in the acquisition area for the third runway) from single-family to multi-family use. These properties, located east of SR 509 - between South 170th and 176th Streets, are currently affected by 65 DNL and greater sound levels. In October 1996, the City Council voted to rezone these properties as multi-family.

In March 1995, the City formed an ad-hoc group called the Westside Ad-Hoc Citizens Advisory Committee for the purpose of developing land use options for the "with" and "without" runway scenarios. The Committee, which was sunset in October 1996, recommended a single plan for both scenarios that included a mix of single family

4/ See Appendix A for copies of PSRC resolutions A-93-03 and EB 94-01.

residential, multi-family residential, medium and high-density commercial mixed use, and open space. It is anticipated that the area where the runway would be developed would be redesignated as "airport use" once the runway was undertaken (i.e., once the Port has acquired the land). In sunseting the group, the planning effort was placed on hold, but the City Council is scheduled to discuss the Westside Plan in early 1997. SEPA review of the Westside Plan is expected to occur in early 1997. No amendments have occurred to bring about transportation compatibility with the Airport, as directed by the Updated MTP.

City of Des Moines - In December 1995, the comprehensive plan for Des Moines was adopted. Amendments considered in 1996 include preferred land use maps for Woodmont and Redondo, predominately residential neighborhoods located on the southside of the city, that are slated for annexation in January 1997. Several other minor land use changes are also slated for various parts of the City. No amendments have occurred to bring about transportation compatibility with the Airport, as directed by the Updated MTP.

City of Normandy Park - Since adoption of their plan in December 1995, no amendments have been adopted or scheduled and no amendments have occurred to bring about transportation compatibility with the Airport, as directed by the Updated MTP.

City of Burien - In April 1995, an interim plan was adopted while the city prepares its comprehensive plan. A public discussion draft comprehensive plan has been circulated, with hearings scheduled for spring 1997 after an official draft has been prepared and released. No amendments have occurred to bring about transportation compatibility with the Airport, as directed by the Updated MTP.

City of Federal Way - Since adoption of their plan in November 1995, no amendments have been adopted. Thus, no amendments have occurred to bring about transportation compatibility with the Airport, as directed by the Updated MTP.

City of Tukwila - Since adoption of their plan in December 1995, no amendments have been adopted. No amendments have occurred to bring about transportation compatibility with the Airport, as directed by the Updated MTP.

(C) Lawsuits and SEPA Appeals

Several legal actions have occurred since the issuance of the Final EIS in February 1996 and are on-going. This section summaries these activities.

In August 1996, the Airport Communities Coalition and its member municipalities filed a suit in King County Superior Court against the PSRC and the Port for "violations of the Growth Management Act (GMA), the State Environmental Policy Act (SEPA) and other laws governing governmental decision-making within the state of Washington". Activities related to this lawsuit are currently underway, including discovery requests and consideration of motions for partial summary judgment filed by the parties.

The Airport Communities Coalition, the City of SeaTac, and two individuals filed administrative appeals with the Port of Seattle's Hearing Examiner challenging the Port's compliance with the Washington State Environmental Policy Act. At the request of certain parties, the Port's Hearing Examiner recused herself from hearing the appeals. The Port has since selected a new hearing examiner.

The applicability of the City of SeaTac regulations to Port development activities at Sea-Tac Airport continues to be subject of negotiation through an interlocal process between the Port and the City of SeaTac. The declaratory judgment lawsuit in King County Superior Court between the Port and City is currently on hold pending these negotiations.

In February 1997, the Port of Seattle brought a petition for review before the Central Puget Sound Growth Management Hearing Board which alleges that the City of Des Moines' Comprehensive Plan amendment in December, 1996 fails to reflect the necessary changes required under Resolution A96-02.

4. CUMULATIVE IMPACTS

One of the primary questions that surfaced in preparing the Draft and Final EIS were requests to clarify how the document treated other non-airport improvements in the area. All of the environmental analysis presented in the Draft and Final EIS reflects a cumulative impact evaluation of the Master Plan Update and several non-aviation related improvements, including:

- *On-Airport Hotel*
- *Des Moines Creek Technology Campus* (DMCTC) with CTI development - during the preparation of this additional environmental analysis, the City of Des Moines and the Port of Seattle discontinued discussions of the DMCTC project. No changes were made in the assumptions associated with development of this site, as it is anticipated that commercial development will occur on the site at some time in the future.
- *City of SeaTac Airport Business Center*
- *Federal Detention Center* is the facility that has been under construction along S. 200th Street, south of Sea-Tac.
- *South Aviation Support Area development* (the Do-Nothing assumes that the site known as SASA is developed for maintenance functions as discussed in the 1994 Final EIS for that project. The Master Plan Update Final EIS and this additional analysis reflects development of this area to support displaced and/or growth in cargo and maintenance facilities.
- *Roadway projects* included in the Transportation Improvement Plan, such as widening International Boulevard, 28th/24th Avenue South improvements, etc.
- *Regional roadway projects*, such as SR 509 Extension and Southern Airport Expressway

In addition, other development is anticipated to occur in the airport area in the future in accordance with the Comprehensive Plans of the individual jurisdictions. Until specific development proposal for these facilities are known, it is not possible to predict the total cumulative impacts.

TABLE 4-1
Page 1 of 4

Seattle - Tacoma International Airport
Supplemental Environmental Impact Statement

PSRC RESOLUTION A-96-02 METROPOLITAN TRANSPORTATION PLAN MITIGATION ACTIONS

Appendix G - Air Transportation Noise Reduction Measures and Implementing and Monitoring Steps

The responsible parties as indicated will agree to pursue additional aircraft noise mitigation for communities surrounding Sea-Tac Airport by implementing the following package of noise reduction measures:

I. <u>THE PORT OF SEATTLE</u>

The Port of Seattle will pass a Port Commission resolution affirming that it agrees to:

A. Evaluate and upgrade its existing noise monitoring system to include the use of approximately 25 noise monitors, develop a schedule for completion by the end of 1998, and thereafter disseminate regular reports to the public using data from the new noise monitoring system to include DNL, SEL and Time Above metrics.

B. Work with the FAA and/or airlines to:

1. Analyze the potential for reducing the use of thrust.
2. Voluntarily minimize the number of flights in the middle of the night (1:30-5:30 am.).
3. Continue to enforce Airport Rules and Regulations to minimize the number of variances for the Nighttime Limitations Program.
4. Work with foreign air carriers to gain cooperation in ensuring that Stage 3 aircraft continue to be used for nighttime international flights.
5. Work with the owners/operators of Stage 2 aircraft under 75,000 pounds to voluntarily limit or eliminate their use.
6. Continue to work to enforce Airport Rules and Regulations to minimize nighttime engine run-ups.

C. Modify its existing contract with noise experts to specifically include the need to review methods of mitigating the impacts of low frequency noise and vibration, and to supply such information to the Port.

D. Design and implement a noise compatible land use plan for Port properties within its current acquisition zone.

E. Complete the "sensitive use" public buildings insulation pilot studies.

F. Seek a public commitment from FAA to evaluate actions needed to prevent apparent violations of the North Flow Nighttime Departure Noise Abatement Procedures to the extent that safety and efficiency allow.

G. In carrying out the Part 150 Study:

1. The Port of Seattle will invite the Regional Council, the FAA, and affected patties to participate, and ensure that they are able to participate actively and constructively, in the Port's upcoming Part 150 study, which will commence in the fall of 1996 and is expected to take two to three years.
2. Part 150 Study participants will be invited to take part in developing the scope of the study, consultant selection, and in all other milestones and products of the project, such as development of noise exposure maps; development of noise reduction and land use compatibility measures; and Port consideration and approval of the program.
3. Items to be considered in developing the scope of the Part 130 Study will include but not necessarily be limited to:
   a. Relocation of run-up areas where daytime engine run-ups occur, to reduce ground-related noise.

TABLE 4-1
Page 2 of 4

Seattle - Tacoma International Airport
Supplemental Environmental Impact Statement

PSRC RESOLUTION A-96-02 METROPOLITAN TRANSPORTATION PLAN MITIGATION ACTIONS

b. Evaluating the potential net benefits of preferential runway use during low activity periods.

c. Evaluating benefits and impacts of changes to departure climb profiles.

d. Analysis of need to adjust Noise Remedy Program boundaries to include those in 65 DNL by the year 2000, provided that the Port will not reduce its established Noise Remedy Program boundaries for currently eligible properties.

e. Evaluating scope, boundaries and funding for public use and multi-family buildings.

4. If, as a result of the Part 150 Study, a proposed noise reduction strategy results in a net improvement but causes a transfer of noise impacts to other communities, the Port of Seattle, Regional Council, FAA and communities affected by airport noise will seek agreement on guidelines or other equitable procedures for dealing fairly with conflicting views and needs of different communities.

5. The Port of Seattle will ask the FAA to include within its Record of Decision on the Master Plan Update Final Environmental Impact Statement the requirement to conduct a Part 130 Study with the goal of assessing needed additional noise abatement and mitigation.

H. School Insulation

1. The Port of Seattle will commit up to $50 million for school insulation.

2. The Port of Seattle will meet with the Highline School District to try to reach agreement on a plan for insulating the District's schools. If direct talks between the District and Port fail to produce agreement on a noise insulation program for the District's schools, the Port may request that the PSRC assist the parties in selecting an independent mediator.

3. The Port will initiate the Highline School District school insulation program consistent with an agreement reached by the District and Port.

4. Once the Port of Seattle completes the sound insulation program for schools affected by aircraft noise exposure of 65 DNL from Sea-Tac International Airport, it will investigate feasibility and funding for insulating schools affected by then current 60-65 DNL aircraft noise exposure from Sea-Tac. Sound insulation must comply with FAA eligibility criteria to achieve measurable noise benefit.

I. Deliver to the Regional Council on or before September 5, 1996, a detailed timetable for carrying out the steps specified in subsections A through H of this section, including (a) defined milestones against which the Port's progress toward completion of those steps may be measured, and (b) a schedule for progression planning, design, and construction of a third runway at Sea-Tac Airport.

II. HIGHLINE SCHOOL DISTRICT-

The Highline School District will:

A. Meet with the Port of Seattle to try to reach agreement on a plan for insulating the District's schools. If direct talks between the District and the Port fail to produce agreement on a noise insulation program for the District's schools, the District may request that the PSRC assist the parties in selecting an independent mediator.

B. Initiate its school insulation program, consistent with an agreement reached with the Port of Seattle.

TABLE 4-1
Page 3 of 4

Seattle - Tacoma International Airport
Supplemental Environmental Impact Statement

PSRC RESOLUTION A-96-02 METROPOLITAN TRANSPORTATION PLAN MITIGATION ACTIONS

III. PUGET SOUND REGIONAL COUNCIL

The Puget Sound Regional Council will:

A. Seek financing to (a) actively participate in the Port's upcoming Part 150 study; (b)undertake a study to evaluate a financing mechanism for the acquisition of incompatible uses as noted in 111-0, below; and conduct surveys as noted in the studies.

B. As part of its Policy and Plan Review process, the PSRC will:
   1. Conduct an initial review of land use plans for areas that are within the 65 Ldn contour, and provide annual review of future changes;
   2. Offer assistance to jurisdictions in finding ways to minimize the introduction of incompatible land uses;
   3. Provide facilitation services, if requested by the Port of Seattle and jurisdictions in the vicinity of Sea-Tac Airport, to reach agreement on ways to redevelop currently incompatible land uses.

C. Upon receipt of a Resolution approved by the Port of Seattle that contains all the items under Port of Seattle Resolution, above, the Executive Director of the PSRC will notify the Executive Board that the Metropolitan Transportation Plan amendment including a third runway at Sea-Tac Airport has taken effect.

D. Encourage King County to continue its efforts to eliminate the two nighttime Alaska Airlines Stage 2 flights from Boeing Field.

E. Seek support for state legislation for state policies regarding land use compatibility around commercial airports, and will seek support for federal legislation to allow use of federally approved funding for insulation and acquisition programs beyond the current federal constraints.

F. Annually convene representatives of the Port of Seattle, FAA, communities affected by airport noise, and other interested parties, to coordinate efforts by all parties to alleviate issues that are undercutting the effectiveness of current noise reduction efforts and eliminate roadblocks to resolving issues, then report on progress to the Executive Board.

G. Undertake a study which evaluates use of a state-financed revolving fund, or other financing mechanism (such as a public/private partnership) for the acquisition of incompatible uses within the 65 DNL to the 75 DNL contour, for conversion to noise compatible non-residential uses. Any such funding mechanism must demonstrate a balance between long-term costs and revenues. The results of the study should he presented to the Executive Board by June 30, 1997.

H. The Regional Council will conduct statistically valid surveys, during and after construction of the third runway, to assess Sea-Tac Airport's effects on such items as noise, transportation/circulation, and land uses in the surrounding communities.

TABLE 4-1

Seattle - Tacoma International Airport
Supplemental Environmental Impact Statement

PSRC RESOLUTION A-96-02 METROPOLITAN TRANSPORTATION PLAN MITIGATION ACTIONS

IV. WASHINGTON STATE DEPARTMENT OF TRANSPORTATION AND TRANSPORTATION COMMISSION

The Washington State Department of Transportation and Transportation Commission will:

A. Seek funding for acceleration of efforts to provide improved higher speed rail service in the I-5 Corridor.

B. Seek legislation similar to-what was approved for general aviation airports during the 1996 session, to provide state policies for land use compatibility around commercial airports.

C. Recommend that the State, in cooperation with appropriate local jurisdictions and regional transportation planing organizations, 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.

V. MONITORING COMPLIANCE

To ensure that measures contained in this Appendix G to the 1993 Metropolitan Transportation Plan are implemented as described, several mechanisms for tracking success and assuring accountability will be implemented. They include:

A. The Port of Seattle will report to the Regional Council twice yearly on progress toward all the efforts encompassed in this action, and

B. King County will report to the Regional Council Executive Board every six months on progress toward eliminating nighttime Stage 2 flights at King County International Airport, and

C. Regional Council staff will report annually to the Executive Board on its participation in the Part 150 Study and, based on its Policy and Plan Review Process, on progress toward minimizing the introduction of incompatible land uses within the 65 Ldn contour.

Source: Puget Sound Regional Council, Resolution A-96-02

CHAPTER 5

ENVIRONMENTAL CONSEQUENCES

This chapter presents an assessment of the environmental impacts of the proposed Master Plan Update improvements using the new forecast prepared by the Port of Seattle, as well as other new data that has become available since publication of the Final EIS in February, 1996. As required by FAA Orders 1050.1D and 5050.4A and the Washington State Environmental Policy Act, the following environmental factors were assessed:

5-1 **Surface Traffic Analysis**

5-2 **Air Quality Impacts**

5-3 **Noise Impacts**

5-4 **Construction Impacts**

5-5 **Biotic Communities, Wetlands, and Floodplains**

5-6 **Land Use Impacts** (Land Use Compatibility, DOT Section 4(f), Archaeological/Cultural and Historical Resources)

5-7 **All Other Impacts** (Prime and Unique Farmland, Social Impacts, Human Health, Induced Socio-Economic Impacts, Water Quality, Coastal Zone Management and Coastal Barriers, Wild and Scenic Rivers, Public Services and Utilities, Earth, Solid Waste, Hazardous Waste and Materials, Energy Supply and Natural Resources, Aesthetics and Urban Design)

The impacts of the alternatives on the environmental factors above were assessed relative to the existing conditions (1993 or 1994 if available) and future years 2000, 2005, and 2010. The Final EIS contains a detailed presentation of the methodology, and resulting analysis prepared based on the Master Plan Update forecast. The Final EIS is hereby incorporated by reference. **Appendix D** of this Supplemental EIS contains an evaluation of possible conditions in year 2020, based on an extrapolation from impacts presented in this chapter. As was noted earlier, projections beyond year 2010 are not reasonably foreseeable in light of the high volatility that has existed in the last few years relative to demand for air travel at Sea-Tac Airport.

Sections of this chapter were revised in preparing the Final Supplemental EIS based on agency and public comments. **Appendix F** contains a summary of the comments received while **Appendix G** contains the comments. The primary changes made to these sections affect Section 5-2 "Air Quality" and Section 5-7 "Other Impacts".

The Final EIS presents a detailed examination of the environmental impacts associated with the Do-Nothing (Alternative 1) and "With Project" alternatives (Alternatives 2 through 4). This Supplemental EIS presents the detailed impacts associated with Alternative 1 (Do-Nothing) and Alternative 3 (Preferred Alternative). As was shown in the Final EIS, very small differences in environmental impacts would occur among the "With Project" alternatives. Impacts associated with Alternative 2 and Alternative 4 were extrapolated based on the material presented in the Final EIS as well as this Supplemental EIS.

A number of reasons were used to identify the Preferred Alternative, as cited in the February 1996 Final EIS (Volume 1, Page II-41):

- Reduces the existing and future disparity between the poor weather and good weather operating capability, enabling dependent parallel arrival streams during poor weather conditions.
- Provides the greatest delay reduction of all alternatives considered. The reduced operating times associated with the implementation of a third parallel runway would result in a substantial cost savings to the airlines. A new parallel runway would have saved the airlines $24 million annually if it had been available for use in 1994. The delays saving is expected to grow to around $59 million per year in 2000 (when aircraft operations were anticipated to be 379,200 operations, which occurred in 1995), and $146 million annually when activity reaches 425,000 operations (which was forecast by the Master Plan to occur near the year 2013 – the new forecasts indicate that this level could now be reached by 2002). As a result, if the runway were available for use in year 2002, the delay savings would compensate for the cost of construction in a 5 year period. If completed later, the pay-back period would be sooner than 5 years.
- The proposed new runway would accommodate 99% of the possible aircraft types for landing which currently use or are anticipated to be operating at Sea-Tac.
- Enables unrestricted departure weights for aircraft departing to the Pacific Rim countries during warm summer weather.
- Provides efficient and flexible landside facilities to accommodate future aviation demand providing the greatest levels of service to air passengers by improving curb-to-terminal and curb-to-gate access, decreased walking distances, and the lowest cost per new aircraft gate.
- Relieves the surface vehicle congestion on the existing terminal drive system.
- Minimizes disruption of commercial development along International Boulevard.
- Enables future expansion of terminal and support facilities in an incremental fashion to accommodate air travel demand as growth occurs.
- Minimizes the disruption to existing airport facilities during the implementation of the proposed improvements.
- Minimizes aircraft push-back and taxiing conflicts as flights enter and exit the terminal area.

None of the reasons for selecting the Preferred Alternative relate to forecast sensitive environmental conditions that differentiated the "With Project" alternatives and the new data would not lead to a different conclusion.

SECTION 5-1

SURFACE TRANSPORTATION

Continued regional population growth will impact the surface transportation system in the vicinity of Sea-Tac Airport regardless of the improvements undertaken at the Airport. This section presents a summary of the detailed surface transportation analysis provided in **Appendix C-1**. Section 5-4 of this chapter of the Supplemental EIS summarizes the construction-related surface transportation impacts.

The surface transportation analysis, using the new forecast shows the following:

- Total Airport traffic is expected to increase from approximately 72,500 vehicles per day in 1994, to approximately 114,000 vehicles per day for the Do-Nothing Alternative (Alternative 1) or approximately 113,300 vehicles per day for the "With Project" in the year 2010. The differences between the Do-Nothing and the "With Project" traffic volumes are primarily associated with the amount of on-airport parking available through each alternative, and how the availability of parking affects vehicular access to the Airport, as listed in **Table 5-1-2**.
- Based on forecast demand, approximately $39.2 million in parking tax revenue will be generated by on-airport parking in Port of Seattle parking facilities by the City of SeaTac parking tax. This tax revenue is programmed in the City's Transportation Improvement Program for improvements necessary to accommodate the Do-Nothing (Alternative 1) traffic levels.
- No significant surface transportation impacts have been identified for the Preferred Alternative in comparison to the Do-Nothing Alternative for any of the evaluated intersections and freeway ramp junctions.
- The Preferred Alternative includes transportation improvement projects to reduce impacts associated with the Master Plan Update improvements. These include intersection improvements at 24th Avenue South/South 154th Street, intersection improvements at International Blvd/South 160th Street.
- The Preferred Alternative would generate an additional 95 PM peak hour trips in the year 2010 over the Do-Nothing Alternative.
- The transportation improvement project that would have the greatest impact on conditions in the Airport area is the construction of the State Route 509 Extension and South Access. Numerous alternatives have been developed and evaluated that range from building a limited access expressway, to using the proposed 24th/28th Avenue South arterial.

(1) METHODOLOGY

The surface transportation analysis is based on detailed level of service calculations at intersections and freeway ramp junctions in the Airport vicinity. These calculations were performed for existing 1994 conditions and for future year conditions, including the years 2000, 2005, and 2010 for the Do-Nothing (Alternative 1) and Preferred Alternatives (Alternative 3). Impacts associated with Alternatives 2 (Central Terminal) and 4 (South Unit Terminal) were extrapolated based on the analysis prepared for the Draft and Final EIS.

For each future year, the level of service results of the Do-Nothing Alternative were separately compared to the level of service results of the "With Project" to identify adverse impacts. An adverse impact is defined as a significant degradation in level of service (defined as a reduction in at least one LOS category) when the "With Project" is compared to the Do-Nothing Alternative.

(A) Level of Service (LOS)

Level of service (LOS) is used to describe the operating conditions at intersections, freeway ramp junctions, or along roadway segments. The level of service is described by the letters ranging from "A" through "F". The highest or most efficient operation is LOS A, which indicates little or no congestion, while LOS F indicates severely congested traffic flow conditions.

The level of service calculations for the Final EIS analysis were performed according to the methodologies presented in the Transportation Research Board's 1985 Highway Capacity Manual for signalized and two-way stop controlled intersections, according to Circular #373 for all-way stop controlled intersections, and according to the methodologies presented in the Transportation Research Board's 1994 Highway Capacity Manual for freeway ramp junctions. The level of service calculations for this revised analysis were performed according to the methodologies presented in the Transportation Research Board's 1994 Highway Capacity Manual for signalized intersections, two-way stop controlled intersections, all-way stop controlled intersections, and freeway ramp junctions. Level of service calculations were performed for peak hour conditions at all relevant intersections and freeway ramp junctions in the Airport vicinity.

Current flight schedules indicate that the Airport's weekday peak period occurs between 11:00 a.m. and 1:00 p.m.[1/] Surface transportation patterns in the vicinity of the Airport peak between 11:00 a.m. and 1:00 p.m., and between 3:00 PM and 6:00 PM.[2/] The afternoon peak reflects the heaviest traffic conditions of the day and the period of peak congestion for the surface transportation system. The hour between 5:00 p.m. and 6:00 p.m. represents the hour of peak congestion for the surface transportation system. Therefore, the level of service calculations were performed for peak hour conditions that occurred between 5:00 p.m. and 6:00 p.m.

(B) Future Traffic Volume Forecasts

The Puget Sound Regional Council (PSRC) is the Metropolitan Planning Organization for the Puget Sound area. The PSRC adopted the 1995 Metropolitan Transportation Plan (MTP), which represents the transportation plan for the entire Puget Sound area. Growth trends are based upon year 1990, 2000, and 2010 traffic forecasts obtained from the PSRC MTP. Airport related traffic used in the analysis presented in this Supplemental EIS is based on the forecasts presented in Chapter 2.

(C) Airport Trip Generation and Travel Patterns

The Airport is a sizable regional traffic generator with an estimated 72,500 annual average vehicle trips per day in 1994. Eight categories of Airport traffic were quantified and described as follows:

1/ *Technical Report No. 4: Facilities Inventory*, p. 5-4, P&D Aviation, Revised August 1994.
2/ *Historical Average Daily Traffic Counts*, City of SeaTac Department of Public Works, 1994.

- Passenger - Traffic on the terminal drive system consisting of short-term and long-term garage parking, passenger drop-offs and pick-ups, courtesy vehicles, shuttles, car rentals, taxis, and transit.
- Passenger Off-Site Parking - Traffic generated by passengers using the off-site parking facilities but not including the courtesy vehicles.
- Airport Employee - Traffic generated by Port of Seattle employees, airline employees, tenants and the remote parking lot shuttle bus.
- Air Cargo - Traffic generated by the air cargo facilities and associated employees.
- Airfield Operations Area (AOA) - Traffic generated by activities within the Airfield Operations Area, including the off-site flight kitchens.
- General Aviation - Traffic generated by general aviation activities and associated employees.
- Aircraft Maintenance - Traffic generated by the Aircraft Maintenance facilities and associated employees.
- Other - Traffic generated by miscellaneous activities such as deliveries to the Airport (non air cargo related).

The trip characteristics of these eight categories of Airport traffic were used to allocate Airport traffic to the various activity centers off-Airport. **Table 5-1-1** summarizes Airport traffic by each category for each year evaluated for both the Final EIS and Supplemental EIS. **Table 5-1-2** summarizes the mode choice patterns of passenger related Airport traffic. **Exhibit 5-1-1** summarizes the regional origin-destination patterns of all Airport related traffic. Further discussion of Airport related trip generation and travel patterns can be found in **Appendix C-1**.

(2) EXISTING CONDITIONS

The following sections summarize the existing surface transportation system and the level of service presently afforded by this system.

(A) Surface Transportation System

The surface transportation system is illustrated in **Exhibit 5-1-3** and further defined in **Appendix C-1**. The 1994 traffic levels represent a combination of data from various sources. Existing 1994 traffic volumes were provided by the City of SeaTac, Washington State Department of Transportation (WSDOT), and collected by field observations. These traffic volumes were then seasonally adjusted to reflect annual average daily traffic (AADT) conditions. WSDOT seasonal adjustment factors were used to adjust these volumes. The 1994 AADT volumes were then compared to the City of SeaTac 1991-1992 traffic volumes,[3] WSDOT 1992 traffic volumes,[4] and the MTP base 1990 traffic volumes to ensure data consistency. The 1994 volumes are shown in **Exhibit 5-1-3**.

(B) Level of Service

Detailed level of service calculations were performed at intersections and freeway ramp junctions in the Airport vicinity. The intersection level of service results are summarized in **Table 5-1-3**, and shown in **Exhibit 5-1-2**. The freeway ramp junction level of service results are summarized in **Appendix C-1**.

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[3] *Comprehensive Transportation Plan Summary Report*, City of SeaTac Department of Public Works and the TRANSPO Group, Inc., 1991.

[4] *1992 Annual Traffic Report*, Washington State Department of Transportation.

According to the City of SeaTac adopted level of service standard,[5] none of the evaluated intersections are currently functioning at an unacceptable level of service. The intersection of International Boulevard/State Route 99 and South 188th Street is functioning at an unacceptable level of service, however, the level of service standard specifically grants an exception at this intersection location.

The surface transportation system has significant peak hour congestion, particularly on the freeway system, mainly due to regional, non-Airport related traffic.

(3) FUTURE CONDITIONS USING THE NEW FORECAST

Using the new forecast described in Chapter 2, the impacts on surface transportation conditions were considered. Several non-airport related transportation improvement projects are planned within the vicinity of the Airport which would impact surface transportation conditions. These improvement projects are shown in **Exhibits 5-1-4 through 5-1-6**, and are described in detail in **Appendix C-1**. These improvements were included in both the Do-Nothing and "With Project" alternatives.

(A) Alternative 1 (Do-Nothing)

Traffic forecasts were performed according to the growth trends obtained from the PSRC MTP and verified against the City of SeaTac's Comprehensive Plan. The forecast AADT volumes are shown in **Exhibit 5-1-3**. Level of service calculations were performed at relevant intersections and freeway ramp junctions in the Airport vicinity.

The intersection level of service results are summarized in **Table 5-1-3**, and shown in **Exhibit 5-1-2**. According to the adopted City of SeaTac level of service standard, a total of three (3) intersections would be functioning at an unacceptable level of service in the year 2000, a total of eight (8) intersections in the year 2005, and a total of nine (9) intersections in the year 2010. The intersections of International Boulevard (also known as SR99) and South 200th Street, International Boulevard and South 188th Street, and Southbound I-5 ramps at South 188th Street were specifically excluded from the City of SeaTac adopted level of service standard.

The freeway ramp junction level of service results are described in detail in **Appendix C-1**.

(B) Alternative 3 (Preferred Alternative - North Unit Terminal)

Chapter 2 provides a detailed description of the actions included in the Preferred Alternative, and the differences between these actions and the Final EIS actions. Traffic forecasts were performed according to the growth trends obtained from the PSRC MTP and verified against the City of SeaTac's Comprehensive Plan. The forecast AADT volumes are shown in **Exhibit 5-1-8**. Level of service calculations were performed at relevant intersections and freeway ramp junctions in the Airport vicinity.

The intersection level of service results are summarized in **Table 5-1-4**, and shown in **Exhibit 5-1-7**. According to the adopted City of SeaTac level of service standard a total of two (2) intersections would be functioning at an unacceptable level of service in the year 2000, a total of four (4) intersections in the year 2005, and a total of seven (7) intersections in the year 2010.

5/ *City of SeaTac Comprehensive Plan*, City of SeaTac, December 1995, Page 3-5

In comparison to the Do-Nothing alternative, the proposed Master Plan Update improvements would improve the level of service at several intersections. These improvements would occur at: five (5) intersections in the year 2000, eight (8) intersections in the year 2005, and at three (3) intersections in year 2010. These improvements would occur for several reasons, including: more long-term passenger parking can be accommodated on-airport under the Preferred Alternative (thus reducing trips off-airport); and the construction of the North Unit Terminal and the South 170th Street access will relieve some of the pressure at the existing South 180th Street access.

The freeway ramp junction level of service results are described in detail in **Appendix C-1**.

(C) Alternative 2 (Central Terminal) and Alternative 4 (South Unit Terminal)

As described previously in Chapter 2, the aviation activity forecasts and the phasing of the proposed improvements have changed since the completion of the Final EIS. The new aviation activity forecasts has essentially accelerated the demand levels at the Airport by five to ten years, which in turn would accelerate the need for development of expanded terminal and landside facilities. As was discussed in the Final EIS, the initial phases of the Master Plan Update improvements are virtually the same under each of the three "With Project" alternatives. As passenger traffic grows, soon after the year 2000 the Port would be required to decide how to accommodate terminal development requirements. The Preferred Alternative would result in the development of a North Unit Terminal, while Alternative 2 would develop a Centralized Terminal or Alternative 4 would call for a South Unit Terminal. The same level of demand would be associated with each terminal concept. The improvements shown in **Exhibits 3-2 and 3-4** constitute these alternatives.

The Final EIS presents a detailed examination of the surface transportation conditions associated with these alternatives. As was shown in Table IV.15-3 of the Final EIS, very small differences in the level of service performance of the intersections would occur between the alternatives, yet the level of delay experienced at various locations would differ. However, as was noted in Chapter 2 of this Supplemental EIS, changes were made to the Preferred Alternative (Alternative 3) as a result of accelerated demand and changes in construction phasing, as well as changes to address surface transportation conditions that could occur at South 24th Ave./South 154th Street and International Blvd/South 160th Street. Similar changes could be made to these other "With Project" alternatives that would eliminate the adverse level of service impacts presented in the Final EIS. As is described in Page II-41 of the Final EIS, a number of reasons lead the Port of Seattle to recommend Alternative 3 as the Preferred Alternative. None of the reasons for identifying the Preferred Alternative relate to off-airport surface transportation conditions that differentiated the "With Project" alternatives.

(4) COMPARISON TO THE MASTER PLAN FORECAST IMPACTS

The primary differences associated with surface traffic conditions, when comparing the analysis in the preceding section to the analysis in the Final EIS, is associated with the aviation activity forecast and the resulting surface traffic levels. When comparing the "With Project" alternatives from the Final EIS to this evaluation, the phasing associated with the proposed improvements is also different, as discussed in Chapter 2. The following sections compare the resulting level of service analysis.

(A) Transportation Improvement Projects

Each year, the transportation agencies must update their transportation improvement project list. These updates can modify existing projects and add new projects. As a result, since publication of the Final EIS, several new or revised transportation improvement projects have been identified to occur in the Airport vicinity. The transportation improvement projects included in the surface transportation analysis are described in detail in **Appendix C- 1**.

(B) Airport Travel Patterns

As described previously in Chapter 2, the new aviation activity forecasts and the phasing of the proposed improvements have changed since the completion of the Final EIS. In addition, more information became available describing the trip generation and distribution patterns of Airport related traffic since publication of the Final EIS. Several types of airport traffic were affected by these changes: passenger off-site parking traffic decreased since better passenger forecast data is available; airport employee traffic decreased since better parking data was available; air cargo traffic decreased due to a corrected error in the trip generation calculations; airfield operations area traffic increased based on new information concerning flight kitchen traffic; and other Airport traffic increased since new traffic data was developed.

(C) Level of Service Analysis

Previously in the Final EIS, the level of service analysis was performed using the 1985 Highway Capacity Manual for signalized and two-way stop controlled intersections, Circular #373 for all-way stop intersections, and the 1994 Highway Capacity Manual for freeway ramp junctions. The level of service analysis contained in this Supplemental Environmental Impact Statement analysis was performed using the 1994 Highway Capacity Manual for signalized, two-way stop controlled, and all-way stop controlled intersection, and freeway ramp junctions. The differences between the methodologies could produce significant changes in the level of service analysis, especially for two-way stop controlled intersections. While the 1994 Highway Capacity Manual was available for the Final EIS, the then newly published manual was not used, as local jurisdictions had not accepted the manual. As is has since been accepted, the methodology was updated to the new manual.

(D) Proposed Improvements

As is discussed in Chapter 2, the accelerated demand could require facilities to be available five to ten years sooner than was identified in the Final EIS. As a result, the analysis presented in this Supplemental EIS shows the impact of the facilities being completed sooner than addressed by the Final EIS. Also, recognizing the impact of accelerated activity levels and projects at certain areas, the two terminal/landside projects were modified to address roadway conditions. First, the completion of the North Employee Lot north of SR 518 would alter surface travel through the intersection of South 154th/24th Avenue South. Therefore, the analysis presented in this document reflects improvements at this intersection to address turning movements and signalization. The development of the North Unit Terminal would close South 170th Street to traffic transiting from eastern SeaTac to western SeaTac. As a result, the Master Plan Update improvement was modified to reflect the additional traffic that would occur through the International Blvd/S. 160th Street intersection, by adding turning lanes and modifying signalization, as noted in Chapter 2. Improvements are noted in the City of SeaTac Transportation Improvement Program for these intersections.

In addition, as the analysis discussed in this Supplemental EIS is through the year 2010, the impacts of the SR 509 Extension and South Airport Access are not presented, as this project is slated to occur after this timeframe.

(5) CUMULATIVE IMPACTS

As is identified in Chapter 4 "Affected Environment" a number of non-Airport related developments are anticipated in the Airport vicinity. These actions are likely to affect surface transportation volumes in the Airport area. As additional surface traffic would occur, increased congestion beyond those forecast by this analysis may result. However, until specific projects are proposed for these developments, the total cumulative impacts can not be identified. The roadway project that is likely to have the greatest impact on conditions in the Airport area is the construction of the State Route 509 Extension and Southern Airport Expressway. This roadway is not likely to be completed until after the year 2010, and therefore was not included in this revised analysis. In addition, other regional and local initiatives are under study to increase vehicle occupancy. These initiatives should assist in reducing roadway congestion.

(5) MITIGATION

Mitigation is proposed for each adverse impact that would occur with the Preferred Alternative. An adverse impact is defined as a significant degradation in level of service (reducing the level of service by one or more LOS categories) when compared to the Do-Nothing alternative.

(A) Do-Nothing Alternative

There are a number of commercial parking lots located within the City of SeaTac that primarily serve passengers using the Airport. This includes the privately owned commercial parking lots located along the International Boulevard/State Route 99 corridor, as well as the commercial parking lots operated by the Port of Seattle on-airport. The City of SeaTac has adopted a parking tax which collects revenues from these commercial parking lots. This parking tax contributes towards the programmed transportation improvements necessary to accommodate the continued growth of the Airport-related traffic.

The City of SeaTac collected approximately $2.3 million in parking tax revenue in 1996; approximately $2.0 million from the Port of Seattle, and approximately $0.3 million from the commercial parking lots along the International Boulevard. Between 1994 and the year 2010 it is anticipated that the City of SeaTac will collect approximately $45.0 million in parking tax revenue; approximately $39.2 million from the Port of Seattle, and approximately $5.8 million from the commercial parking lots. The Port of Seattle's $39.2 million contribution provides mitigation for the impacts associated with the continued growth of the Airport, as defined by the Do-Nothing Alternative.

(B) Preferred Alternative

No significant adverse changes in LOS were identified as a result of the Preferred Alternative for any of the evaluated intersections and freeway ramp junctions in the Airport vicinity for the year 2000, 2005, and 2010 conditions. A detailed discussion of the impact analysis is included in **Appendix C-1**.

(C) Transportation Impact Fees

The City of SeaTac has adopted a developer impact fee to offset the cost of transportation improvement projects necessary to accommodate the growth of new developments. Since the Preferred Alternative would enable the Airport to accommodate levels of passenger and aircraft operations above the capacity of the existing system, the Preferred Alternative could be subject to the developer impact fees, depending upon the outcome of jurisdictional negotiations currently underway between the City of SeaTac and the Port of Seattle. The current City of SeaTac developer impact fee is defined as $773 per additional PM peak hour trip. The difference in PM peak hour trips between the Preferred and Do-Nothing Alternatives would be considered additional PM peak hour trips. However, since the City of SeaTac collects impact fees only for additional PM peak hour trips on their roadway facilities, the additional PM peak hour trips on the Airport Expressway would not be considered for the developer impact fee. The total PM peak hour trips generated by the Airport is summarized in **Table 5-1-5**, in addition to type of Airport traffic, and access route for the future year 2010 condition. The Preferred Alternative would generate less total traffic in the year 2010 but generate more trips on City of SeaTac roadway facilities. These additional 95 PM peak hour trips could equate to developer impact fees of $73,435.00.

(D) Transportation Demand Management

The purpose of Transportation Demand Management (TDM) strategies is to reduce the travel demand by either encouraging the use of high occupancy vehicles (i.e. transit and carpools), or discouraging single-occupant vehicle trips. TDM strategies typically target such groups as employees, or an urban area. The Port of Seattle is currently considering the use of several TDM strategies described in P&D Aviation's International Boulevard Access Study and Travel Demand Management Mitigation Policies Report. Two general types of TDM strategies were discussed in this report and are described as follows:

- Employee Based TDM Strategies - These TDM strategies aim to reduce peak hour traffic by reducing peak hour employee commute trips. These strategies can be implemented voluntarily or as part of the mandated Commute Trip Reduction program.

- Regional or Areawide TDM Strategies - These TDM strategies aim to reduce the number of single-occupant vehicle passenger trips within the Terminal area. These strategies have the most potential benefit since passenger traffic represents approximately 80 percent of the total Airport traffic.

Specific TDM measures are not included in the proposed Master Plan Update for either employee or passenger demand volumes. The Port of Seattle is currently participating in the Commute Trip Reduction Program as an employee TDM measure; and has received an award from the State of Washington for its success for the last two consecutive years. The Port of Seattle supports the proposed RTA system as a regional TDM measure, and is currently coordinating with the RTA board and the City of SeaTac to determine the location of the Airport light-rail station. The Port of Seattle is also coordinating with the City of SeaTac to determine the feasibility of the City's proposed Personal Rapid Transit (PRT) system. While the proposed improvements are not anticipated to have a significant impacts on the regional surface transportation system, it is anticipated that the Port of Seattle would continue to aggressively pursue TDM policies to reduce travel demand at the Airport.

(E) State Route 509 and South Access

Issues surrounding the State Route 509 extension project and an Airport South Access have been discussed among the Port of Seattle and the surrounding southwestern King County communities for quite some time. State Route 509 was originally adopted by the Washington State Transportation Commission in 1957 as a limited-access highway between Seattle and Tacoma. Construction from the northern terminus began in the 1960s in South Seattle, and ended in the 1970s at South 188th Street. WSDOT did not finish the construction of the proposed highway due to rising costs, limited federal and state highway construction funds, and local government opposition to the project.

In 1992 the WSDOT took the lead for several local agencies (Cities of SeaTac, Des Moines, King County, and the Port of Seattle) to begin the State Route 509 Extension/South Access Road Corridor Environmental Impact Study.[6] A technical Steering Committee, composed of representatives from member agencies, was organized to direct the EIS consultant team. An Executive Committee, composed of elected and appointed officials from member agencies, provided direction on policy decisions and would select the preferred corridor alignment. The Federal Highway Association (FHWA) must approve and the Washington Transportation Commission must adopt the preferred corridor alternative before a more in-depth project-level analysis can be completed. The corridor programmatic Draft EIS has been completed and was issued in December, 1995. Each of the "build" alternatives analyzed in that Draft EIS include the extension of State Route 509 to Interstate 5, and the construction of the South Access roadway as a limited access expressway that connects the Airport's terminal drive system with State Route 509. A project level EIS is planned to be completed in early 1998.

Over the past few years the Puget Sound Regional Council has been updating the Metropolitan Transportation Plan (MTP).[7] The adopted 1995 MTP includes both the State Route 509 extension and South Access roadway projects to be completed by the year 2020.

All of these plans and studies were based on two general developments assumptions: the forecast passenger activity levels at the Airport; and the proposed urban development south of the Airport along the 28th/24th Avenue South corridor. These development assumptions are summarized by plan or study as follows:

- **SeaTac Area Update (1989)** - This plan forecast a 190 acre business park along the 28th/26th Avenue South corridor which would generate approximately 30,000 to 50,000 average weekday trips. It was also assumed that 40 percent of Airport traffic would utilize the South Access roadway.

- **South Access Roadway Study (1990)** - This plan forecast a 6 million gross square foot (gsf) business park along the 28th/24th Avenue South corridor which would generate approximately 60,000 to 80,000 average weekday trips. Airport activity levels were also forecast at 38 million annual passengers by the year 2010. According to that report 149,000 average weekday trips, of which approximately 40 percent, or 59,600 average weekday trips, would utilize the South Access roadway.

- **City of SeaTac Comprehensive Transportation Plan (1994)** - This plan forecast a 2-3 million gsf combined commercial/industrial/retail development along the 28th/24th Avenue South corridor which would generate approximately 34,000 average weekday trips.

- **Seattle-Tacoma International Airport Master Plan Update (1996)** - The Master Plan Update[8] forecast 23.8 Million Annual Passengers (MAP) by the year 2000 (11.9 million enplaned passengers), 27.2 MAP (13.6 million enplaned passengers) by the year 2005, and 30.6 MAP (15.3 million enplanements) by the year 2010. The new forecast indicates that demand for air travel could reach 27.4 MAP by 2000, 31.4 MAP by 2005, and 35.8 MAP by 2010. This level of activity would generate approximately 88,700 annual average weekday vehicle trips within the terminal area by the year 2010.

Differences between these development assumptions have led to several different proposed alignments and configurations for the South Access roadway. These development assumptions will also continue to evolve with land use decisions concerning the South

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6/ *State Route 509 Extension/South Access Road Corridor Study,* King County, SeaTac, Des Moines, Kent, December 1995.

7/ *1995 Metropolitan Transportation Plan: The Transportation Element of VISION 2020, the Region's Adopted Growth and Transportation Strategy,* , Puget Sound Regional Council, May 25 1995.

8/ *Technical Report No.2: Preliminary Forecast Report,* Port of Seattle, 1994.

Aviation Support Area,[9] the Des Moines Creek Technology Campus,[10] and other local development. However, there are two alternate options for the South Access roadway described as follows:

- The construction of two separate roadway facilities: the construction of a principal arterial along the 24th/28th Avenue South corridor to accommodate the forecast urban development; and the construction of a separate limited access expressway for the Airport to accommodate forecast Airport passenger activity.

- The construction of a combined facility along the 24th/28th Avenue South corridor to accommodate both the forecast urban development, and the forecast Airport passenger activity.

Until the Federal Highway Administration and the Washington Transportation Commission approve and adopt a preferred alignment for the SR 509 Extension/South Access, the exact alignment and configuration would not be known.

9/ *South Aviation Support Area Final Environmental Impact Statement,* Port of Seattle, March 1994.

10/ *Des Moines Creek Technology Campus Final Environmental Impact Statement,* CH2M Hill, May 1995.

TABLE 5-1-1

Seattle-Tacoma International Airport
Supplemental Environmental Impact Statement

AIRPORT TRAFFIC SUMMARY

WITH THE NEW FORECAST (Supplemental EIS)

Airport Traffic Description	1994 Existing (AADT)	Do-Nothing Alternative			Preferred Alternative		
		2000 (AADT)	2005 (AADT)	2010 (AADT)	2000 (AADT)	2005 (AADT)	2010 (AADT)
Passenger	58,200	69,000	77,000	85,600	69,000	77,100	88,700
Passenger Off-Site Parking	880	2,100	3,540	5,280	1,040	1,180	1,320
Airport Employee	4,310	5,440	6,150	7,200	5,440	6,150	7,200
Air Cargo	4,170	5,200	6,340	7,490	5,200	6,340	7,490
Airfield Operations Area	1,460	1,690	1,840	1,900	1,690	1,840	2,010
General Aviation	100	100	100	100	100	100	100
Maintenance	3,190	6,080	6,270	6,270	3,190	4,730	6,270
Other	200	200	200	200	200	200	200
Totals	**72,510**	**89,810**	**101,440**	**114,040**	**85,860**	**97,640**	**113,290**

WITH THE MASTER PLAN UPDATE FORECAST (Final EIS)

Airport Traffic Description	1994 Existing (AADT)	Do-Nothing Alternative			Preferred Alternative		
		2000 (AADT)	2005 (AADT)	2010 (AADT)	2000 (AADT)	2005 (AADT)	2010 (AADT)
Passenger	58,200	64,200	N/A	79,300	64,200	N/A	80,300
Passenger Off-Site Parking	1,160	2,570	N/A	6,740	1,290	N/A	1,670
Airport Employee	6,410	7,140	N/A	8,540	7,140	N/A	8,540
Air Cargo	4,450	6,000	N/A	7,930	6,000	N/A	7,930
Airfield Operations Area	1,460	1,630	N/A	1,740	1,630	N/A	1,740
General Aviation	60	65	N/A	70	65	N/A	70
Maintenance	3,190	4,730	N/A	6,270	3,190	N/A	4,730
Other	100	130	N/A	160	130	N/A	160
Totals	**75,030**	**86,465**	N/A	**110,750**	**83,645**	N/A	**105,140**

- Passenger - Traffic on the terminal drive system consisting of short-term and long-term garage parking, passenger drop-offs and pick-ups, courtesy vehicles, shuttles, car rentals, taxis, and transit.
- Passenger Off-Site Parking - Traffic generated by passengers using the off-site parking facilities but not including the courtesy vehicles.
- Airport Employee - Traffic generated by Port employees, airline employees, tenants and the remote parking lot shuttle bus.
- Air Cargo - Traffic generated by the air cargo facilities and associated employees.
- Airfield Operations Area (AOA) - Traffic generated by activities within the AOA, including the off-site flight kitchens.
- General Aviation - Traffic generated by general aviation activities and associated employees.
- Maintenance - Traffic generated by the Aircraft Maintenance facilities and associated employees.
- Other - Traffic generated by miscellaneous activities such as deliveries to the Airport (non air cargo related).

Source: P&D Aviation and INCA Engineers, Inc.,Final EIS, Appendix O, Table O-B-1 and Appendix C-1, January 1997

AADT = Average Annual Daily Traffic

TABLE 5-1-2

Seattle-Tacoma International Airport
Supplemental Environmental Impact Statement

PASSENGER MODE CHOICE PATTERNS

Passenger Mode of Access		1994 Existing	Do-Nothing Alternative			Preferred Alternative		
			2000	**2005**	**2010**	**2000**	**2005**	**2010**
Curb Side (Drop-Off/Pick-Up)	Arriving	16.0%	16.0%	16.0%	16.0%	16.0%	16.0%	16.0%
	Departing	33.0%	33.0%	33.0%	30.0%	33.0%	33.0%	30.8%
Courtesy Buses	Arriving	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%
	Departing	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%
Taxis	Arriving	4.7%	4.7%	4.7%	4.7%	4.35%	4.35%	4.35%
	Departing	4.7%	4.7%	4.7%	4.7%	4.35%	4.35%	4.35%
For-Hire Vans	Arriving	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
	Departing	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
METRO Transit	Arriving	2.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
	Departing	2.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
RTA	Arriving	None	None	None	None	None	None	None
	Departing	None	None	None	None	None	None	None
Scheduled Buses	Arriving	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%
	Departing	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%
Short-Term Parking	Arriving	26.0%	26.0%	26.0%	26.0%	26.0%	26.0%	26.0%
	Departing	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%
Long-Term Parking	Arriving	19.0%	16.0%	15.0%	14.0%	18.35%	18.35%	18.35%
	Departing	19.0%	16.0%	15.0%	14.0%	18.35%	18.35%	18.35%
Car Rentals	Arriving	17.1%	17.1%	16.1%	15.1%	17.1%	17.1%	17.1%
	Departing	17.1%	17.1%	16.1%	15.1%	17.1%	17.1%	17.1%
Off-Site Parking	Arriving	2.0%	4.0%	6.0%	8.0%	2.0%	2.0%	2.0%
	Departing	2.0%	4.0%	6.0%	8.0%	2.0%	2.0%	2.0%
Charter Buses	Arriving	3.6%	3.6%	3.6%	3.6%	3.6%	3.6%	3.6%
	Departing	3.6%	3.6%	3.6%	3.6%	3.6%	3.6%	3.6%
Other Buses	Arriving	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%
	Departing	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%
Total Forecast Passengers *	**Arriving**	**22,100**	**26,200**	**29,500**	**33,000**	**26,200**	**29,500**	**33,000**
	Departing	**21,900**	**26,200**	**29,500**	**33,000**	**26,200**	**29,500**	**33,000**
	Total	**44,000**	**52,400**	**59,000**	**66,000**	**52,400**	**59,000**	**66,000**

Source: P&D Aviation and INCA Engineers, Inc., January 1997.

TABLE 5-1-3

Seattle-Tacoma International Airport
Supplemental Environmental Impact Statement

DO-NOTHING ALTERNATIVE
INTERSECTION LEVEL OF SERVICE SUMMARY

Evaluated Intersection	1994 Exist.	Do-Nothing (Alternative 1)					
		New Forecast			Master Plan Forecast		
		2000	2005	2010	2000	2005	2010
24th Ave S. / Perimeter Rd & S. 154th St	B	C	C	D	C	n/a	D
28th Avenue S. & S. 188th St.	B	C	C	D	B	n/a	F
28th Avenue S. & S. 192nd St.	A	B	B	B	B	n/a	B
28th Avenue S. & S. 200th St.	A	F	C	C	C	n/a	F
Air Cargo Rd & S.160th St.	A	B	B	B	B	n/a	B
Air Cargo Road & S. 170th St.	C	D	F	F	D	n/a	F
Air Cargo Road & SB Airport Expressway Ramps	B	B	B	B	E	n/a	B
Des Moines Memorial Dr S. & Marine View Dr	B	B	B	B	B	n/a	B
Des Moines Memorial Dr S. & S. 156th St	B	B	C	C	C	n/a	C
Des Moines Memorial Dr S. & S. 160th St.	B	B	B	B	B	n/a	B
Des Moines Memorial Dr S. & S. 188th St.	C	C	B	C	B	n/a	B
Des Moines Memorial Dr S. & S. 200th St.	B	D	D	D	B	n/a	B
International Blvd & Kent-Des Moines Rd.	D	E	F	F	D	n/a	F
International Boulevard & S. 180th St.	C	C	D	E	C	n/a	D
International Boulevard & S. 154th St.	D	D	F	F	D	n/a	F
International Boulevard & S. 160th St.	C	D	E	F	D	n/a	E
International Boulevard & S. 170th St.	E	F	F	F	F	n/a	F
International Boulevard & S. 176th St.	C	C	C	C	C	n/a	C
International Boulevard & S. 188th St.	F	F	F	F	F	n/a	F
International Boulevard & S. 192nd St.	B	D	D	E	C	n/a	D
International Boulevard & S. 200th St.	D	F	F	F	E	n/a	F
Military Road S & S 200th St. / SB I-5 Ramps	B	D	F	F	E	n/a	F
Military Road S. & NB Interstate 5 Ramps	A	B	D	E	B	n/a	E
Military Road S. & S. 188th St.	D	D	F	F	D	n/a	F
NB Airport Expressway Ramps & S. 170th St	A	A	A	B	D	n/a	B
NB Interstate 5 Ramps & S. 188th St.	C	D	F	F	D	n/a	F
NB SR 509 Ramps / 5th Pl. S & S 160th St	A	A	A	B	n/a	n/a	n/a
NB State Route 509 Ramps & State Route 518	A	A	A	A	A	n/a	A
SB I-5 Ramps & Kent-Des Moines Rd./SR 516	D	F	F	F	E	n/a	F
SB Interstate 5 Ramps & S. 188th St.	C	C	D	F	C	n/a	E
SB SR 509 Ramps & S. 160th St.	A	A	A	A	D	n/a	E
SB State Route 509 Off-Ramp & S. 188th St.	A	A	A	A	B	n/a	C
SB State Route 509 Ramps & State Route 518	B	B	C	C	B	n/a	C

SB = Southbound, NB = Northbound, WB = Westbound, EB = EastBound, SR = State Route, n/a = Not Evaluated.

Source: INCA Engineers, Inc., January 1997.

TABLE 5-1-4

Seattle-Tacoma International Airport
Supplemental Environmental Impact Statement

PREFERRED ALTERNATIVE
INTERSECTION LEVEL OF SERVICE SUMMARY

Evaluated Intersection	1994 Exist.	Preferred Alternative (Alternative 3)					
		New Forecast			Master Plan Forecast		
		2000	2005	2010	2000	2005	2010
20th Ave S. & EB SR 518 Ramps	N/C	N/C	B	B	n/a	n/a	B
20th Ave S. & S. 154th/156th St.	N/C	N/C	B	B	n/a	n/a	B
20th Ave S. & WB SR 518 Ramps	N/C	N/C	B	B	n/a	n/a	B
24th Ave S. / Perimeter Rd & S. 154th St.	B	C	C	C	C	n/a	D
28th Ave S. & S. 188th St.	B	B	C	D	B	n/a	D
28th Ave S. & S. 192nd St.	A	A	B	B	B	n/a	B
28th Ave S. & S. 200th St.	A	B	B	C	C	n/a	F
Air Cargo Rd & S. 160th St.	A	B	B	B	B	n/a	B
Air Cargo Rd & S. 170th St.	C	D	N/C	N/C	D	n/a	N/C
Air Cargo Rd & SB Airport Expressway Ramps	B	B	N/C	N/C	E	n/a	N/C
Des Moines Mem. Dr S. & Marine View Dr	B	B	B	B	B	n/a	B
Des Moines Memorial Dr S. & S. 200th St.	B	D	C	D	B	n/a	B
Des Moines Memorial Drive S. & S. 156th St.	B	B	C	C	B	n/a	B
Des Moines Memorial Drive S. & S. 160th St.	B	B	B	B	B	n/a	B
Des Moines Memorial Drive S. & S. 188th St.	C	C	B	C	B	n/a	B
International Blvd & Kent-Des Moines Rd.	D	E	E	F	D	n/a	F
International Blvd / SR 99 & S. 154th St.	D	D	E	F	D	n/a	D
International Blvd / SR 99 & S. 160th St.	C	D	C	D	C	n/a	F
International Blvd / SR 99 & S. 170th St.	E	F	F	F	F	n/a	F
International Blvd / SR 99 & S. 176th St.	C	C	C	C	C	n/a	C
International Blvd / SR 99 & S. 180th St.	C	C	B	B	C	n/a	A
International Blvd / SR 99 & S. 188th St.	F	F	F	F	F	n/a	F
International Blvd / SR 99 & S. 192nd St.	B	C	D	D	C	n/a	C
International Blvd / SR 99 & S. 200th St.	D	F	F	F	E	n/a	F
Military Road S & S 200th St. / SB I-5 Ramps	B	D	F	F	D	n/a	F
Military Road S. & NB Interstate 5 Ramps	A	B	C	E	B	n/a	E
Military Road S. & S. 188th St.	D	D	E	F	D	n/a	F
NB Airport Expressway Ramps & S. 170th St.	A	A	N/C	N/C	D	n/a	N/C
NB Interstate 5 Ramps & S. 188th St.	C	D	F	F	D	n/a	F
NB SR 509 Ramps & SR 518	A	A	A	A	A	n/a	A
NB SR 509 Ramps / 5th Place S & S 160th St.	A	A	A	B	D	n/a	D
SB I-5 Ramps & Kent-Des Moines Rd.	D	F	F	F	E	n/a	F
SB Interstate 5 Ramps & S. 188th St.	C	B	D	F	C	n/a	E
SB SR 509 Off-Ramp & S. 188th St.	A	A	A	A	B	n/a	C
SB SR 509 Ramps & S. 160th St.	A	A	A	A	E	n/a	E
SB SR 509 Ramps & SR518	B	B	C	C	B	n/a	C

n/a - not evaluated

SB = Southbound, NB = Northbound, WB = Westbound, EB = EastBound, SR = State Route, N/C - Not Constructed

Source: INCA Engineers, Inc., January 1997.

TABLE 5-1-5

Seattle-Tacoma International Airport
Supplemental Environmental Impact Statement

**YEAR 2010 PM PEAK HOUR
AIRPORT TRAFFIC SUMMARY**

Airport Traffic	Do-Nothing Alternative			Preferred Alternative		
	Airport Expressway	Other Route	Total	Airport Expressway	Other Route	Total
Passenger	3,262	1,301	4,563	2,699	1,667	4,366
Off-Site Parking	N/A	374	374	N/A	92	92
Airport Employee	N/A	279	279	N/A	279	279
Air Cargo	N/A	521	521	N/A	521	521
Airfield Operations Area	N/A	190	190	N/A	201	201
General Aviation	N/A	17	17	N/A	17	17
Aircraft Maintenance	N/A	273	273	N/A	273	273
Other	N/A	20	20	N/A	20	20
Totals	**3,262**	**2,975**	**6,237**	**2,699**	**3,070**	**5,769**

Source: INCA Engineers, Inc., January 1997.

TABLE 5-1-6

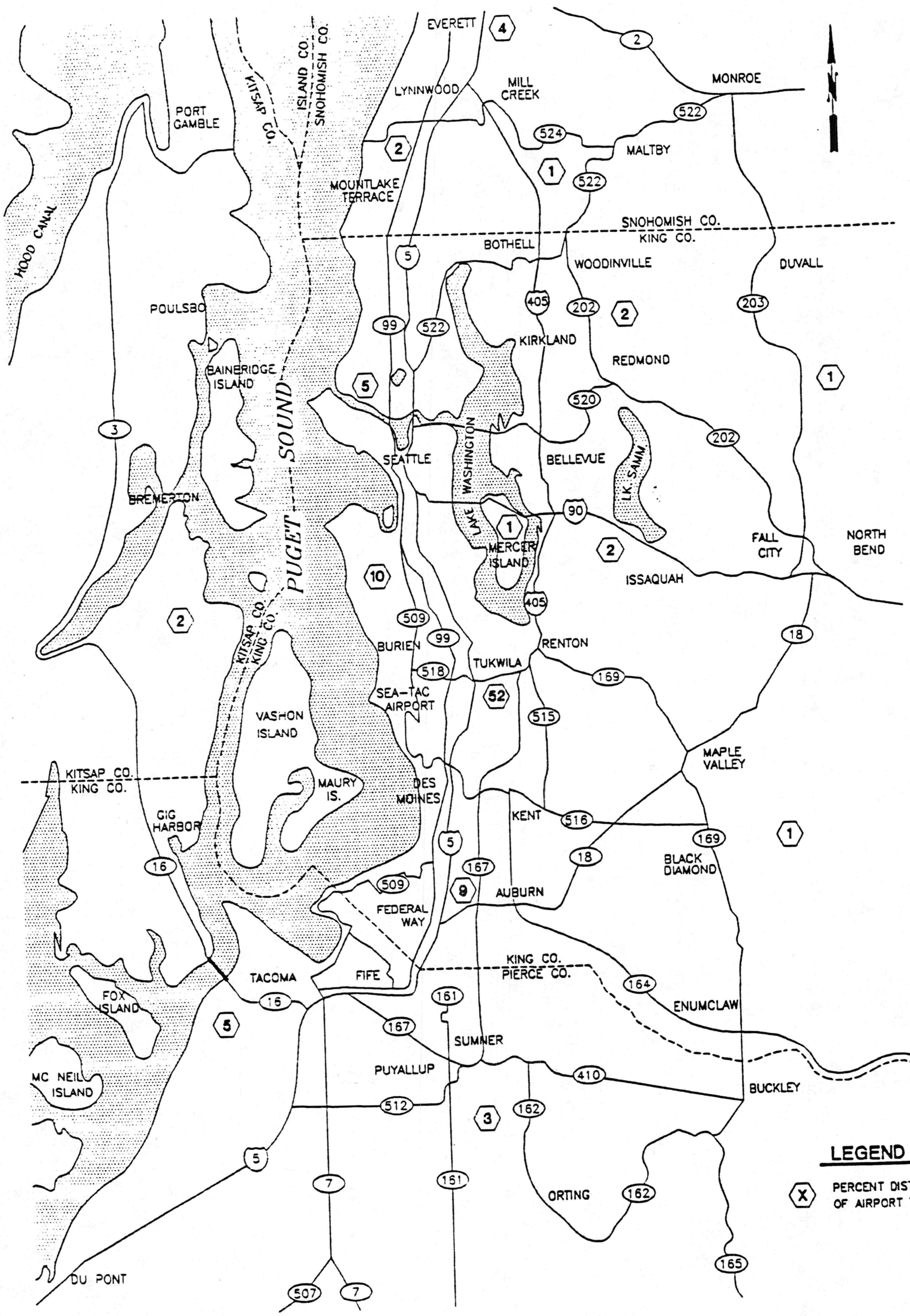
Seattle-Tacoma International Airport
Supplemental Environmental Impact Statement

COMPARISON OF DO-NOTHING TO PREFERRED ALTERNATIVE INTERSECTION LEVEL OF SERVICE SUMMARY

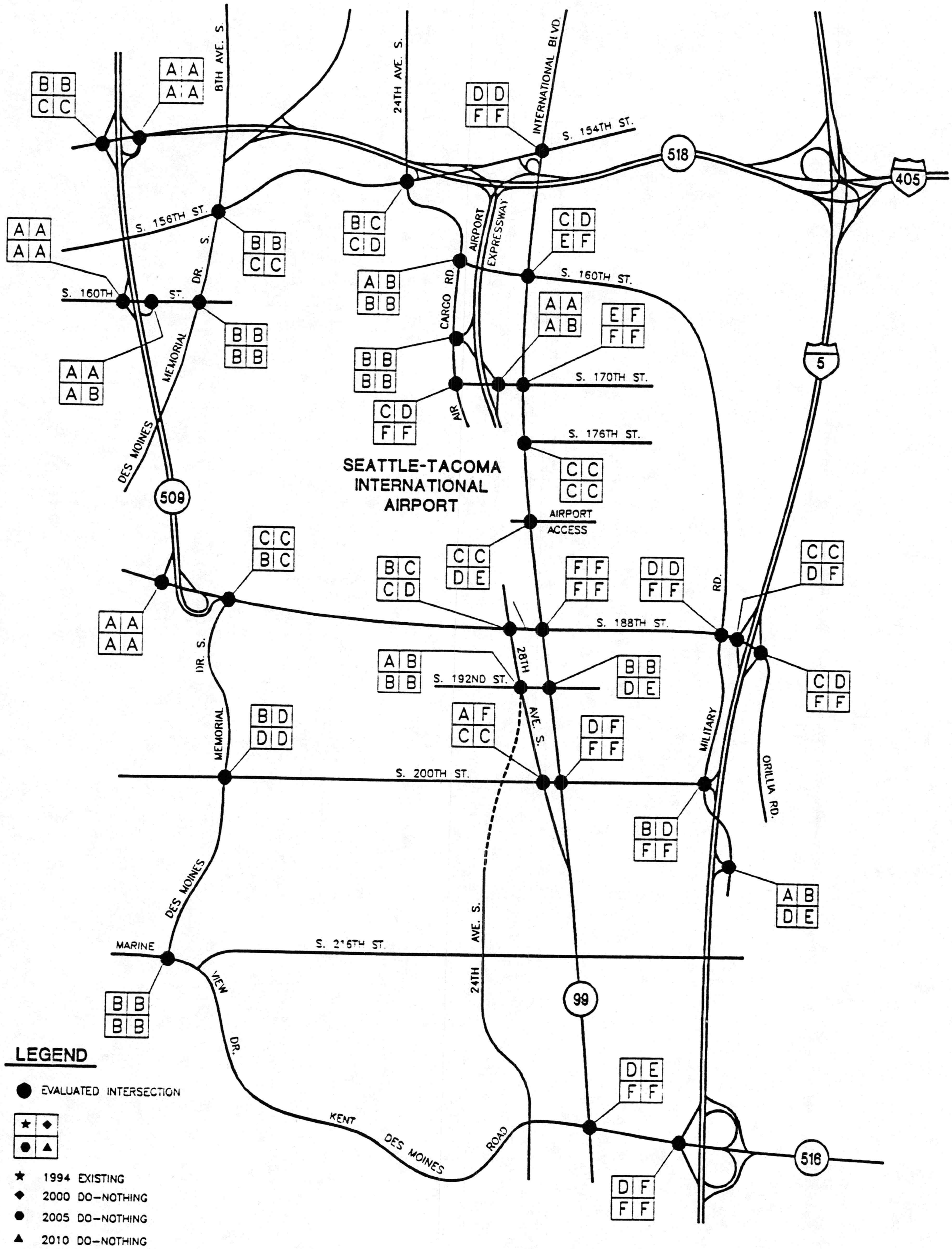
Evaluated Intersection	NEW FORECAST					
	Do-Nothing			Preferred Alternative		
	2000	2005	2010	2000	2005	2010
20th Ave S. & EB SR 518 Ramps	N/C	N/C	N/C	N/C	B	B
20th Ave S. & S. 154th/156th St.	N/C	N/C	N/C	N/C	B	B
20th Ave S. & WB SR 518 Ramps	N/C	N/C	N/C	N/C	B	B
24th Ave S. / Perimeter Rd & S. 154th St	C	C	D	C	C	C
28th Avenue S. & S. 188th St.	C	C	D	B	C	D
28th Avenue S. & S. 192nd St.	B	B	B	A	B	B
28th Avenue S. & S. 200th St.	F	C	C	B	B	C
Air Cargo Rd & S.160th St.	B	B	B	B	B	B
Air Cargo Road & S. 170th St.	D	F	F	D	N/C	N/C
Air Cargo Road & SB Airport Expressway Ramps	B	B	B	B	N/C	N/C
Des Moines Memorial Dr S. & Marine View Dr	B	B	B	B	B	B
Des Moines Memorial Dr S. & S. 156th St	B	C	C	B	C	C
Des Moines Memorial Dr S. & S. 160th St.	B	B	B	B	B	B
Des Moines Memorial Dr S. & S. 188th St.	C	B	C	C	B	C
Des Moines Memorial Dr S. & S. 200th St.	D	D	D	D	C	D
International Blvd & Kent-Des Moines Rd.	E	F	F	E	E	F
International Boulevard & S. 180th St.	C	D	E	C	B	B
International Boulevard & S. 154th St.	D	F	F	D	E	F
International Boulevard & S. 160th St.	D	E	F	D	C	D
International Boulevard & S. 170th St.	F	F	F	F	F	F
International Boulevard & S. 176th St.	C	C	C	C	C	C
International Boulevard & S. 188th St.	F	F	F	F	F	F
International Boulevard & S. 192nd St.	D	D	E	C	D	D
International Boulevard & S. 200th St.	F	F	F	F	F	F
Military Road S & S 200th St. / SB I-5 Ramps	D	F	F	D	F	F
Military Road S. & NB Interstate 5 Ramps	B	D	E	B	C	E
Military Road S. & S. 188th St.	D	F	F	D	E	F
NB Airport Expressway Ramps & S. 170th St	A	A	B	A	N/C	N/C
NB Interstate 5 Ramps & S. 188^{th} St.	D	F	F	D	F	F
NB SR 509 Ramps / 5th Pl. S & S 160th St	A	A	B	A	A	A
NB State Route 509 Ramps & State Route 518	A	A	A	A	A	B
SB I-5 Ramps & Kent-Des Moines Rd./SR 516	F	F	F	F	F	F
SB Interstate 5 Ramps & S. 188th St.	C	D	F	B	D	F
SB SR 509 Ramps & S. 160th St.	A	A	A	A	A	A
SB State Route 509 Off-Ramp & S. 188th St.	A	A	A	A	A	A
SB State Route 509 Ramps & State Route 518	B	C	C	B	C	C

SB = Southbound, NB = Northbound, WB = Westbound, EB = EastBound, SR = State Route, N/C = Not Constructed.

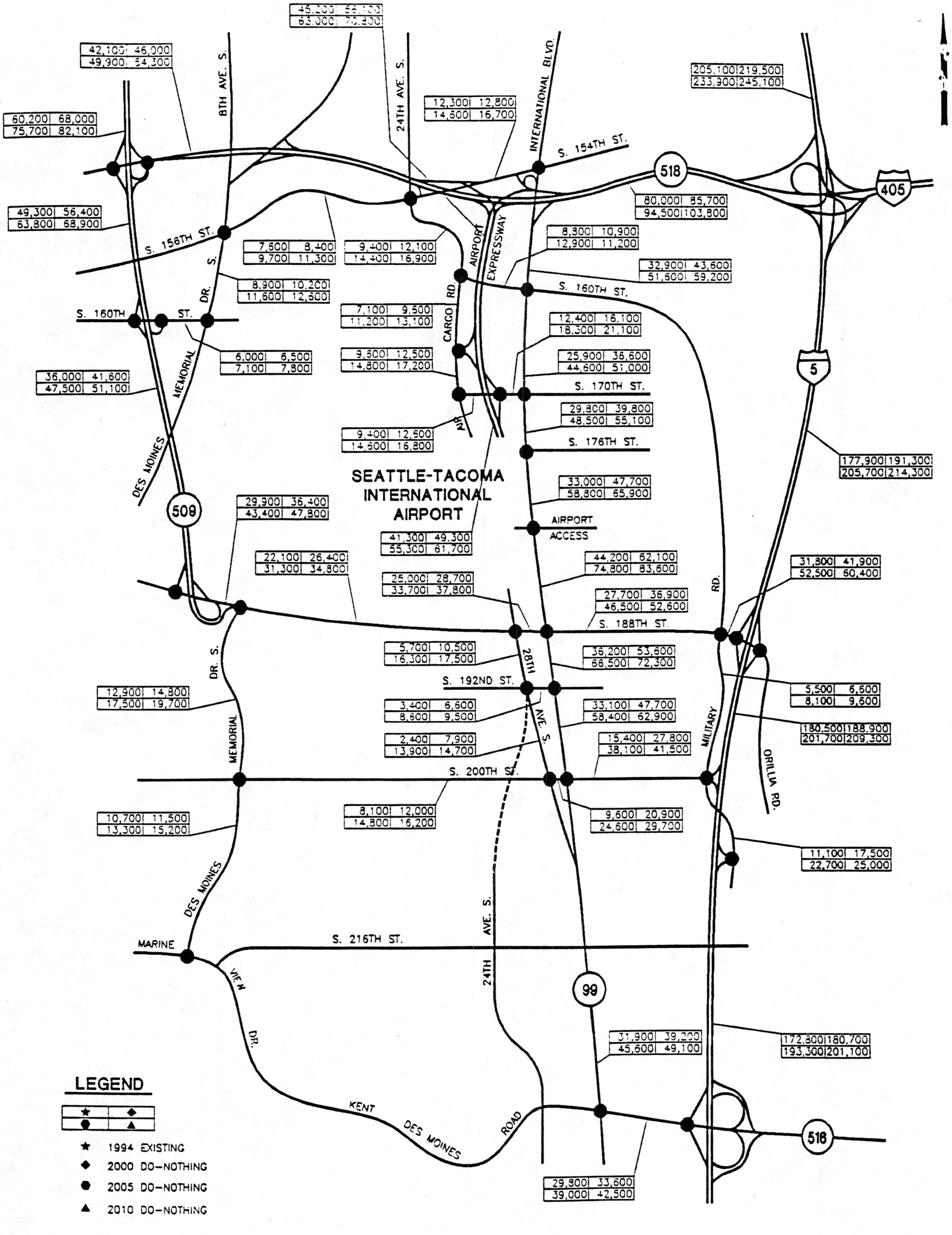
Source: INCA Engineers, Inc., January 1997.



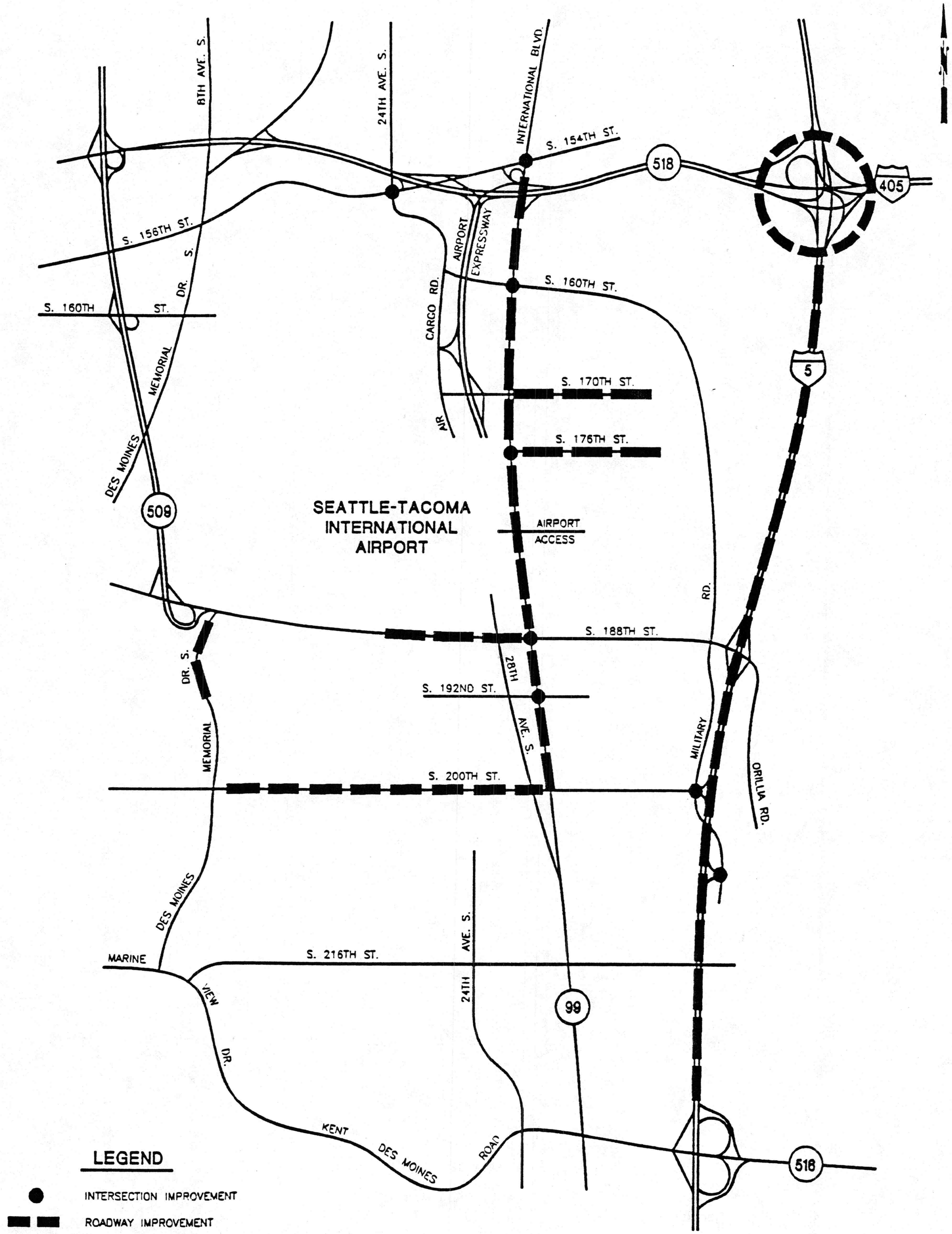
Seattle-Tacoma International Airport	REGIONAL ORIGIN DESTINATION PATTERNS	EXHIBIT: 5-1-1



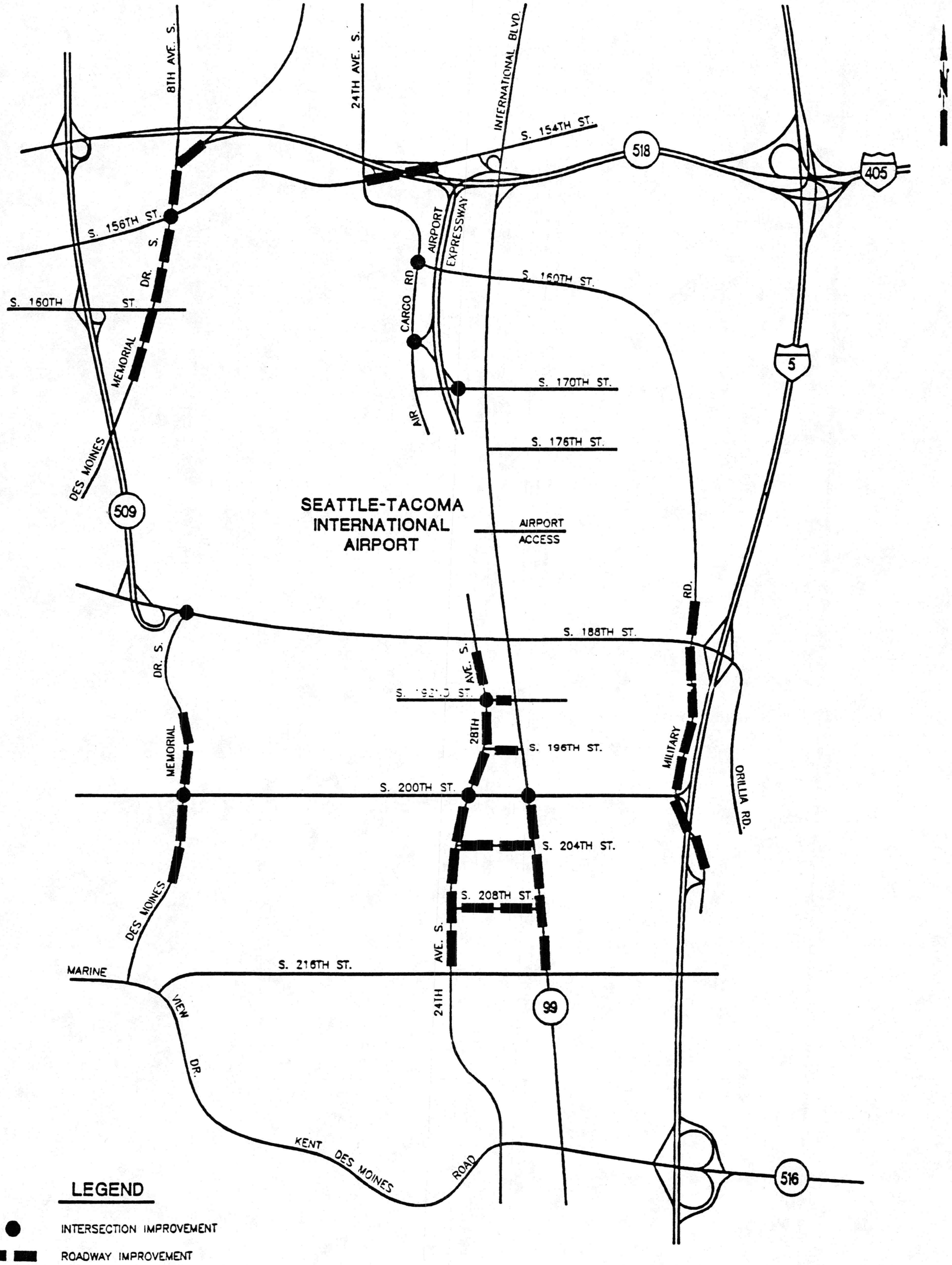
Seattle-Tacoma International Airport	DO-NOTHING ALTERNATIVE INTERSECTION LEVEL OF SERVICE	EXHIBIT: 5-1-2



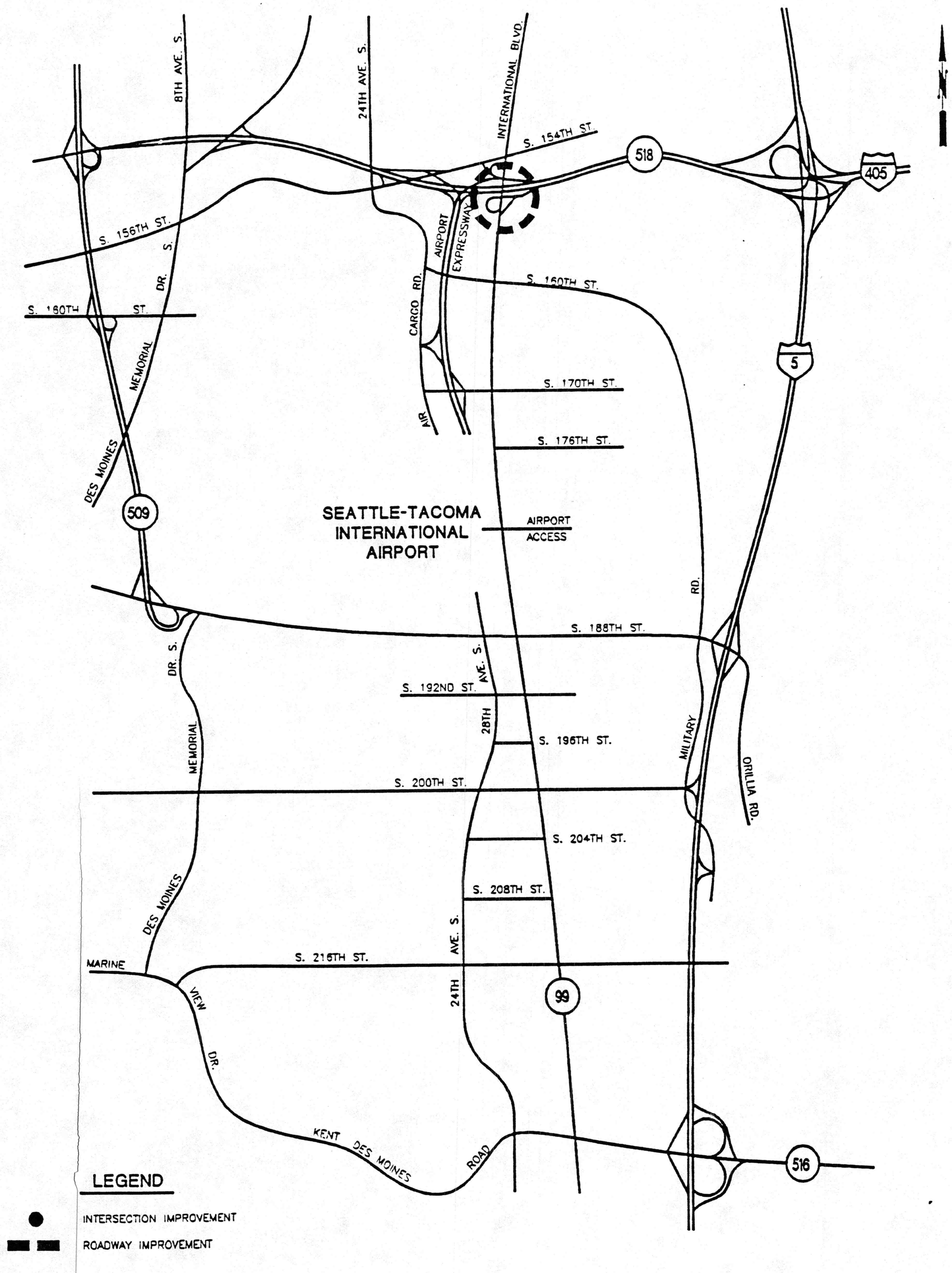
Seattle-Tacoma International Airport	DO-NOTHING ALTERNATIVE ANNUAL AVERAGE DAILY TRAFFIC VOLUMES	EXHIBIT: 5-1-3



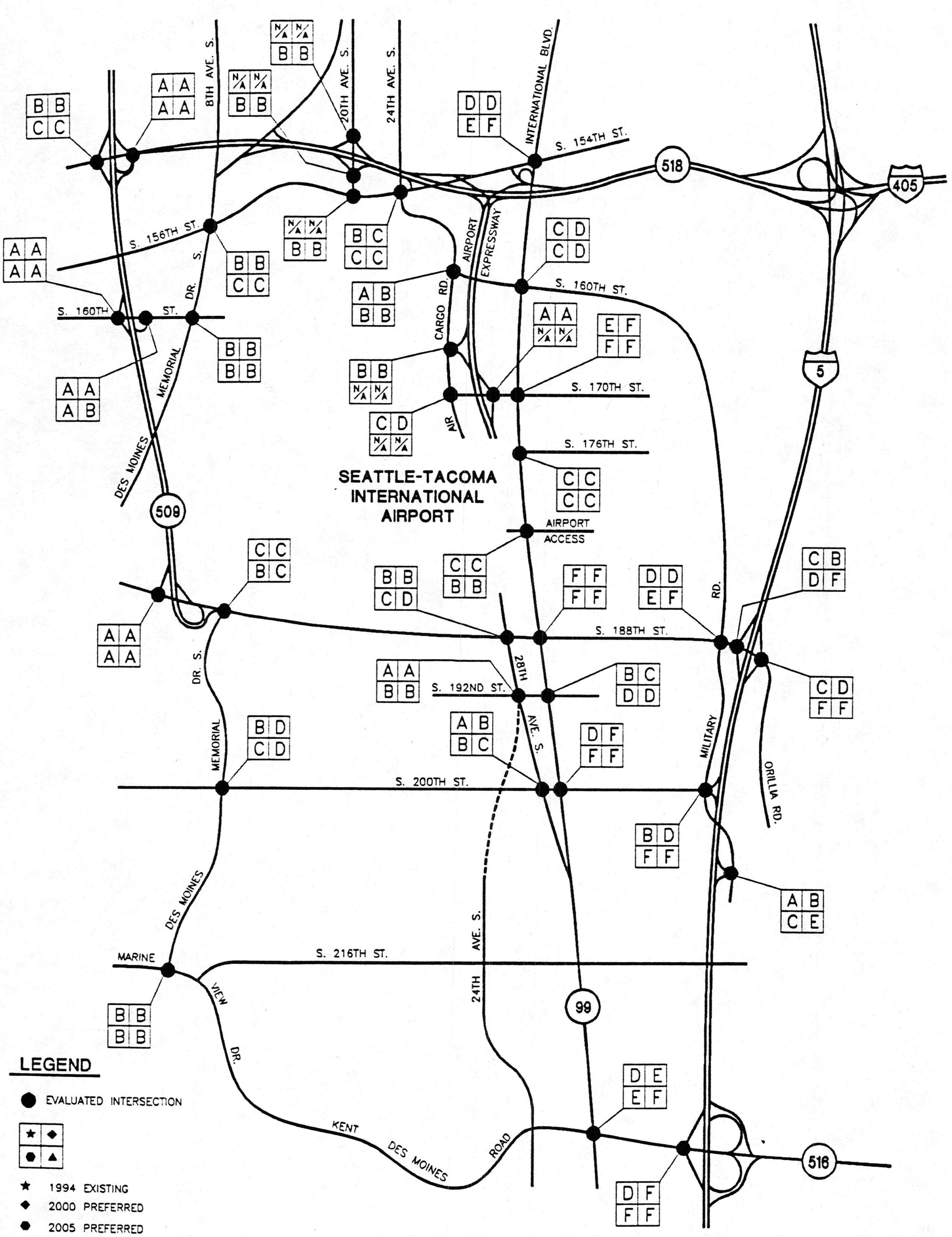
Seattle–Tacoma International Airport	YEAR 2000 TRANSPORTATION IMPROVEMENT PROJECTS	EXHIBIT: 5–1–4



Seattle-Tacoma International Airport	YEAR 2005 TRANSPORTATION IMPROVEMENT PROJECTS	EXHIBIT: 5-1-5



Seattle-Tacoma International Airport	YEAR 2010 TRNASPORTATION IMPROVEMENT PROJECTS	EXHIBIT: 5-1-6



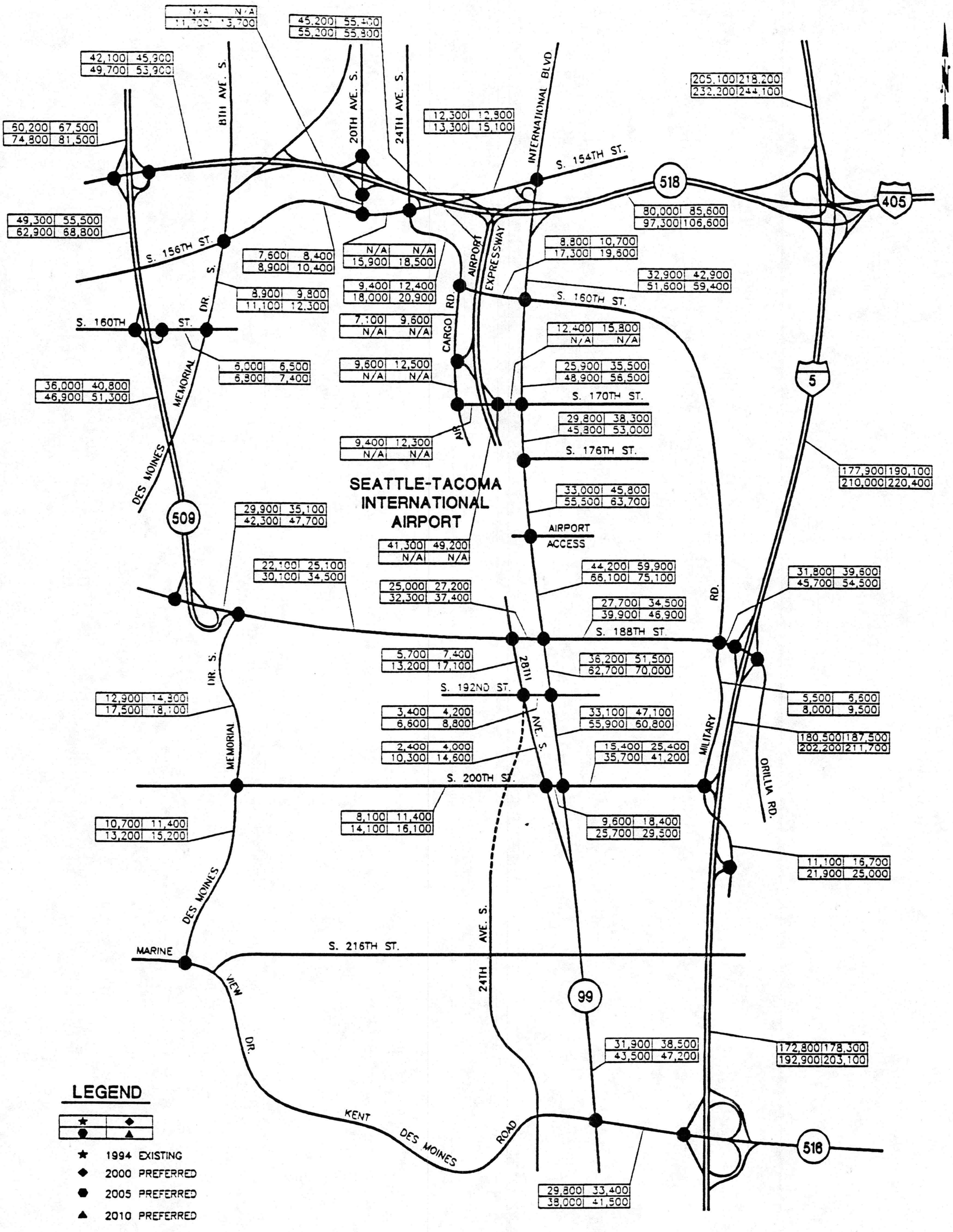
LEGEND

● EVALUATED INTERSECTION

★	◆
●	▲

★ 1994 EXISTING
◆ 2000 PREFERRED
● 2005 PREFERRED
▲ 2010 PREFERRED

Seattle–Tacoma International Airport	PREFERRED ALTERNATIVE INTERSECTION LEVEL OF SERVICE	EXHIBIT: 5-1-7



Seattle–Tacoma International Airport	PREFERRED ALTERNATIVE ANNUAL AVERAGE DAILY TRAFFIC VOLUMES	EXHIBIT: 5-1-8

SECTION 5-2

AIR QUALITY

This section of the Supplemental EIS summarizes the potential air quality impacts associated with the new forecasts and new information that has arisen as described in Chapter 2. This analysis continues the analysis and supporting documentation presented in the Final EIS (namely Chapter IV, Section 9 and Appendix D and Appendix R) which are hereby incorporated by reference. In addition, **Appendix B** of the Final Supplemental EIS contains a Final Conformity Analysis based on the results of the analysis presented in this section. The Final Conformity Analysis reflects a revised air emissions inventory based on the comments received on the Revised Draft Conformity Analysis presented in the Draft Supplemental EIS. **Appendix F** contains the summary of the comments received and responses, while **Appendix G** contains the comment.

As is noted in Appendix F, several issues with the revised draft analysis were identified in comments from the air quality agencies and public. Based on these comments, and comments from the general public, a detailed quality assurance process was conducted for the data input to the air emissions and dispersion models. This section, and **Appendix B**, reflects the revised analysis. While the specific emissions estimate has been revised in some cases, the proposed improvements will result, in many cases, in less emissions than would be experienced under the Do-Nothing alternative. In all cases, the proposed improvements result in less emissions than the de-minimis levels contained in the Clean Air Act conformity rules.

This analysis focuses on three evaluations:

- Air Pollutant Emissions Inventory
- Area Dispersion Analysis
- Roadway Intersection Dispersion Analysis

Appendix C-2 of this report describes the modeling input assumptions and modeling methodology used in the analysis. As identified by the Final EIS air quality analysis, the two pollutants of concern include Carbon Monoxide (CO) and Nitrogen Oxides (NO_x). The Puget Sound Region was considered non-attainment for CO and Ozone until the fall of 1996, when the EPA approved the region's maintenance plan. Accordingly, this analysis focuses on airport-related emissions of CO and NO_x. The National, State and local Ambient Air Quality Standards (AAQS) for these pollutants are summarized in **Table 5-2-1**. Nitrogen Oxides and Hydrocarbons (HC) have been included in the air pollutant emission inventory because they react in sunlight to form ozone.

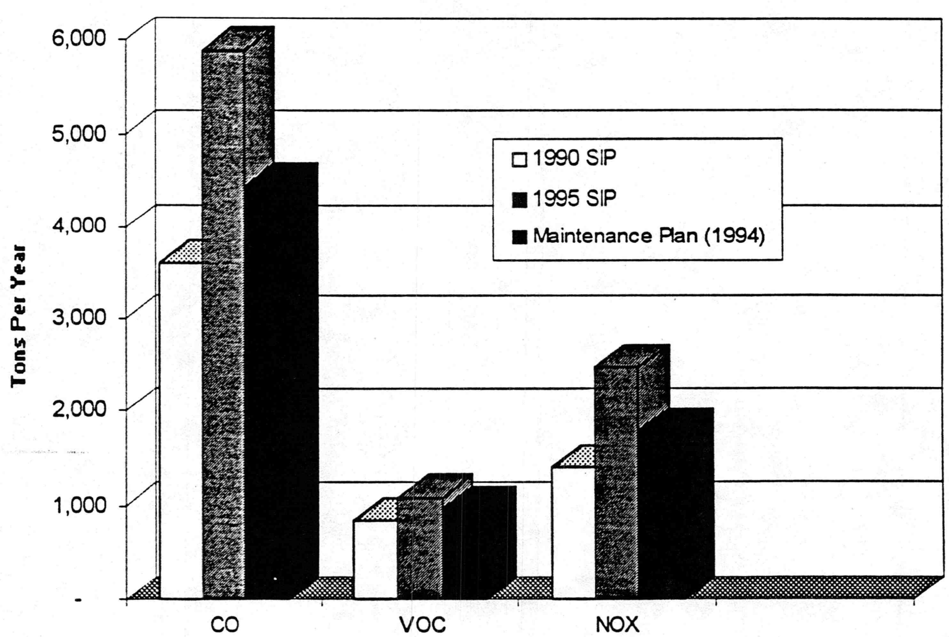
Final EIS Chapter IV, Section 9 "Human Health" discusses an evaluation of air toxics, while Appendix D of the Final EIS discusses air toxics monitoring in the Airport vicinity.

1. PUGET SOUND REGION

Until October 1996, the Puget Sound Region had been designated as a 'high-moderate' non-attainment area for carbon monoxide, and as a 'marginal' ozone non-attainment area. The CO non-attainment area extended from north of Everett to Tacoma. The ozone non-attainment area comprised all of Pierce County, all of King County except for a small portion in the northwest corner, and the western portion of Snohomish County. In January 1996, the region submitted to EPA a request for redesignation of the region to attainment, and a maintenance plan for how the region will maintain compliance with the Clean Air Act. In October 1996 the EPA approved the maintenance plan for both CO and Ozone. The redesignation became effective November 25, 1996.

The Washington State Department of Ecology has prepared implementation plans for reducing CO and ozone levels within the Puget Sound Region. The State Implementation Plan (SIP) inventories pollutant emissions for a variety of sources within the Puget Sound Region including Sea-Tac Airport. Once all the pollutant sources are inventoried, the SIP then focuses on measures to reduce pollutant levels in order to meet pollutant reduction goals for the Region. The SIP inventories do not mean that activity within the Region cannot grow. **Exhibit 5-2-1** identifies the SIP aircraft emissions inventory levels for Sea-Tac for 1990 and 1995.

EXHIBIT 5-2-1
SIP AIRCRAFT EMISSIONS INVENTORY



The SIP anticipated that overall emissions within the Region would decrease by 37% between 1990 and 1995. At the same time, the SIP planned for aircraft emissions at Sea-Tac to increase: by 63% for Carbon Monoxide, 77% for Nitrogen Oxides, and 31% for Volatile Organic Compounds (VOC's; hydrocarbons or "ozone precursors"). Because motor vehicles are expected to remain the largest contributor of pollutants in the region, the SIP focuses on reducing emissions from motor vehicles to achieve the Region's goals for reducing air pollutants. The anticipated decrease in emissions from motor vehicles is expected to result from continuation of the vehicle inspection and maintenance program, and by the replacement of older automobiles with newer, cleaner, more efficient models.

2. AIR POLLUTANT EMISSIONS INVENTORY

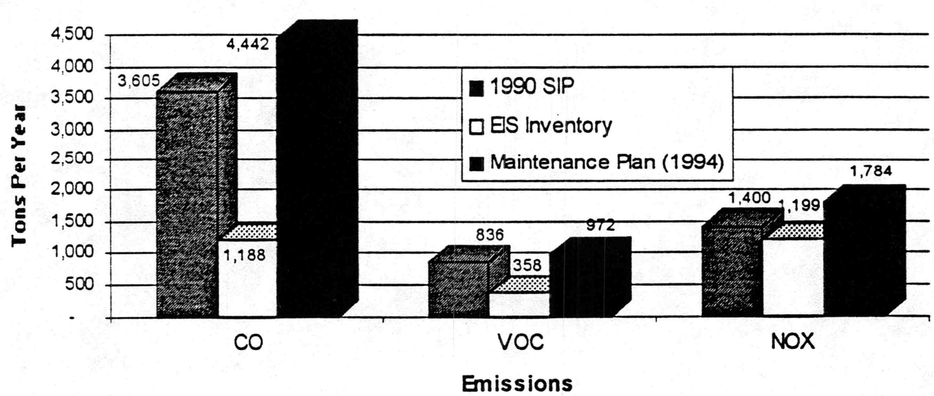
For the Final EIS and this Supplemental EIS evaluation, aircraft pollutant inventories were prepared similar to the SIP aircraft pollutant inventory. The aircraft pollutant inventory summarizes the *total* quantity of each pollutant emitted by aircraft operating at the Airport. The aircraft emissions inventory was performed using the FAA's Emissions and Dispersion Modeling System (EDMS) computer model. The following paragraphs present the existing (1994) inventory levels and future (2000, 2005, 2010) Do-Nothing and "With Project" pollutant emissions for the Airport. The emission levels for CO, NOx, and VOC's for the existing scenario is compared to the 1990 SIP, whereas the future scenarios are compared to the 1995 SIP emission levels.

(A) Existing (1994) Inventory

Exhibit 5-2-2 compares the existing emissions for Sea-Tac with the State's 1990 emissions inventory levels for Sea-Tac.

EXHIBIT 5-2-2

EXISTING EMISSIONS INVENTORY COMPARED TO THE SIP



As is shown above, the existing aircraft pollutant emission in inventory prepared for the Final EIS shows that aircraft emissions are less than the SIP and less than the maintenance plan. In addition, the future aircraft emissions identified by the February 1996 Final EIS, as well as this Final Supplemental EIS are less than the SIP or maintenance plan inventories.

(B) Future Emissions Inventory With the Revised Forecasts

Future aircraft emission levels were evaluated based on the revised forecast levels as described in Chapter 2. The future Do-Nothing and "With Project" emission levels were then compared to the 1995 SIP. **Exhibit 5-2-3** illustrates the change in emissions for each future Do-Nothing and "With Project" scenario. As shown, with or without a new runway aircraft emissions are expected to increase as forecast aircraft activity increases. However, aircraft emissions are expected to continue to be well below the 1995 SIP levels.

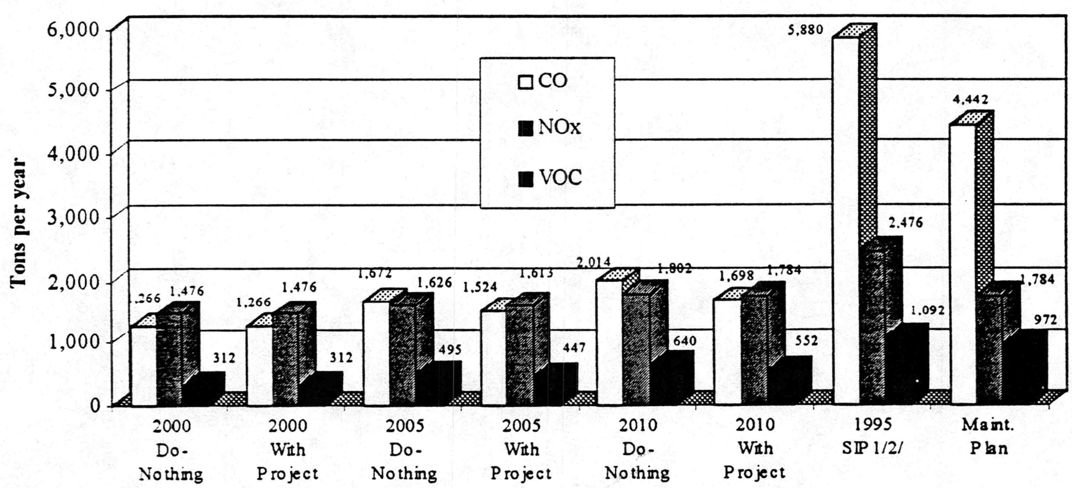
In 2000, the Do-Nothing and all "With Project" aircraft emissions would be the same, as the primary action that would affect aircraft operations (the operation of the third parallel runway) would not be available for use. By 2005, the proposed improvements (including the runway and terminal improvements discussed in Chapter 2) would reduce aircraft CO emissions by 9%, reduce NO_x emissions by 1%, and reduce VOC emissions by 10%. By 2010, the projects relative to the Do-Nothing would reduce aircraft CO emissions by 16%, reduce NOx emissions by 1%, and reduce VOC emissions by 14%, and result in no change in NO_x.

3. EDMS DISPERSION ANALYSIS

An air pollution dispersion analysis was performed to determine the impact of airport-related activity on pollutant levels in the vicinity of the Airport. Unlike the emissions inventory that focused on aircraft emissions, this dispersion evaluation reflects a study area in the immediate airport vicinity, and includes all sources of pollution in the study area. The analysis prepared for this Supplemental EIS supports the Final EIS conclusion that development of the proposed third parallel runway would not create new exceedances of the ambient air quality standards for all forecast periods.

EXHIBIT 5-2-3

AIRCRAFT EMISSIONS INVENTORY



1/ Non-highway mobile projections for 1995, Emissions Inventory for Carbon Monoxide and Precursors of Ozone for King, Pierce and Snohomish Counties, Washington State, Puget Sound Air Pollution Control Agency, September, 1994.

2/ Includes military, commercial, general aviation, and commuter aircraft for Seattle-Tacoma International Airport.

The EDMS dispersion analysis encompasses a wide range of airport-related sources in comparison to the air pollution inventory, which focused solely on aircraft emissions. The dispersion analysis considers all direct and indirect emissions from aircraft and aircraft support equipment, on and off-airport parking lots, roadways, training fires, fuel systems, terminal heating and cooling, and aircraft maintenance activities. The FAA's Emissions and Dispersion Modeling System (EDMS) computer model was utilized to perform the dispersion analysis. Modeled pollutant levels were compared to the Ambient Air Quality Standards (AAQS) presented in **Table 5-2-1**.

TABLE 5-2-1
AMBIENT AIR QUALITY STANDARDS

POLLUTANT	NATIONAL		WASHINGTON STATE	PUGET SOUND REGION
	PRIMARY	SECONDARY		
CARBON MONOXIDE				
8 Hour Average	9 ppm	N/A	9 ppm	9 ppm
1 Hour Average	35 ppm	N/A	35 ppm	35 ppm
NITROGEN DIOXIDE				
Annual Average	0.053 ppm	0.053 ppm	0.053 ppm	0.053 ppm
OZONE				
1 Hour Average[d]	0.12 ppm	0.12 ppm	0.12 ppm	0.12 ppm

Notes:
ppm = parts per million No AAQS exist for Volatile Organic Compounds (VOC) a precursor of Ozone.
Annual standards never to be exceeded; shorter term standards not to be exceeded more than once per year unless noted.
Refer to Table IV.9-1 of the Final EIS for a complete listing of the AAQS for all criteria pollutants.

The EDMS dispersion analysis is based on consideration of hourly, weekly, and monthly distribution of operating conditions by each source, and actual weather data for 8,760 hours (over an entire year). Use of actual operating and weather data produces pollutant emission more closely linked to "real world" conditions.

Exhibit 5-2-4 identifies the receptor locations modeled for the EDMS dispersion analysis. The receptor locations were identified through consideration of "worst" case operational and meteorological conditions as summarized in Appendix D of the Final EIS. The receptor locations represent the location of highest pollutant concentration in the closest ambient location, and are consistent with the receptor locations evaluated for the Final EIS. An increase in airport activity would not alter the locations experiencing the highest air pollutant concentrations, but would influence the actual concentrations experienced. Included are receptor locations located at South 154th Street which is just 650 feet (200 meters) north of the end of Runway 16L, and along South 188th Street on either side of the roadway tunnel extending under Runway 34R. Airport property is located on either side of these roadways for nearly the entire roadway length in the Airport.

The following sections describe the results of the local areawide dispersion analysis. Background concentrations have been added to the modeled results to ensure that all direct and indirect emissions have been identified.

(A) Existing Pollutant Concentrations

As illustrated in **Exhibit 5-2-5**, the highest concentrations of Carbon Monoxide currently occur along the terminal curbfront. There were no exceedances of the short-term 1-hour and 8-hour standards for Carbon Monoxide (CO) identified by the EDMS dispersion analysis. For each receptor location, the source of the concentration (i.e., airport, roadways, background) is identified. As shown, roadway sources are the major contributors to CO concentrations.

A possible exceedance of the Nitrogen Dioxide[1/] (NO_2) ambient air quality standard (AAQS) was modeled at the South 154th Street receptor, which was located 650 feet north of the end of Runway 16L. The modeled NO_2 concentration of 0.08 ppm at this location exceeded the AAQS annual standard of 0.053 ppm. Pollutant concentrations at this location are influenced by emissions from aircraft takeoffs. Airport property is located on either side for the entire length of South 154th Street in the Airport area. There are no homes, parks or businesses located in this area. As this area requires security clearance to access, prolonged public exposure along South 154th Street would not be expected relative to the longer-term annual NO_2 standard. Concentrations at other receptors located within the surrounding community areas are below the ambient air quality standards for all pollutants including NO_2.

It is also worth noting that actual measurements of NO_2 in the Region have not exceeded the NAAQS. Also, there has never been an attainment issue for NO_2 in Washington State. EPA has indicated, in the preamble to the General Conformity Regulations, that use of detailed receptor modeling is not appropriate for NO_2 and Ozone, which are regional scale pollutants.

(B) Future Conditions With the New Forecasts

Exhibit 5-2-6 illustrates the results for the future Do-Nothing and "With Project" alternatives for the 1-hour CO, 8-hour CO, and NO_2 concentrations at each receptor location. The pollutant concentrations at all receptor locations are either below the AAQS or are less than for the Do-Nothing condition. This is consistent with the results identified by the February, 1996 Final EIS.

As for the existing conditions, the highest concentrations of 8-hour CO would continue to occur in the terminal area, and the highest concentration of NO_2 would continue to occur along South 154th Street just off the end of the Runway 16L. All future 1-hour CO concentrations continue to be well below the NAAQS.

(1) Alternative 1 (Do-Nothing)

Including background levels, the highest NO_2 concentration identified by the refined dispersion analysis would be along South 154th Street, which would exceed the AAQS for each forecast year of the Do-Nothing/No-Build alternative. By 2005, NO_2 concentrations along the eastern edge of South 188th Street would also exceed the standard. No other receptor locations would exceed the annual NO_2 standard with the Do-Nothing alternative.

Including background, the highest CO concentrations would continue to occur in the terminal area. By 2005, the 8-hour CO concentrations would exceed the AAQS. The highest CO concentrations would occur along the Airport terminal roadway in the area of the planned on-airport hotel and along the south-terminal area curbfront.

(2) Alternative 3 (Preferred Alternative)

As with the Do-Nothing condition, the highest concentration of NO_2 for all receptor locations would be along South 154th Street and South 188th Street. Concentrations of NO_2 would increase slightly over the Do-Nothing condition at Receptor 9A (SeaTac Industrial Park), and at Receptor 188th Street West (located south of the Airport) with use of the third parallel runway. However, such concentrations at both receptor locations

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1/ The EDMS model used for this analysis evaluates concentrations of Nitrogen Oxides (NOx). Using EPA approved methodologies, the NOx concentrations were converted to Nitrogen Dioxide (NO_2) to enable comparison to the AAQS.

would be below the AAQS. No other receptor locations would be expected to exceed the annual NO_2 standard.

The Preferred Alternative would result in changes in surface transportation traffic volumes and aircraft movements. The highest concentrations of CO emissions would continue to occur in the existing terminal area. However, all concentrations would remain below the 1-hour and 8-hour CO standards.

(3) Alternatives 2 (Central Terminal) and Alternative 4 (South Unit Terminal)

Based on the analysis prepared for the Preferred Alternative for this Supplemental EIS, the impacts relative to "With Project" Alternatives 2 and 4 were estimated from the analysis in the Final EIS. Concentration levels for NO_2 and CO associated with Alternative 2 (Central Terminal) and Alternative 4 (South Unit Terminal) would change in the same fashion as identified for the Preferred Alternative. As with the Preferred Alternative, the higher concentrations of CO would occur in the existing terminal areas due to changes in traffic volumes and movements. All NO_2 and CO concentrations would be expected to be below the AAQS.

(C) Comparison to the Master Plan Update Forecast Impacts

The results of this Supplemental Environmental Impact Statement analysis are consistent with the results presented for the February, 1996 Final EIS. As indicated by the aircraft pollutant emissions inventory, emissions "With Project" would be less than for the Do-Nothing condition. **Table C-2-6** presents a comparison of emissions for the additional environmental evaluation and Final EIS. As shown, based on the higher activity levels presented by the new forecasts, the emission inventory evaluated by the Supplemental EIS is greater than the inventory presented in the Final EIS.

Pollutant concentrations at receptor locations around the Airport would either be less than the Ambient Air Quality Standards or less than for the Do-Nothing condition in all future years. **Table C-2-9** presents a comparison of pollutant concentrations for the new forecasts and the Final EIS. As shown, the results of the Supplemental EIS evaluation are consistent with the results identified for the Final EIS. With the increase in aircraft activity identified by the new forecasts, receptor concentrations for CO and NO_2 would be slightly higher or the same as concentrations identified for the Final EIS. As expected with the evaluation of peak activity, the 1-hour CO concentrations are 10 to 25% higher than for the Final EIS depending on receptor location. Nonetheless, the 1-hour CO concentrations remain well below the 1-hour CO standard.

Appendix C-2 presents a detailed comparison of the Final EIS and new forecast results for the air pollutant emissions inventory and dispersion analysis.

4. CAL3QHC LOCAL ROADWAY INTERSECTION ANALYSIS

Because motor vehicles are the major source of air pollutants in the Puget Sound and Sea-Tac area, a separate, more detailed air quality analysis was conducted for highly congested roadway intersections in the Airport area. In accordance with EPA CO modeling guidelines, the local roadway intersection dispersion analysis focused on the intersections with lowest levels of service and the highest activity levels. The most highly congested intersections in the Airport area today and in the future are:

- South 160th Street and International Boulevard/(SR99)
- South 170th Street and International Boulevard/(SR99)
- South 188th Street and International Boulevard/(SR99)
- South 200th Street and International Boulevard/(SR99)

Additionally, the intersection of South 154th Street and 24th Avenue South was also considered due to the proposed development of an employee parking lot north of SR 518, west of 24th Avenue South. The location of the intersections modeled are shown in **Exhibit 5-2-7.**

The intersection dispersion analysis was evaluated using the EPA approved CAL3QHC air quality computer model, with emission factors developed using MOBILE5A. The modeling methodology and input assumptions used in the analysis are described in **Appendix C-2**. These assumptions were designed to be conservative and to predict worst-case conditions.

Carbon Monoxide (CO) is the pollutant of greatest concern at roadway intersections because it is the pollutant emitted in the greatest quantity by motor vehicles for which short-term health standards exist. The analysis presents the results in terms of the two CO AAQS standards: 1-hour and 8-hour concentrations. The 1-hour CO AAQS standard is 35 ppm and the 8-hour CO standard is 9 ppm. Existing and future levels, as compared to the respective CO standards, are presented in **Exhibits 5-2-8 and 5-2-9**.

As is shown, in the Do-Nothing/No-Build and "With Project" alternatives for the existing and future years, exceedances of the CO AAQS are modeled to occur with the worst case meteorological conditions and use of regular unleaded fuels or oxygenated fuels, regardless of whether improvements are undertaken at Sea-Tac. If these conditions actually occurred, the maintenance plan would require the region to begin using oxygenated fuels during the winter months. However, as this section shows, even with oxygenated fuels exceedances of the CO AAQS could occur in the Do-Nothing/No-Build alternative. As exceedances are predicted regardless of the improvements at Sea-Tac Airport, this section presents the data for the oxygenated fuels. **Appendix C-2** presents the results of the intersection analysis for both oxygenated and regular unleaded gasoline fuel. On average, use of oxygenated fuels reduces CO emissions 10 to 20%.

(A) Existing Impacts

The already high traffic volumes at the four intersections and "worst case" poor meteorological conditions modeled by this analysis contributed to high 8-hour CO concentrations at all intersections considered. Although the 1-hour CO concentrations are well below the 35 ppm ambient air quality standard at each intersection, exceedances of the 8-hour CO standard occur at each intersection with the addition of background concentrations.

The highest concentration identified would occur at the busy intersection of International Boulevard at South 188th Street. A peak 8-hour concentration of approximately 18 ppm, including background was found at this location. For International Boulevard (SR 99) and South 170th Street, the highest 8-hour concentration was about 13 ppm. For South 160th Street, the highest 8-hour concentration was approximately 11 ppm, and 15 ppm at South 200th Street. These concentrations are all well above the 8-hour CO standard of 9 ppm.

Because modeling presented in the February, 1996 Final EIS predicted existing and continued future exceedances of the Carbon Monoxide AAQS, the Port of Seattle, the Washington State Department of Ecology, the Puget Sound Air Pollution Control Agency, and the U.S. Environmental Protection Agency entered into a Memorandum of Agreement (presented in **Appendix B**) to conduct air measurements in the vicinity of Sea-Tac Airport. The Department of Ecology has assumed responsibility for placing the monitoring equipment and collecting the data. Measurements were initiated in November 1996 and completed in February 1997. This monitoring effort found that actual measured concentrations along International Boulevard are between 3-5 ppm and "fell within health standards, even on days with the most pollution-prone weather". As noted by the Department of Ecology "'Air Quality in the study appears to be typical' ...'It even seems a little better than we've seen in similar high-traffic Areas elsewhere in the region...' Overall, 85% if the readings fell within the 'good' air quality range of 4.5 ppm and less. Fifteen percent of the readings were 'moderate' between 4.5 and nine ppm. There were no 'poor' air quality readings above nine ppm."

(B) <u>Future Conditions With the New Forecasts</u>

In the future, these four intersections would continue to experience high traffic volumes. Although improvements in vehicle emissions are expected that would reduce CO concentrations, the increase in regional traffic volume would counter the beneficial effect of these improvements. For the analysis presented in this Supplemental EIS, modeling was performed for only the Do-Nothing (Alternative 1) and Preferred Alternative (Alternative 3). The analysis presented for Alternatives 2 and Alternative 4 is based on an extrapolation from the Final EIS.

As is noted in Chapter 4, "Affected Environment" and in Section 5-1 "Surface Transportation", other regional development efforts are anticipated in the future that will affect surface traffic conditions. These improvements have been reflected in the surface transportation analysis and the air quality evaluation discussed in the following paragraphs. As shown in **Exhibits 5-2-8 and 5-2-9**, in the future, CO concentrations for the 1-hour level would be below the AAQS, while the 8-hour concentrations would exceed the standard similar to conditions that exist today, regardless of whether or not the improvements at Sea-Tac Airport are pursued.

(1)<u>Alternative 1 (Do-Nothing)</u>

For all four intersections along International Boulevard (SR 99), the future Do-Nothing CO concentrations would exceed the 8-hour standard under the Do-Nothing/No-Build.

For the year 2000, the highest CO concentration would occur at the intersection of International Boulevard (SR 99) at South 188th Street would be 19.1 ppm including background; 13.0 ppm at South 170th Street; 11.5 ppm at South 160th Street; and 15.1 ppm at South 200th Street. For 2005 and 2010, emissions would be expected to continued at these levels, as reductions in vehicle emissions noticeably compensate for increases in roadway traffic.

Exhibits 5-2-8 and 5-2-9 illustrate the maximum 1 and 8-hour CO concentrations at each intersection. The 8-hour CO standard would be exceeded at each intersection with the Do-Nothing alternative and use of oxygenated fuels (**Appendix B** presents the oxygenated fuels and unleaded fuel results).

(2) Alternative 3 (Preferred Alternative)

The Preferred Alternative would result in changes in the way traffic accesses the Airport and affect traffic movement in the Airport area. For instance, with the completion of the North Employee Parking Lot (north of SR 518), employee traffic would access this site instead of the existing employee lots. To address these changes in surface traffic patterns, the parking lot action includes the addition of turn lanes and signalization at South 154th Street at 24th Avenue South. Similarly, the development of the North Unit Terminal would result in the closure of South 170th Street (between International Blvd and Air Cargo Road) to through traffic using Airport roads to transit from eastern SeaTac to western SeaTac. Therefore, improvements to the South 160th Street interchange are included in the Master Plan Update to address changes in surface transportation conditions. As a result, additional traffic would be expected to use various intersections differently than the Do-Nothing/No-Build alternative.

CO Concentrations for the Preferred Alternative were evaluated at each of the intersections modeled. No exceedances of the AAQS would be expected based on the 1-hour CO standard. For each intersection, the 8-hour CO concentration would be at or below the future Do-Nothing condition. As a result, many of these intersections could continue to exceed the AAQS regardless of whether improvements are undertaken at Sea-Tac Airport. **Exhibits 5-2-8 and 5-2-9** illustrate the maximum CO concentrations at each intersection with the Preferred Alternative. Similar to the existing conditions, the 8-hour CO levels would be the greatest at the International Blvd intersection at South 188th Street. Conditions in year 2000 would produce the highest concentration "With Project" at 18.9 ppm, in contrast to the Do-Nothing/No-Build concentration of 19.1 ppm.

(2) Alternative 2 (Central Terminal) and 4(South Unit Terminal)

Based on the results of the Preferred Alternative evaluation discussed above, and the results presented in the Final EIS, the air pollutant conditions associated with the other "With Project" alternatives was examined. As was described in the Final EIS, the concentrations at the intersections for Alternatives 2 and 4 were virtually the same. As with the Do-Nothing and Preferred Alternative, concentrations at all intersections would be expected to be less than the AAQS for the 1-hour CO concentrations, but greater than the 8-hour CO AAQS. All of these alternatives would likely produce CO levels equal to or less than the Do-Nothing Alternative, assuming project modifications that could occur to minimize surface transportation congestion.

(C)Comparison of the New Forecasts to the Master Plan Update Forecast Air Quality

Relative to the information presented in the February, 1996 Final EIS, the analysis shown in the Supplemental EIS indicates higher pollutant concentrations in accordance with a greater level of surface traffic. The results of the "With Project" and Do-Nothing 8-hour CO concentrations are 1 ppm to 5 ppm greater than the results presented in the Final EIS. The following summarizes these differences between the "With Project" CO levels from this Supplemental EIS and the February, 1996 Final EIS:

	8-Hour CO Concentration (ppm)					
	Supplemental EIS			Final EIS		
Location	2000	2005	2010	2000	2010	2020
SR99/S.188th St.	19	18	18	15	20	13
SR99/S. 200th St	15	14	15	13	13	11
SR99/S. 170th St.	13	12	13	11	13	13
SR99/S. 160th St	11	11	12	11	11	12

Thus, the new information that has become available since publication of the Final EIS has resulted in the year 2000 concentrations being as much as 26% greater than presented in the Final EIS. While the forecast of total traffic levels (airport and regional traffic) in general is about 10% greater than the levels presented in the Final EIS, the level of delay experienced at the intersections produced the greater difference in pollutant concentrations.

5. CUMULATIVE IMPACTS

The cumulative impact of the SeaTac Master Plan improvements and other proposed local projects within the vicinity could create direct and indirect impacts on air emissions within the region. The impacts associated with the Master Plan Update and the specific other regional projects identified in Chapter 4 have been identified by this report. Additional improvements in the region would expect to affect air emissions. However, until project specific plans are developed for these developments, the cumulative impacts can not be identified. Projects resulting in physical development that add traffic to the area, without reducing congestion, would be expected to increase emissions.

6. AIR CONFORMITY DETERMINATION AND GOVERNOR'S CERTIFICATE

The Clean Air Act Amendments of 1990 require Federal agencies to ensure their actions conform to the appropriate State Implementation Plan (SIP). The SIP is a plan which provides for implementation, maintenance, and enforcement of the Ambient Air Quality Standards (AAQS), and includes emission limitations and control measures to attain and maintain the AAQS. Conformity is defined as demonstrating that a project conforms to the State Implementation Plan's purpose of eliminating or reducing the severity and number of violations of the ambient air quality standards and achieving expeditious attainment of such standards. The determination of conformity in a maintenance area is governed by the following principle:

- That the project will not cause or contribute to any new violations of any of the ambient air quality standards (AAQS) in the project area or the metropolitan area;

Because the analysis, using the worst case weather conditions, predicts exceedances of the AAQS if the Do-Nothing/No-Build were pursued, the analysis also considered non-attainment issues:

- That the project will not increase the frequency or severity of future modeled violations of any AAQS; and
- That the project will not delay timely attainment of the AAQS or any required interim emission reduction in the project area.

The purpose of the air quality analysis, therefore, is to demonstrate that the proposed improvements at Sea-Tac conform to the SIP requirements for the Puget Sound Region. Because the Master Plan Update includes proposed changes to the airfield, landside, terminal and off-airport roadways, two forms of conformity have been addressed: Transportation and general conformity.

The USEPA has issued rules for determining general conformity of airport related projects (40 CFR Part 93, Subpart B). Although the conformity determination is a Federal responsibility, State and local air agencies are provided notification and their expertise consulted. The Federal agency must provide a 30-day notice of the Federal action and draft conformity determination to the appropriate USEPA Region, and State and local air agencies. On March 31, 1997, a 45-day public comment period concluded on the Revised Draft Conformity Analysis presented in the Draft Supplemental EIS. Based on the comments received, **Appendix B** containing the Final Conformity Analysis was prepared. As is noted in Appendix F, a number of issues were identified in the Revised Draft Conformity Analysis. Based on these comments a detailed review was conducted of all data input to the models. The corrected results were discussed in this section and are detailed in **Appendix B** and **Appendix C-2.**

As the corrected analysis reflected in **Appendix B** of this report shows, the project will not increase emissions above the applicable de-minimis thresholds. Also, the project will not be considered "regionally significant" with regard to air pollution emissions. A formal conformity determination, therefore, is not legally required for this project. EPA's rules and guidance are clear that where the net emissions increase resulting from the project do not exceed the applicable threshold rates, there are no further obligations with regard to the conformity rules. Although a conformity determination is not legally required, an analysis of air quality impacts utilizing the conformity determination structure has been conducted to address community and agency concerns regarding potential air quality impacts. The analysis presented in Appendix B demonstrates that if this project was legally obligated to make a conformity determination, the project would conform to the applicable State Implementation Plan. This conclusion is especially strong given the conservative nature of the assumptions used in the analysis, and the fact that "worst case" assumptions were used, even though the conformity regulations do not specify this as a requirement. Cumulatively, the conservative and worst-case inputs serve to provide a "cushion" to the analysis results, assuring that the positive conformity determination is well founded.

To meet the air quality criteria of conformity, the analysis relies on air quality modeling as specified in 40 CFR Section 93.158(a)(3). The results of the corrected modeling effort are used to demonstrate whether the Federal action will cause or contribute any new violations of the AAQS. As indicated in this section, a corrected emissions inventory and dispersion analysis were performed for the proposed improvements at Sea-Tac. The results of the dispersion analysis indicate that the proposed improvements would not result in any new exceedances, nor increase the frequency or severity of any existing violations of the ambient air quality standards for carbon monoxide (CO) or nitrogen dioxide (NO_2) at any modeled receptor locations. The addition of the proposed Federal action to the existing conditions results in fewer emissions than for the Do-Nothing condition, thereby demonstrating conformity with the State's SIP by not increasing emissions with respect to the baseline condition.

Therefore, it has been demonstrated, by USEPA standards, that the Federal action for proposed improvements at Sea-Tac conform to the applicable SIP for the Puget Sound Region. This conclusion of a positive general conformity determination for the Federal action planned at Sea-Tac fulfills the FAA's obligation and responsibility under 40 CFR Part 93, Subpart B. This conformity conclusion has been prepared as specified in Section 176(c)[42 USC 7506c] of the Clean Air Act Amendments of 1990. The conclusion has been made in accordance with the final rule of the U.S. Environmental Protection Agency (EPA), "Determining Conformity of General Federal Actions to State or Federal Implementation Plans" as published in the Federal Register on November 30, 1993. The final rule (40 CFR Part 93, Subpart B) was effective January 31, 1994.

As requested by the air quality agencies, an additional public review is being conducted concerning the Final Conformity Analysis. Public notices announcing the availability of the Final Conformity Analysis have been published in four local newspapers (Highline News, Tacoma News Tribune, Seattle Times, and Seattle Post-Intelligencer). Responses to significant public or agency comments will be reflected in the FAA's Record of Decision.

7. AIR CERTIFICATION

49 USC 47106(c)(1)(B) requires that Airport Improvement Program applications for airport projects involving the location of a new runway may not be approved unless the Chief Executive Officer of the state (or the appropriate state official) in which the project is located, or the appropriate state official certifies in writing that there is "reasonable assurance" that the project will be located, designed, constructed, and operated in compliance with applicable air quality standards (the AAQS). On December 20, 1996 the Department of Ecology, under delegated authority from the governor, issued a letter certifying that such assurance was provided.

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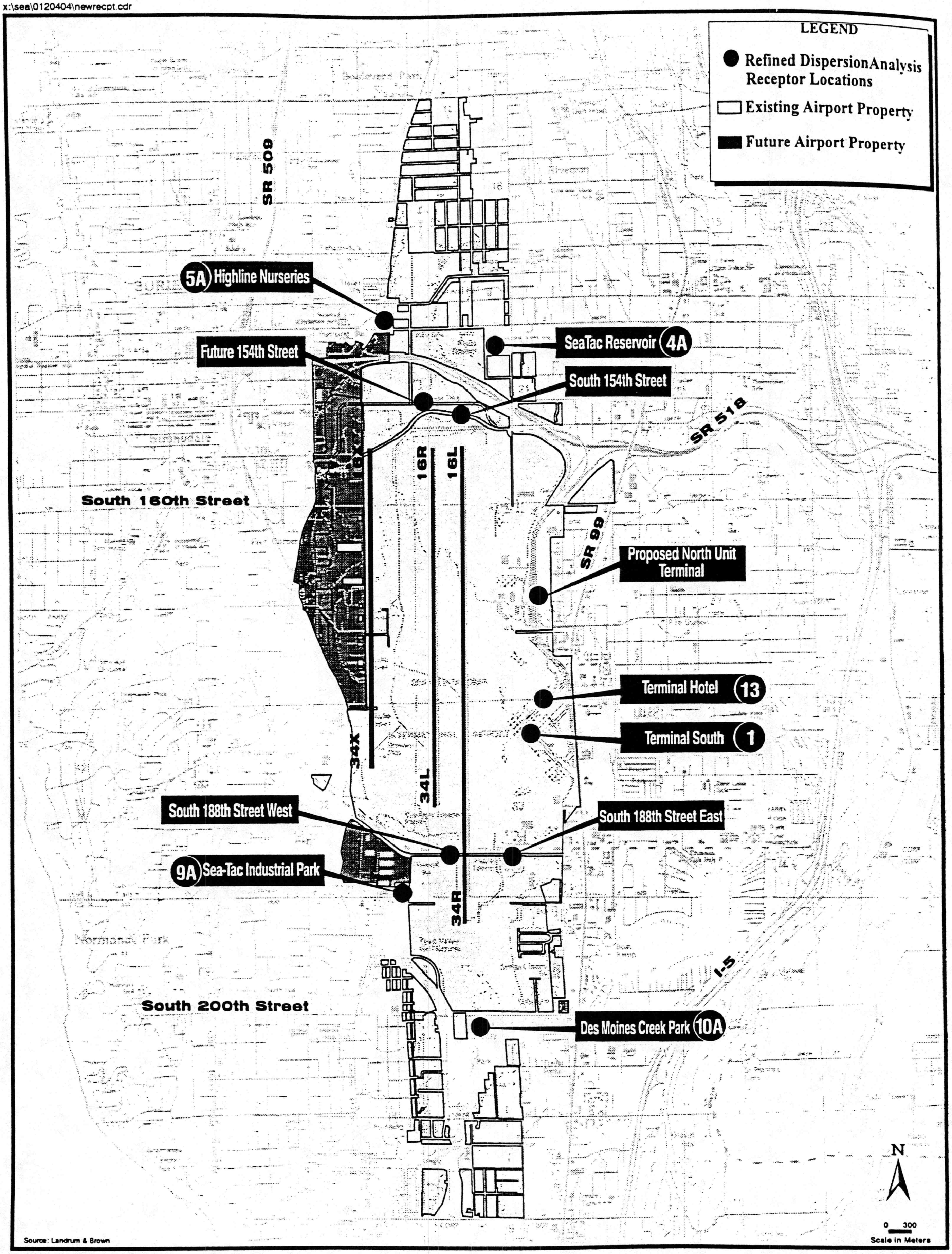


Seattle - Tacoma International Airport

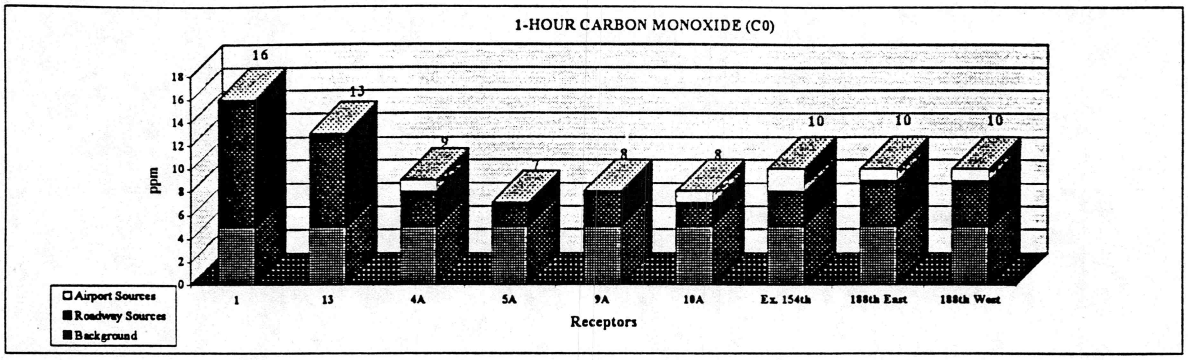
Refined Dispersion Analysis Receptor Locations

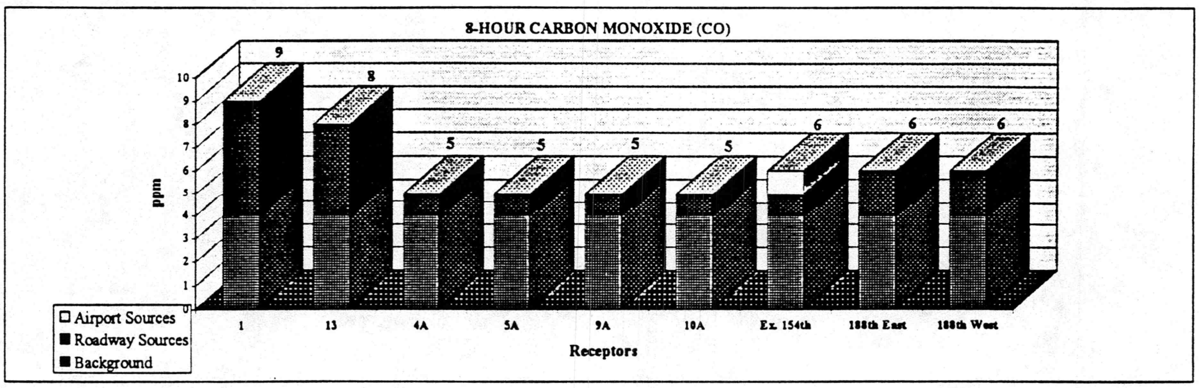
EXHIBIT: 5-2-4

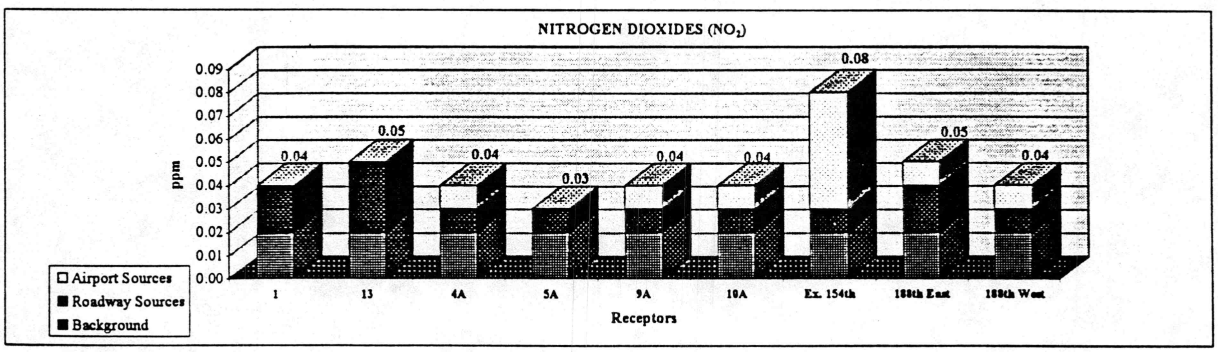
Exhibit 5-2-5

Seattle-Tacoma International Airport
Environmental Impact Statement

EXISTING CONDITIONS (1994)
REFINED DISPERSION ANALYSIS







Receptors: 1 = Terminal-South; 13 = Terminal Hotel; 4A = SeaTac Reservoir; 5A = Highline Nurseries; 9A = Sea-Tac Industrial Park; 10A = DesMoines Creek Park; Ex. 154th = Existing South 154th Street; 188th East = South 188th Street, East Receptor; 188th West = South 188th Street, West Receptor. Receptor locations are shown on Exhibit IV.9-1.

Source: Landrum & Brown, Inc., using EDMS Version 944

AAQS: 1-hour CO = 35ppm; 8-hour CO = 9 ppm; NO_2= 0.053 ppm

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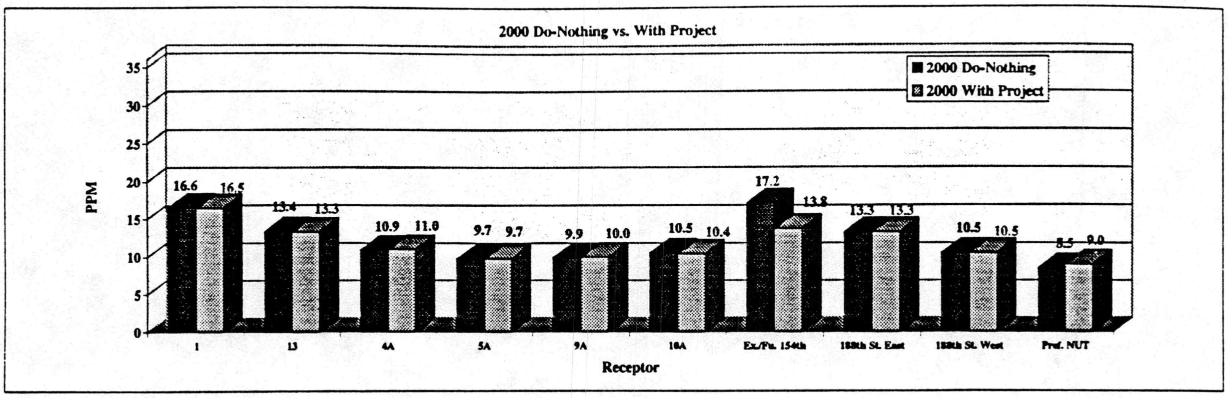
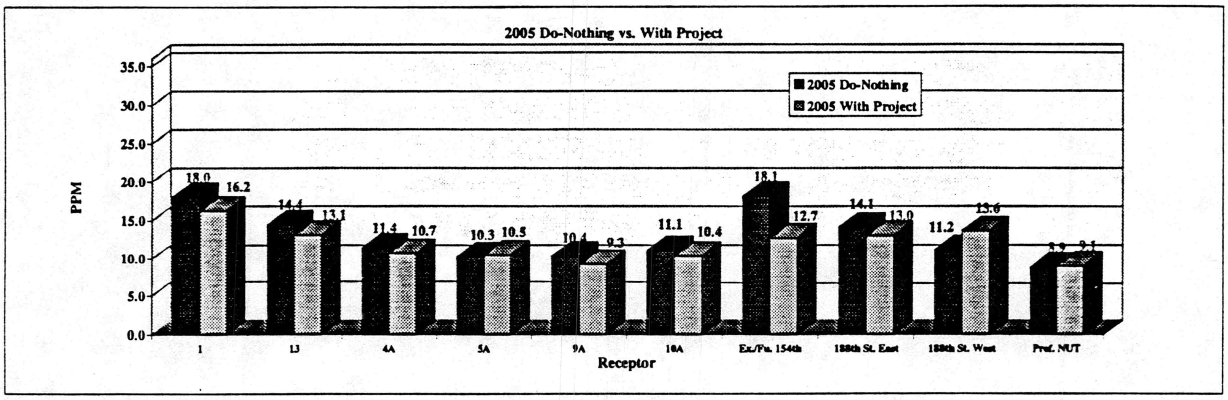
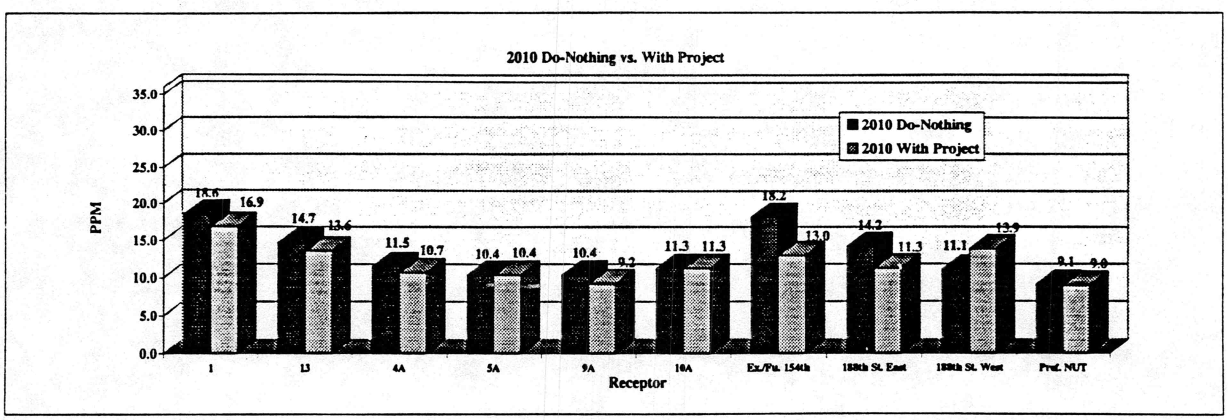
Exhibit 5-2-6
(Page 1 of 3)

Seattle-Tacoma International Airport
Supplemental EIS - Air Quality Analysis

CARBON MONOXIDE 1-HOUR CONCENTRATION (PPM)







Receptors: 1=Terminal-South; 13=Terminal Hotel; 4A=SeaTac Reservoir; 5A=Highline Nurseries; 9A=Sea-Tac Industrial Park; 10A=DesMoines Creek Park; Ex./Fu. 154th=Existing vs. Future South 154th Street; 188th East=South 188th Street, East Receptor; 188th West=South 188th Street, West Receptor.

Note: AAQS = 35.0 ppm
Background = 5.0 ppm

Source: Landrum & Brown, Inc., using EDMS Version 944

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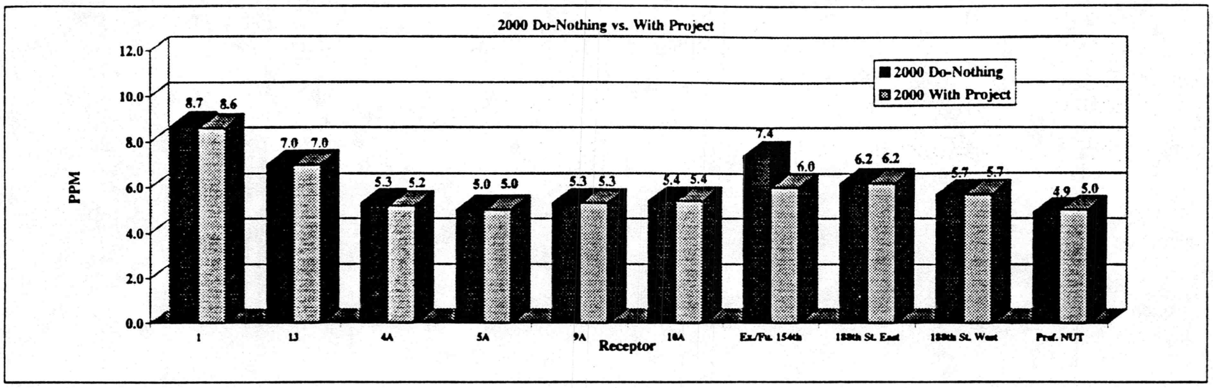
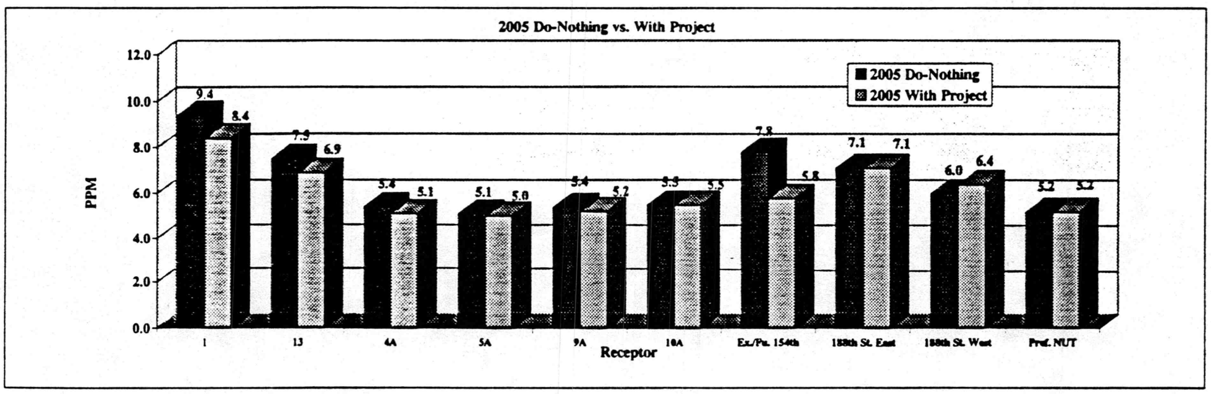
April 30, 1997

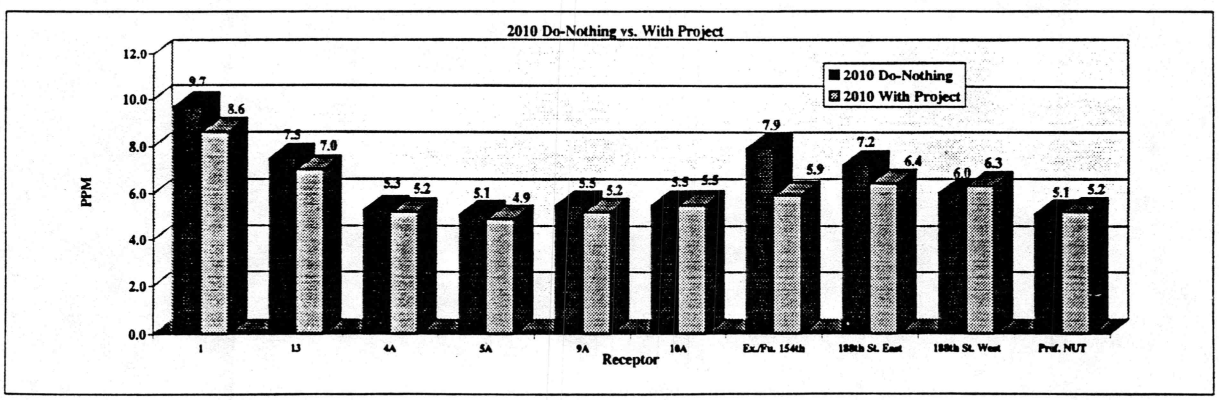
Exhibit 5-2-6
(Page 2 of 3)

Seattle-Tacoma International Airport
Supplemental EIS - Air Quality Analysis

CARBON MONOXIDE 8-HOUR CONCENTRATION (PPM)







Receptors: 1=Terminal-South; 13=Terminal Hotel; 4A=SeaTac Reservoir; 5A=Highline Nurseries; 9A=Sea-Tac Industrial Park; 10A=DesMoines Creek Park; Ex./Fu. 154th=Existing vs. Future South 154th Street; 188th East=South 188th Street, East Receptor; 188th West=South 188th Street, West Receptor.

Note: AAQS = 9.0 ppm
Background = 3.5 ppm

Source: Landrum & Brown, Inc., using EDMS Version 944
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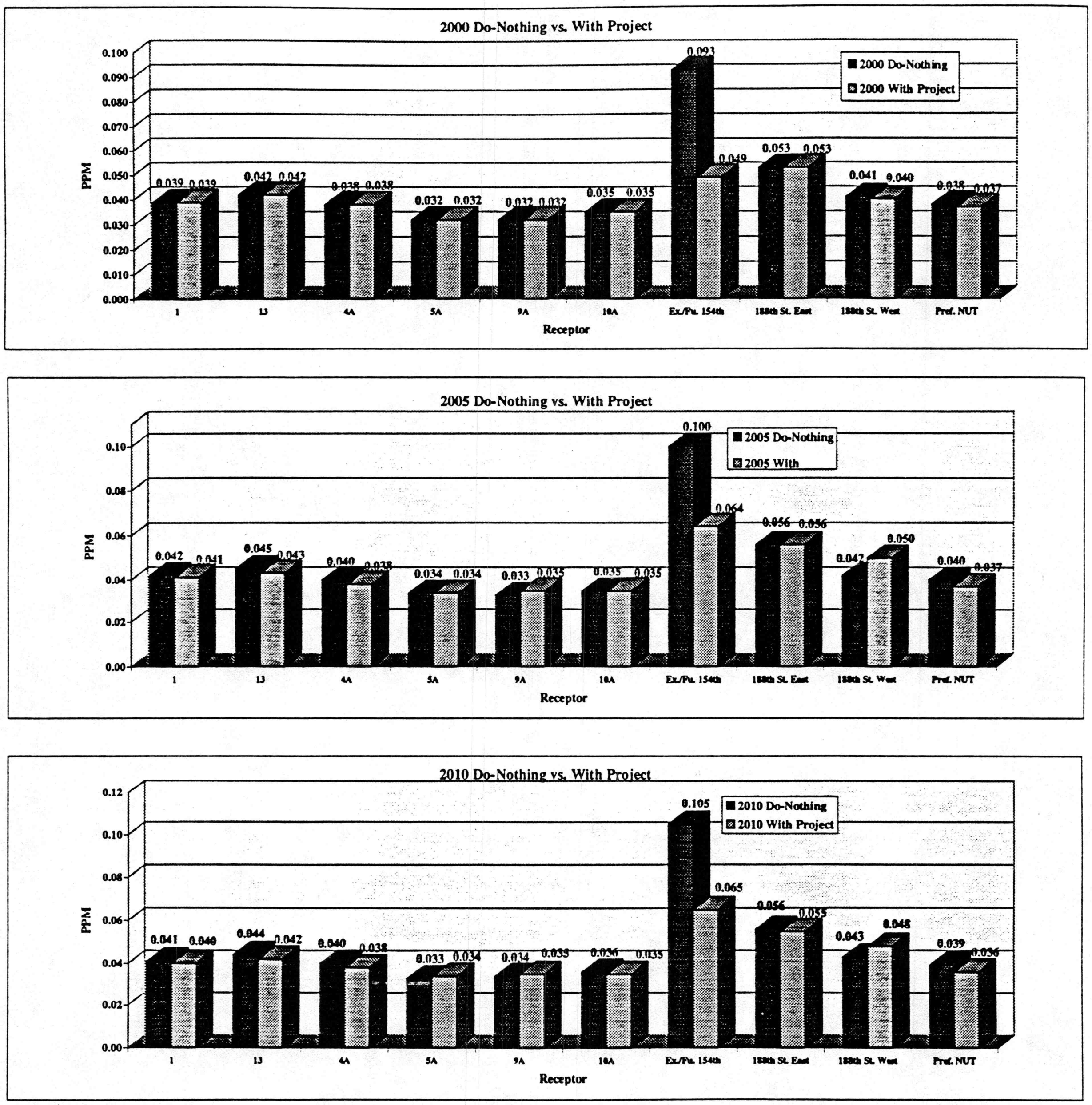
April 30, 1997

Exhibit 5-2-6
(Page 3 of 3)

Seattle-Tacoma International Airport
Supplemental EIS - Air Quality Analysis

NITROGEN DIOXIDE CONCENTRATIONS (PPM)



Receptors: 1=Terminal-South; 13=Terminal Hotel; 4A=SeaTac Reservoir; 5A=Highline Nurseries; 9A=Sea-Tac Industrial Park; 10A=DesMoines Creek Park; Ex./Fu. 154th=Existing vs. Future South 154th Street; 188th East=South 188th Street, East Receptor; 188th West=South 188th Street, West Receptor.

Note: AAQS = 0.053 ppm
Background = 0.02 ppm

Source: Landrum & Brown, Inc., using EDMS Version 944

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April 30, 1997

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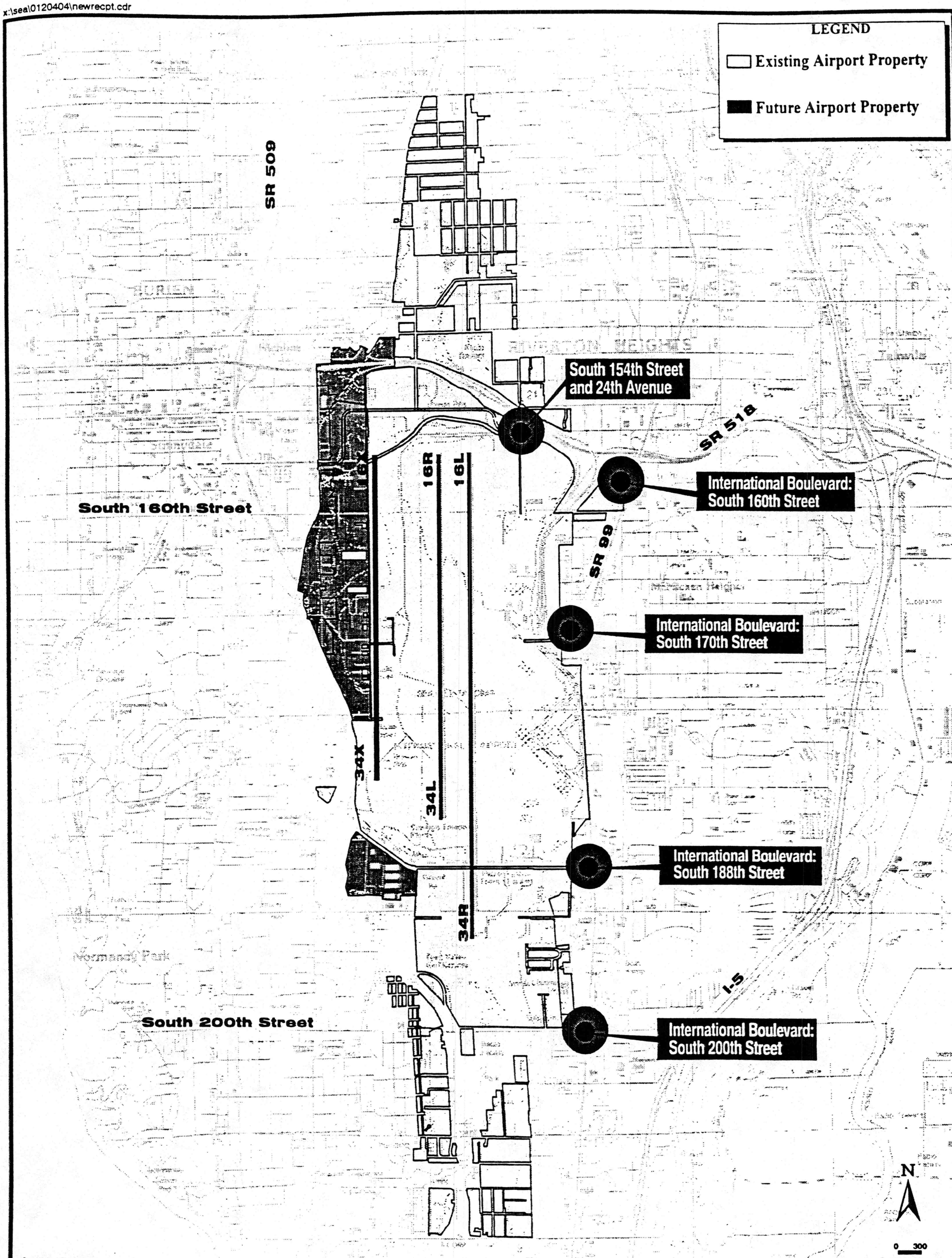
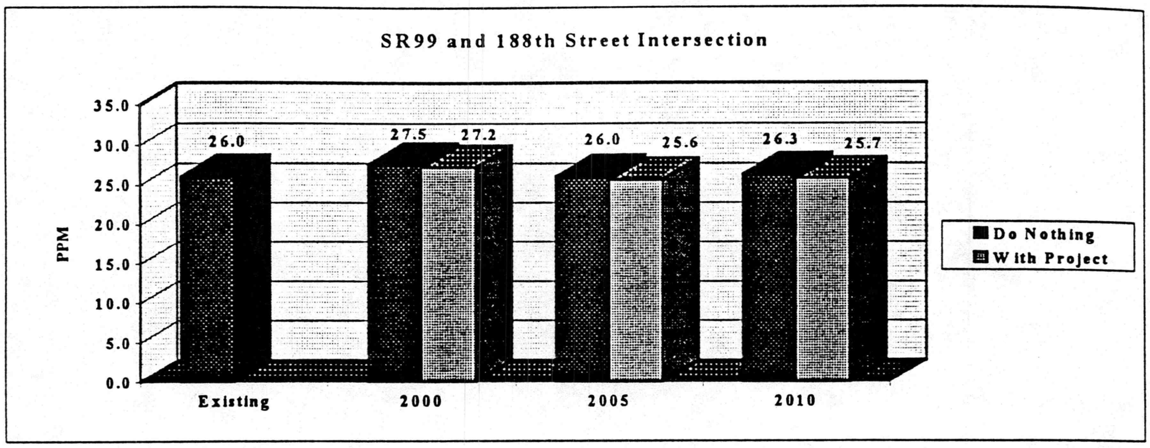


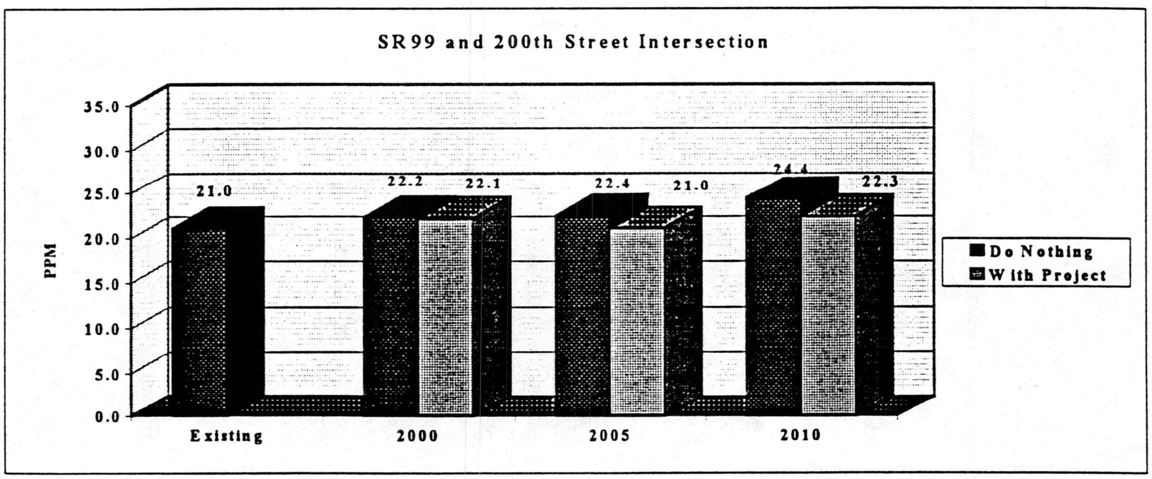
Seattle - Tacoma International Airport	Roadway Intersection Dispersion Analysis	EXHIBIT: 5-2-7

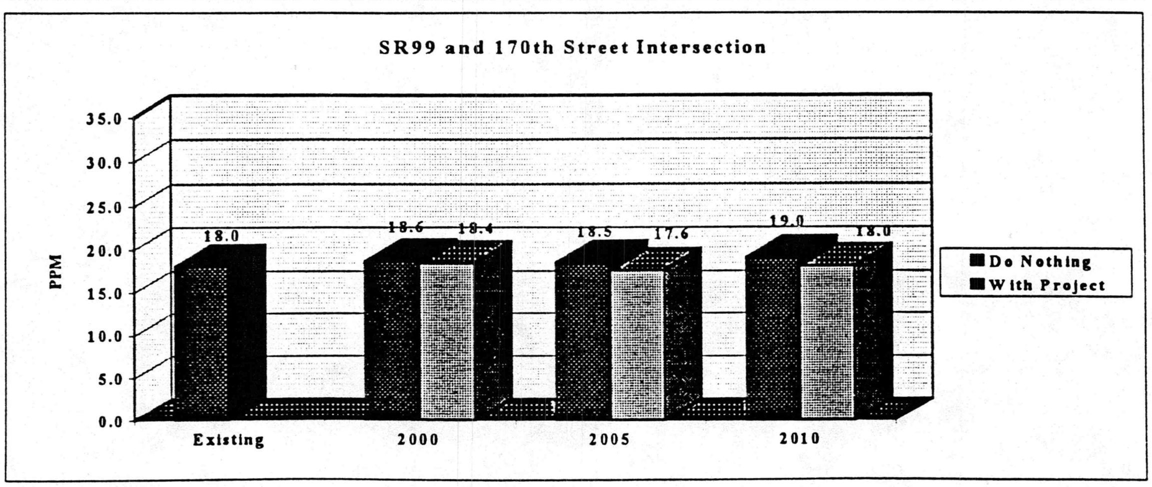
Exhibit 5-2-8
Page 1 of 2

Seattle-Tacoma International Airport
Supplemental EIS - Air Quality Analysis

INTERSECTION DISPERSION ANALYSIS
1-HOUR CARBON MONOXIDE (CO) WITH BACKGROUND LEVEL 5.0 ppm





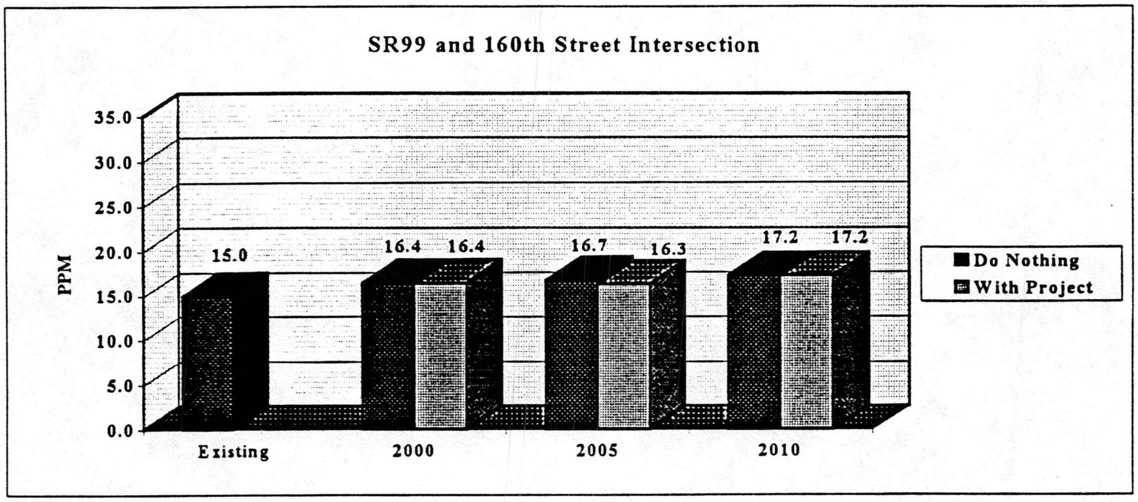


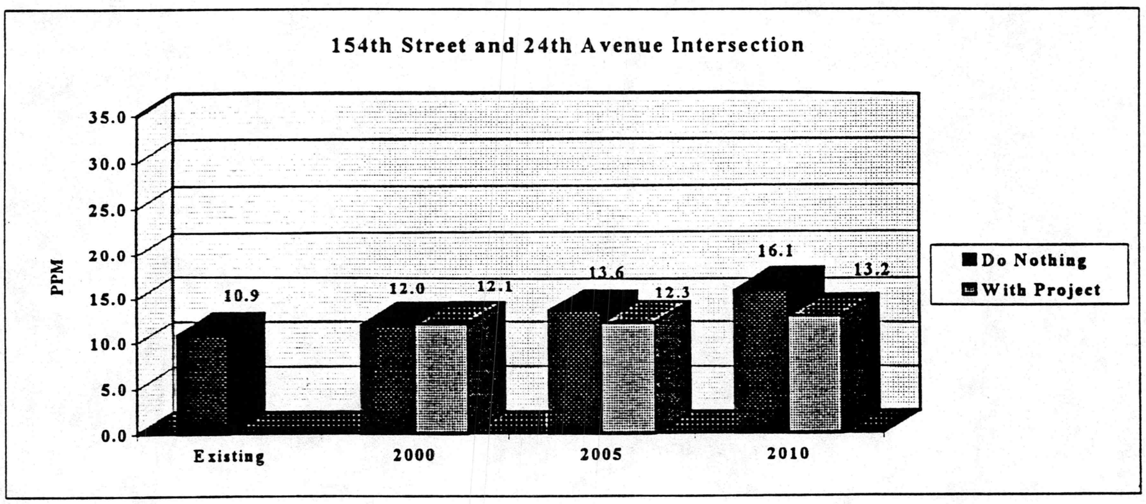
Source: Landrum & Brown, Inc., December, 1996
Note: AAQS=Ambient Air Quality Standards (1-Hour CO=35 ppm)
Intersections modeled are shown on Exhibit 5-2-7.

Exhibit 5-2-8
Page 2 of 2

Seattle-Tacoma International Airport
Supplemental EIS - Air Quality Analysis

INTERSECTION DISPERSION ANALYSIS
1-HOUR CARBON MONOXIDE (CO) WITH BACKGROUND LEVEL 5.0 ppm





Source: Landrum & Brown, Inc., December, 1996
Note: AAQS=Ambient Air Quality Standards (1-Hour CO=35 ppm)
Intersections modeled are shown on Exhibit 5-2-7.

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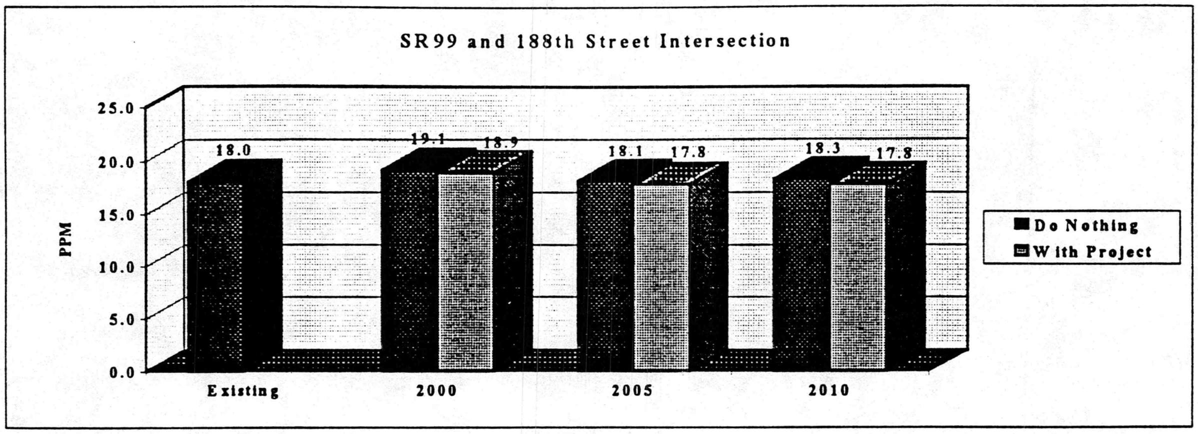
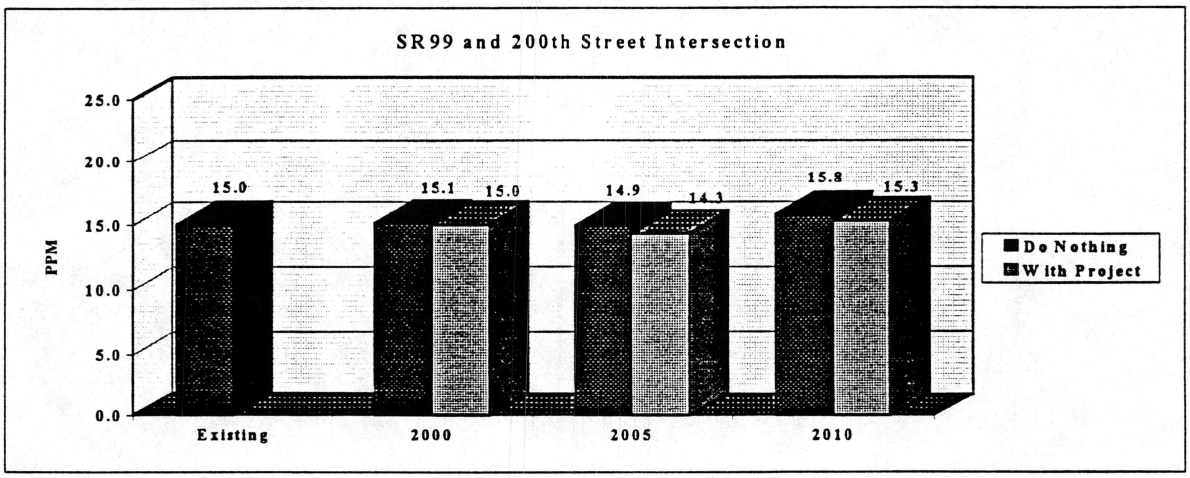
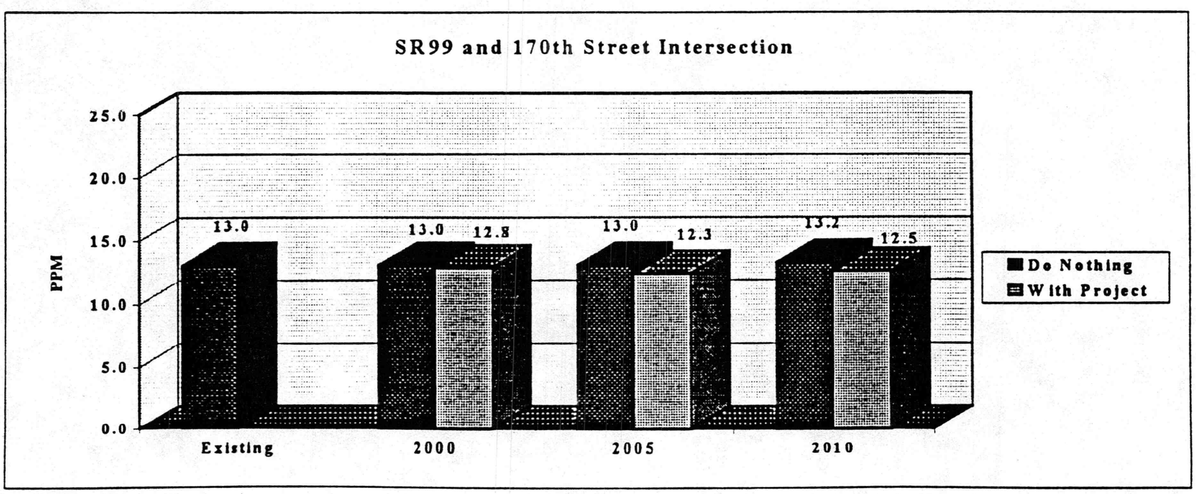
Exhibit 5-2-9
Page 1 of 2

Seattle-Tacoma International Airport
Supplemental EIS - Air Quality Analysis

INTERSECTION DISPERSION ANALYSIS
8-HOUR CARBON MONOXIDE (CO) WITH BACKGROUND LEVEL 5.0 ppm





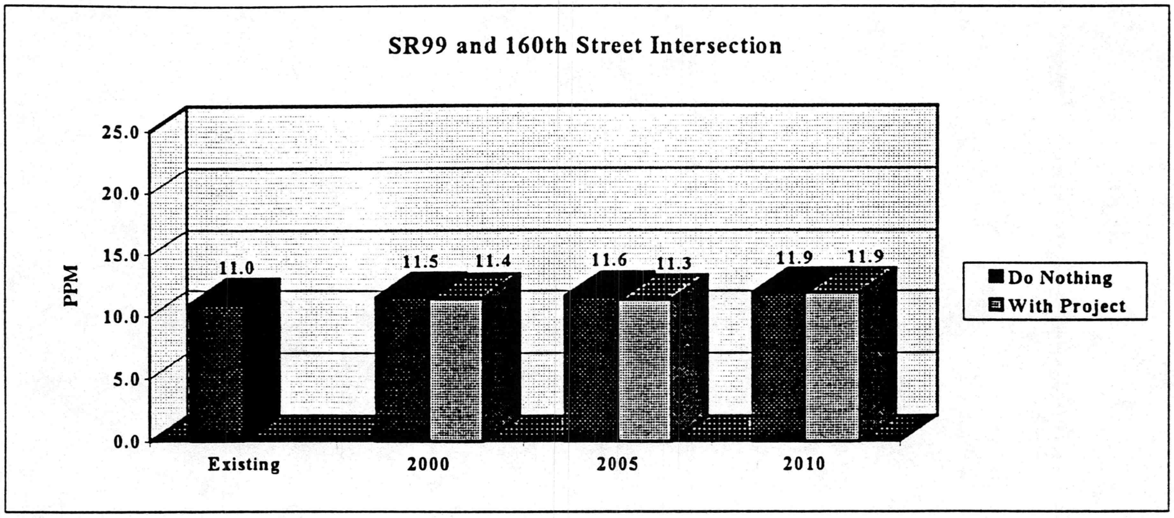


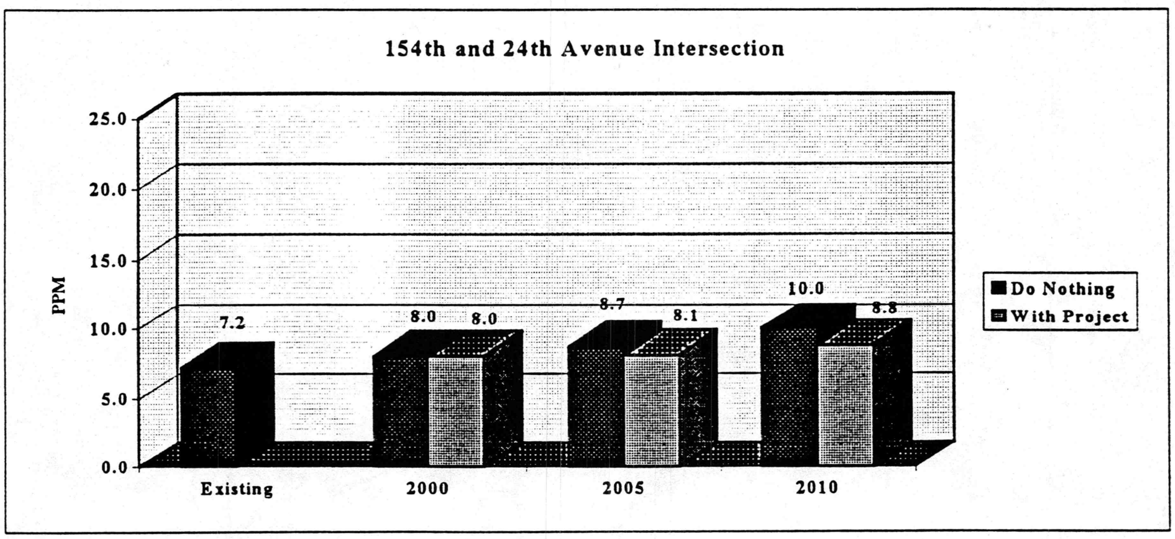
Source: Landrum & Brown, Inc., December, 1996
Note: AAQS=Ambient Air Quality Standards (8-Hour CO=9 ppm)
Intersections modeled are shown on Exhibit 5-2-7.

Exhibit 5-2-9
Page 2 of 2

Seattle-Tacoma International Airport
Supplemental EIS - Air Quality Analysis

INTERSECTION DISPERSION ANALYSIS
8-HOUR CARBON MONOXIDE (CO) WITH BACKGROUND LEVEL 5.0 ppm





Source: Landrum & Brown, Inc., December, 1996
Note: AAQS=Ambient Air Quality Standards (8-Hour CO=9 ppm)
Intersections modeled are shown on Exhibit 5-2-7.

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SECTION 5-4

CONSTRUCTION IMPACTS

Since publication of the Final EIS, new information has arisen that has lead to possible changes in the construction of the Master Plan Update improvements. Chapter 2 of this Supplemental EIS describes the effects of the new Port forecasts on construction phasing. Other construction related changes include:

- Third parallel runway haul duration - the Final EIS analyzed a 3 year haul, with the runway being available for use in the year 2000. This Supplemental EIS analyzes a 5-year haul, with the runway available for use in late 2004. Under this new construction schedule, the peak of hauling would occur in year 2000, with the haul complete in 2002. The lengthening of the haul duration would likely reduce the number of average daily truck trips;[1/]
- Additional haul routes have been identified - the Final EIS examined the primary haul routes that are anticipated to be used. Based on a further examination of barge transfer opportunities and a review of alternative material delivery methods, several additional routes were identified.
- Examination of two temporary interchanges - In addition to the identification of additional haul routes, two temporary, construction-only interchanges were identified: from SR 518 near 20th Avenue South and from SR 509 near South 176th Street.

No changes in the total quantity of fill material have been identified since publication of the Final EIS.

At this time, detailed design and construction plans have not been prepared. Therefore, it is not possible to identify the specific types of construction equipment and frequency of usage that could occur with construction of the proposed Master Plan Update improvements. However, based on a refined examination of possible equipment, additional analysis of possible construction impacts has been prepared. This section identifies a range of construction impacts, assuming two alternative scenarios:

1. Option 1: minimum excavation from on-site sources, and
2. Option 2: maximum excavation from on-site sources.

To implement the proposed new parallel runway and other Master Plan Update improvements, one or more permitted material site(s) off of Port owned land may be used to supply the required fill (or serve as transfer sites from barge to truck). Permitted material sites have or will be subjected to environmental review as part of the appropriate regulatory process that granted the permits and which established conditions of operations. Several municipalities have recently adopted truck route ordinances that may pose additional conditions on operations from individual

[1/] The February 1996 Final EIS examined 109 one-way hourly truck trips based on a 3-year haul. This Supplemental EIS, unless otherwise noted, examines 66 one-way hourly truck trips based on a 5-year haul. These truck levels represent an average hourly truck level over the duration of the haul. Therefore, conditions during any one day could incur higher or lower truck trip levels.

material sites. The process of removing fill material from the source location and transporting it to the fill site must comply with valid and legally enforceable local permits, operating conditions, legal load limits, and restoration associated with the source site(s) and haul routes. This is standard procedure for construction projects in the Puget Sound Region.

Provisions of FAA Advisory Circular 150/5370-10 "Standards for Specifying Construction of Airports", would be incorporated into construction specifications.

(A) METHODOLOGY

A number of assumptions were made concerning the construction of the Master Plan Update alternatives:

- Schedule:
    1. Activities involving the hauling of embankment fill material for the construction of the proposed new parallel runway, the expansion of Runway Safety Areas, and the haul of fill material for the South Aviation Support area are anticipated to occur over a five year period between 1997 and the year 2002. The runway would be available for use in late 2004.
    2. Year 2000 would represent the peak year of haul activity.
    3. Transport of fill material from off-site sources could occur as much as 270 days per year and 16 hours per day. Transport of fill material from on-site sources could occur as much as 210 days per year and 16 hours per day. It is anticipated that during peak periods, haul could occur more than 16 hours a day.
    4. While the analysis presented in this study reflects an average annual haul over the 5 year period, peak conditions with greater truck levels could occur. For instance, during good summer weather periods, truck haul would be anticipated to be as high as 109 one-way truck trips. During winter periods, of cold or wet weather, truck trips could be expected to be substantially reduced.

- On-Site Borrow:
    1. The Final EIS, and this Supplemental EIS, addresses both the likely minimum and the likely maximum use of on-site fill (Option 1 and Option 2 defined previously).
    2. The Port will explore non-trucking alternatives for material extracted from Port land. Alternatives such as conveyer belts could be used to move fill within Port-owned land. To present a worst case assessment, this EIS assumes that on-site fill is transported to the embankment area by truck. Impacts associated with alternative on-site movement of material would be expected to lessen the environmental impacts of conventional truck haul.
    3. The analysis prepared for the Supplemental EIS reflect the average on-site haul over the construction period. It is anticipated that the time to excavate any individual site could take as little as 4 months to as much as about 38 months.

- Off-Site Borrow:
    1. At this time, it is not possible to determine the exact off-site material sources that will be used. Several permitted sites exist within 20 miles of the Airport, sufficient to supply some or all of the material needed for the Master Plan Update improvements. Given the fill requirements of the Master Plan Update, it is also possible that new material sites could be economically developed and permitted. A selection will be made among the material sites based on availability, costs, mitigation requirements for the use of those material sites, and other considerations.

2. Fill may be transported by rail or barge to locations near to the Airport and then trucked or conveyed by belt systems to the Airport construction sites. To present a worst case assessment, this EIS assumes that fill will be most likely transported by truck (or by barge to a transfer site, where trucks would transport the material the remaining distance).
3. Material transported by truck will use freeway, highway, arterial class roadways, designated truck routes, permitted local streets, or Port properties, until reaching the on-airport haul routes. Include in this analysis is use of existing permitted barge transfer sites where material could be transferred from barge to truck .

Table 5-4-1 shows fill requirements associated with the Master Plan Update improvements. The compacted in-place fill requirements were increased by 15 percent to account for swell/shrinkage during placement of transported fill material. Based on an assumed average capacity of 22 cubic yards per truck, about 1,200,000 truck loads of fill would be needed to complete all of the improvements included in the Master Plan Update. Using the five year construction haul period, the average number of trucks required to haul the required material could range from 44 one-way truck trips to 17 trips per hour, per direction for Option 1 (minimum on-site) and Option 2 (maximum on-site) respectively. A factor of 1.5 was assumed to account for average peaking of truck traffic, resulting in off-site truck traffic rates of 66 and 26 trucks per hour, per direction for Option 1 and 2, respectively. On-site truck traffic necessary to haul material would average 33 trucks per hour, per direction or adjusted for peaking to 50 trucks per hour, per direction. Construction vehicles, such as scrapers or loaders, are anticipated for use in moving the common excavation material, with no trips on public roads.

The following contrast the assumptions of this Supplemental EIS with those of the Final EIS:

	Supplemental EIS		1996 Final EIS	
Haul Duration	5 years		3 years	
Total Fill Required (Million Cubic Yards)	23.64		23.64	
<u>On-Site/Off-Site Fill Sources</u>	<u>Option 1</u>	<u>Option 2</u>	<u>Option 1</u>	<u>Option 2</u>
On-Site (Million Cubic Yards)	0	12.35	0	8.0
Off-Site (Million Cubic Yards)	20.74	8.19	20.74	12.54
Common (Million Cubic Yards)[2]	2.90	3.10	2.90	3.10
<u>Average Hr Traffic/Peaking</u>	<u>Option 1</u>	<u>Option 2</u>	<u>Option 1</u>	<u>Option 2</u>
On-Site truck traffic (1 direction)	0	50	0	33
Off-Site truck traffic (1 direction)	66	26	109	66

Option 1= Minimum use of on-site material Option 2= Maximum use of on-site material

As is shown above, and in **Table 5-4-1**, this Supplemental EIS examines possible use of a greater quantity of fill from on-site sources. This Supplemental EIS Option 2 (maximum use of on site sources) evaluated a greater quantity from On-Site Borrow Source #1 relative to the Final EIS, the same as the Final EIS for On-Site Sources #2 through #4, and no material from On-Site Source #5. The revision to On-Site Source #1 reflects the quantity identified by the Preliminary Engineering Study. On-Site Source #5 will not be used to provide material due to the potential operational costs associated with excavation. The net result is that the Supplemental EIS

[2] Material moved from one portion of the construction site to another location in the site.

examines a greater quantity for Option 2 for on-site sources (12.35 MCY versus the Final EIS evaluation of 8.0 MCY).

Of the on-site options, Option 1 would result in the greatest amount of off-airport truck traffic. For Option 1, the Final EIS examined 109 hourly truck trips on all roads, whereas with the new construction schedule and fill source assumption, the average truck trips could be lessened. Therefore, the analysis described in the Supplemental EIS reflects a lower, more realistic level of truck travel on the arterials in the airport area (with 66 on-way truck trips per average hour). With the exception of International Blvd.(SR99), the off-airport site haul routes converge on three roads (I-5, SR 509, SR 518). For these three roads, the analysis relies on the evaluation prepared for the Final EIS with the higher truck trips, which under the longer construction haul period would reflect peak construction conditions on these roads.

(B) SURFACE TRANSPORTATION

The following section summarizes construction related surface transportation impacts. Off airport hauling could affect the level of service on freeways, highways, arterials, and permitted local streets used for hauling. The degradation of service levels would be significant if hauling occurs in congested areas during peak travel times. However, these impacts would be temporary and would be mitigated as a part of actions to be included in the Construction and Earthwork Management Plan and similar mitigation measures. For the purpose of the construction surface transportation analysis, a significant impact was found if the construction activity would create LOS F (or on arterials LOS E or LOS F) or worsen an existing LOS F intersection.

(1) On-Site Source Transportation

Source Locations: Due to wetland impacts, type of material, and operational costs, four of the eight on-airport sites identified by the Preliminary Engineering Study would likely be used to extract fill (Source locations #1 through 4). The location of those sources and potential haul routes are shown in **Exhibit 5-4-1**.

On-site Sources #1 through 4 are located south of South 188th Street and north of South 216th Street. All of Site #2 and portions of #1 and #3 lie within the City of Des Moines. Portions of #1 and #3, and all of Sites #4 and #5 lie within the City of SeaTac.

This analysis assumes a constant hourly rate of truck trips, and accounted for the ability to construct during poor weather. A construction haul period of 210 days per year was assumed to account for the water sensitive nature of the on-site material source soils.

Haul Conveyance Mechanism: As was noted earlier, several means exist for the transport of fill. While trucks are anticipated to be used, contractors may bid use of conveyor systems for the on-site sources. The Final EIS, and this Supplemental EIS, presents a worst case evaluation by assuming truck modes. Use of conveyors would reduce or eliminate truck trips.

Haul Routes and Service Levels: Transport of the material from the southern on-site material sources would most likely use on-site haul routes constructed within or adjacent to the on-site sources to reach South 200th Street, whereupon the trucks would either access directly into the area known as SASA or to the on-airport roadway system. Construction activity could cross South 188th Street via the runway bridge or an at-grade flagged crossing (which would not be used during peak traffic hours). Because off-site routes could be used, the EIS assessed their use.

Construction trucks from On-Site Sources #1 through 4 could use South 200th Street to access Des Moines Memorial Drive and Starling Drive at the intersection with South 188th Street. Both South 200th Street and Des Moines Memorial Drive in this area are designated truck routes. As residences exist along both South 200th Street and Des Moines Memorial Drive, travel conditions were examined along these routes. This analysis showed that entering sight distance, roadway width, and shoulder conditions are adequate for safe truck traffic along these roadways. Through the year 2000, all intersections along this alternative construction route are expected to operate at LOS C or better. The use of both South 200th Street and Des Moines Memorial Way may require rehabilitation of the pavement at the end of the construction period.

On-Site Source #2 is anticipated to be connected to Site #1 via a constructed east-west haul route, and then use the on-site haul route through Site #1 to South 200th Street. This route would roughly parallel South 216th Street, traversing the existing WsDOT SR 509 Extension right-of-way. In the event that this haul route could not be constructed, the Port could seek permits from the City of Des Moines for the use of South 216th Street as an alternative route, between Sites #1 and #2.

As was noted earlier, no material is anticipated to be excavated from On-Site Source #5 or #8.

(2) <u>Off-Site Source Transportation</u>

As noted earlier, the amount of truck trips that would occur would depend on the quantity of soil obtained on-site versus off-site, as well as the source of material, its quality, and weather conditions. Using the new construction timetable, Option 1 (minimum on-site) versus Option 2 (maximum on-site) off-site truck trips necessary to transport required import material could range from 66 to 26 trucks per hour, per direction respectively, adjusted for peaking conditions. As was noted earlier, the evaluation prepared for this Supplemental EIS reflects the use of this lower, average annual haul, while the converge points in the Airport vicinity (I-5, SR 509, and SR 518) reflect the higher 109 one-way trips, reflecting the greater possibility of peak traffic occurring on these roadways.

Source Locations: Eighteen (18) off-site material source locations were identified in the Final EIS. Potential haul routes to access those sites are depicted in **Exhibit 5-4-2**. Based on a further review of the off-site sources, the truck haul would most likely focus on Off-Site Sources 4 (SeaTac-Kent-Tukwila), 7 (Auburn), 9 (Maltby), 11 (Black Diamond), 11A (Black Diamond), 12 (Covington/Kent), 13 (North Bend), 15 (Maury Island), and a potential future site at the Maury Island King County Park (15A) due to the quantity of material these sites can provide, and the condition of the roadway access to these sites. **Table 5-4-2** lists the following haul route characteristics for these off-site locations: roadway jurisdiction; roadway classification; number of lanes; current pavement condition; speed limit along route; and existing average daily traffic volumes.

Most of the probable off-site material locations are currently permitted. Sites 11A, 13, and the Maury Island King County Park site could require additional permits.[1] Most likely a combination of sites would be required to comply with hours of operation and future truck route conditions. For these off-site sources, the expected haul routes are arterial or highway roads, in 'fair' or better pavement conditions. No safety concerns are anticipated due to sight distance or roadway configuration. **Table 5-4-3** summarizes the conditions along the off-site haul routes, and Final EIS evaluations of potential use of the off-site material sources.

[1] Currently, the Maury Island King County Park site is not permitted, although one would be anticipated with the grading associated with the King County project. The other Maury Island site has been exhausted of fill material under the present permit requirements. Weyerhaeuser is presently working with the owner concerning expansion of the fill capability.

The Port also anticipates the use of suitable fill material from other construction projects in the region as well as possible sources outside the region/state or country. The Final EIS and this Supplemental EIS analyze the impact of virtually all likely routes that converge on the Airport construction site. Transport of material in the immediate vicinity of those other regional construction projects would be assessed in the environmental approval documents for those projects.

Haul Conveyance Mechanism: Similar to the on-site source conveyance, trucks are expected to be the likely mode of transport from off-site sources. Other potential ways of providing material to the construction site involve barges to the Duwamish area from sites #15 and the King County Parks site (#15A), and/or rail supplied material from site #9 to either the Duwamish or Kent Valley areas. Material barged or rail transported to the Duwamish could be trucked to the Airport via SR 509. In 1996, the Port of Seattle completed the first phase of an Alternative Delivery Method Study that identified several barge sites in the Duwamish where fill could be transferred from barge to truck. The feasible sites include several existing private operations (including Lone Star, Cadman, Ash Grove, etc.), and Port properties at: Terminal 105, Terminal 115, and Terminal 106 West-Container Freight Station (W-CFS). Capacity exists, as the private operators currently operate subject to appropriate permits for the transfer of such fill material, and these facilities could be used in accordance with their permit requirements. Port owned land was also considered. Terminal 2 and Terminal 18 could also be used, but would require haul traffic to cross congested intersections at Southwest Spokane Street. Port owned properties at Terminal 105 and Terminal 115, and the private operations have existing capacity to enable barge traffic associated with the Sea-Tac Airport fill requirements and are located south of Southwest Spokane Street, along West Marginal Way (a four lane arterial that is in good condition with light to moderate traffic volumes). SR 509, south of West Marginal Way, currently operates at LOS E and is anticipated to remain at LOS E through the year 2010. **Exhibit 5-4-3** shows the locations of these sites.

Material transported by rail to the Kent Valley area could be trucked to the site, but due to roadway congestion in that area, trucking may be limited to evening and night periods. Required environmental review would be conducted and compliance with permitting requirements would occur prior to development of a new rail station or rail spur for this rail alternative.

An alternative to the import of off-site material by trucks has been suggested. This alternative could use a conveyor belt system to transport material barged or transported by rail to a site in the general vicinity of the Airport. Based on one proponents suggestion, several conveyance routes were reviewed. These include: conveyance south from the Duwamish industrial area along SR 509, conveyance from the Kent valley west along Orilla Road, and conveyance from Puget Sound, along the Des Moines Creek. The Port's 1996 Alternative Material Delivery Study performed a more detailed consideration of the alternatives. That study found that only the Des Moines Creek and SR 509 routes to be technically viable alternatives to conventional truck haul. The SR 509 route would result in significant right-of-way difficulties.

The Des Moines Creek route is in the initial stages of development by a private proponent. It is anticipated to require an in-water of Puget Sound off-load and docking station near the Des Moines Beach Park, and installation of an above-ground conveyor belt system approximately two miles along the Des Moines Creek Park via a Midway Sewer District easement to the construction site. The advantages of this proposal is that it has been used effectively on other large scale projects and it could effectively eliminate all off-site fill material truck transport. Due to the size and quality of the material sites that could barge material, this alternative could also eliminate the need for use of the on-site material sources. The conveyor belt proponent has obtained an agreement with the Sewer District for the use of the easement, but has not obtained other permits or environmental review which could be insurmountable. Thus, the Final EIS (and this Supplemental EIS) assumes transport of material by truck (and a truck/barge combination). Required environmental review would be conducted and compliance with applicable permitting requirements would occur prior to development of an off-site conveyor system and any associated facilities.

Haul Routes and Service Levels: The Final EIS examined the haul routes that were believed to be the routes most likely to be used. However, since completion of the Final EIS, additional routes have been identified that could be used by construction traffic. Routes that were not examined in the Final EIS, but assessed in this additional analysis are:

- I-5 from the North or South to South 188th Street, to Starling Drive
- I-5 from the South to South 200th Street to International Blvd. to South 188th Street to Starling Drive
- I-5 from the South to Kent-Des Moines Road (SR 516) to International Blvd./SR99 to South 188th Street to Starling Drive
- South 154th/156th Street, Southcenter Blvd., SW Grady Way
- State Route 509 to South 176th Street temporary construction traffic access
- State Route 518 to 20th Avenue South temporary construction traffic access
- State Route 518 to International Blvd. to South 192nd Street
- I-5 from the North or South to South 188th Street, to 28th Street South to South 192nd Street
- I-5 from the North or South to South 200th Street, to 28th Street South to South 192nd Street
- I-5 from the South to Kent-Des Moines Road (SR 516) to International Blvd./SR99 to South 192nd Street

All haul routes considered by this Supplemental EIS are shown in **Exhibit 5-4-2.**

Contractor use of off-site material sites east of I-5 would require the use of I-5 or I-405 to reach SR 518 and SR 509 to access the Airport construction site. Use of material sources located on Maury Island, Port Gamble, or the Dupont area are expected to be barged into the Duwamish and trucked to the Airport construction site. Level of service analysis throughout the day for year 2000 volumes at key locations with conditions expected to cause congestion impacts due to increased volumes of heavy vehicles were performed. Year 2000 traffic was chosen as a worst case condition, even though most construction haul activities are to occur before then, as well as up through 2002. Year 2000 is anticipated to represent the peak period of haul.

As is shown in **Exhibit 5-4-2**, all haul routes (with the exception of SR 99/International Blvd) converge on either I-5, SR 509 or SR 518 in the immediate Airport vicinity. Therefore, for the purpose of this evaluation, I-5, SR 509 and SR 518 were evaluated using a 109 one-way peak hour truck trips and the remaining roadways were examined using the lower 66 one-way truck trips. The higher 109 trips reflect peak construction conditions on these converge points, while the lower 66 represents the peak construction conditions on these other roadways, either due to congestion or distance/location relative to the construction site.

Results of the level of service analysis are summarized in **Table 5-4-4.** Analysis conducted by the Final EIS for both minimum and maximum off-site truck traffic found that varying impacts to the regional transportation network were predicted where background levels of congestion are near or exceed roadway capacity and where extended grades exist.[a] The minimum off-site truck traffic examined in the Final EIS corresponds to the maximum truck traffic now expected as a result of the changes to the Airport Master Plan discussed previously in this supplemental analysis. The year 2000 was used as the forecast year in the Final EIS analysis of the regional system, and under the new construction schedule would represent the peak year of construction activity for the third parallel runway.

In the Final EIS, there were six (6) locations where the maximum (109 one-way truck trips) off-site haul truck volumes would reduce the expected operating conditions to LOS F from a LOS E or higher (or deeper into LOS F) relative to the "Do Nothing" condition. These included:

1. I-5 southbound between SR 518 and South 188th Street during the Midday and PM peak hours of the day.
2. SR 518 westbound between I-5 and SR 99 during the PM peak.
3. SR 18 westbound, between I-5 and SR 167 during all hours except the evening and night hours.
4. SR 167 southbound, between I-405/Carr Street, during the PM peak.
5. I-405 northbound between SR 167 and I-5, during the AM peak and the PM peak.
6. I-405 southbound between SR 167 and I-5 during the Midday and PM peak.

At the reduced volumes associated with a longer construction period, deterioration to LOS F from "Do Nothing" conditions occurs at five (5) regional system locations:

1. Interstate 5 Southbound between SR 518 and South 188th Street during the PM peak.
2. SR 18 westbound, between I-5 and SR 167 during all hours except the evening and night hours.
3. State Route 167 Southbound, between Interstate 405 and SW 34th Street, during the PM peak.
4. Interstate 405 Northbound, between State Route 167 and Interstate 5, during the AM and PM peak.
5. Interstate 405 Southbound, between State Route 167 and Interstate 5, during the Midday and PM peak.

Haul truck access directly to the Third Runway construction site from either State Route 509 at South 176th Street or from State Route 518 in the area of 20th Avenue South may be occur through the development of construction only temporary interchanges. Construction access from State Route 509 and State Route 518 would be temporary, being used only during construction of the Third Runway by construction related traffic. Key issues involved in WSDOT permitting of these access points would be operational affects on State Route 509 and State Route 518, as well as safety and traffic control. LOS conditions with these facilities are:

<u>State Route 518</u>

• West Bound Off Ramp to 20th Avenue South	LOS C
• East Bound On Ramp from 20th Avenue South	LOS B

[a] *Final Environmental Impact Statement for the Proposed Master Plan Update Development Actions at Seattle-Tacoma International Airport*, February 1996, Section 23, B-2, p. IV 23-4

State Route 509

• South Bound Off Ramp to South 176th Street	LOS C
• North bound On Ramp from South 176th Street	LOS B

Peak Hour (PM) level of service analysis was performed for major intersections along these routes for the five year haul process. Level of service results are summarized in **Table 5-4-5**. Of the 40 intersections analyzed, 14 degraded to LOS E, or further into LOS F, when compared to the Do-Nothing condition as a result of the construction truck traffic.

Most intersections listed in **Table 5-4-5** are only affected by a few of the alternative truck routes. Level of service was calculated for all intersections for all alternatives in order to also determine the affects of trips generated by the Preferred Alternative and construction employee traffic. As was the case for the Final EIS, construction employee traffic was estimated as 50 vehicles per hour during the peak hour.

Potential airport vicinity haul routes were reviewed to supplement off-site route analysis performed under the Final EIS. A summary of that review is included as **Table 5-4-5**.

All of the additional haul routes identified through the Alternative Materials Delivery Study are minor arterial or above in classification, in fair or better pavement condition. Evaluated routes within the City of SeaTac are designated truck routes, although South 188th Street, South 200th Street, and Des Moines Memorial Drive south of South 188th Street has abutting residential land use.[3] All the additional routes considered serve commercial or industrial areas and have existing truck movements. The additional routes are classified appropriately for use by truck traffic, subject to any truck ordinance restrictions or street use permits.

(3) Temporary Construction Only Interchanges

The Port of Seattle is considering the development of construction-traffic-only interchanges that would be developed to enable transport of fill material directly from State roads onto Airport property. Two interchanges are being considered: 1) from SR 518 near 20th Avenue South and 2) from SR 509 near South 176th Street. Use of these interchanges would be envisioned to be used solely by airport construction traffic. The purpose of their development and use would be to minimize impacts to the off-airport arterial roadway system and adjoining neighborhoods.

The SR 518 interchange could be completed in the location of the future ramps proposed by the Master Plan Update near 20th Avenue South. While the ramps are not needed for public traffic until the development of the North Unit Terminal, the ramps could be developed earlier to serve as an interchange for the construction traffic. No homes or businesses are located in the immediate vicinity of this location and, therefore, no adverse impacts on the built or social environment would be expected. All natural resource (water, wetland, biotic communities, floodplains) impacts associated with the use of a construction interchange would be the same as would occur with the public access ramps addressed by the Final EIS and this Supplemental EIS. Air quality impacts would be less than if all traffic were to access the site from South 160th Street/SR 509, which is projected to be well below the AAQS.

The SR 509 interchange would occur in the vicinity of the South 176th Street overpass. This interchange would be developed to only accommodate airport related construction traffic, and would be abandoned after completion of the runway embankment. This interchange could be developed within the current WSDOT right-of-way, and thus would not disrupt any significant natural resources. Homes on the east side of SR 509 are being acquired as part of

[3] *City of SeaTac, Comprehensive Transportation Plan*, February, 1994, Figure 3, Truck Route Plan

the Master Plan Update. A few residences exist west of SR 509, along South 176th Street. Impacts to these residential areas would be similar to those that would occur if the existing South 160th Street were used, and are discussed throughout this section, which would not be significant.

During construction of the temporary interchange(s) construction impacts would occur including, additional roadway traffic, movement of earth to develop the interchanges, etc. Construction impacts would be minimized through the implementation of the construction best management practices shown in **Table 5-4-8**.

(4) Cumulative On-Site and Off-Site

The proposed new Runway embankment and runway safety areas lie along the west side of the existing airfield. Potential direct access from existing roadways include South 154/156th Street, South 160th Street, Starling Road, Airport Perimeter Road, and associated airport security roads. Haul traffic would reach these roads from SR 518, the Northern Airport Expressway, Air Cargo Road, Des Moines Memorial Drive, SR 509, South 188th Street, and 24th Avenue South. Construction traffic transporting off-site fill material requirements for SASA are anticipated to use SR 509, South 188th Street, and 28th Avenue South. The traffic level of service both with and without construction traffic was calculated at key intersections and freeway locations, and for combinations of on-site and off-site truck volumes.

Airport construction traffic could result in a degradation in levels of service on area roads during construction. This degradation could be significant, particularly where background levels of congestion are at or exceed capacity. However, there are periods and routes which can be used to haul the required material to the site without significant degradation of levels of service.

WSDOT, upon review of the information developed for Final EIS, requested several conditions as mitigation for use of the State Highway System: Based on WSDOT comments and the revised surface transportation analysis, the following were identified in addition to those listed in **Table 5-4-8:**

- Legal load limit and other hauling requirements must be enforced on State Highways. In addition to weight requirements, this requires top of loads to be 6 inches or more below top of truck bins (freeboard) or use of covered loads.

- Coordination must occur with the WSDOT Construction Traffic Office regarding all haul routes on State Routes. Coordination must be maintained through the Construction Traffic Office in order to minimize conflicts between Port construction activities and any WSDOT projects along the haul routes.

- The Port should consider restricting hauling activities during peak hours through congested areas of the State Highway System.

- Provisions should be considered that would handle complaints of broken windows and other damage to vehicles caused by flying debris off the trucks identified as associated with these projects.

- Haul truck traffic should avoid or minimize use of arterial routes with afternoon peak hour congestion of LOS E or LOS F. This would include State Route 99 between State Route 518 and State Route 516, South 188th Street, and South 200th Street.

- Haul truck traffic should avoid or minimize use of arterial routes during evening and night conditions with abutting residential land use. This would include South 188th Street, South 200th Street, South 154th Street/Southcenter Boulevard/Grady Way, and Des Moines Memorial Drive.

- Many of the potential haul routes are scheduled for reconstruction or improvements between 1997 and the year 2005. Haul truck traffic should avoid or minimize use of those routes while under construction. The contractor should be required to coordinate activities with contractors working on roadway projects.

(C) SITE AESTHETICS

As part of continued preliminary design associated with the proposed third parallel runway, additional consideration has been given to the layout of the area where the runway would be developed. Additional review was also performed of the on-site borrow sources. The following summarize these efforts.

1. Westside Third Runway Embankment

A number of comments have been received requesting clarification of how the embankment would look when complete and how it would appear to residents living west of the Airport. **Exhibit 5-4-5** illustrates possible conditions in the northern portion of the site as well as the southern portion. These illustrations show a site where a retaining wall may be used while the other site shows the earth embankment with a 2:1 slope.

2. Borrow Source Areas

The following summarize the on-site borrow source locations, which are shown in **Exhibit 5-4-1**. The Master Plan Update does not identify an eventual use of this land, as no specific users or uses have been identified. However, to provide a greater understanding how the site would be excavated, a visualization of the property after excavation was undertaken. The following paragraphs summarize the sources and possible after-use options:

- **Borrow Site Area 1** - this site consists of approximately 111 acres and is located South of the Airport at the corner of South 216th Street and 24th Avenue South. The north and west sides of the site is bound by Des Moines Creek Park and the Washington State Department of Transportation (WSDOT) SR 509 Extension right of way and is located in the City of Des Moines and City of SeaTac. The site is mostly vegetated by a mixture of Douglas Fir, Western Red Cedar, Alder, Cottonwood, Ferns, Salal, English Ivy, and Brambles. Existing topography is characterized by gently sloping from the east to the west toward Des Moines Creek with significantly steep slopes on the northwest side.

- **Borrow Site Area 2** - is located south of the Airport approximately at the corner of South 216th Street and 15th Avenue South and consists of 17 acres. Bordering the site to the west and the south is residential development, with future Business Park zoning to the south. The north and east sides are bound by the Des Moines Creek and the existing WSDOT right of way. The site lies entirely within the limits of the City of Des Moines. Primarily existing vegetation includes mostly grasses with some mix of Douglas Fir, Western Red Cedar and minimal ornamental shrubs, the northwest corner of the site is heavily wooded with Douglas Fir, Western Red Cedar, Alder, Cottonwood, with an understory of ferns, salal, and blackberry. The existing topography is primarily gently sloping toward the Des Moines Creek drainage area. This site has been identified as the potential park and recreational opportunity area with view points identified in the northwest corner at approximately elevation 250.

- **Borrow Site Area 3** - consists of approximately 60 acres at the northwest corner of South 200th Street and 15th Avenue. Bordering the site to the north and east is WSDOT right of way and Des Moines Creek Park. To the west is residential development and to the south is Des Moines Creek. The site is split between the City of Des Moines and the City of SeaTac at approximately South 208th Street. The site is mostly vegetated heavily with Douglas Fir, Western Red Cedar, Alder, and Cottonwood with an understory of blackberries, salal, ferns, English Ivy, and grasses. The existing topography is characterized as gently sloping to the southeast with steep slopes adjacent to the Des Moines Creek ravine on the southern end of the site. The southern end of the site is identified as having potential for recreational/open space opportunities which will link to the potential park site in Area 2. The site offers view opportunities down to the Des Moines Creek from the southeast corner of the site.

- **Borrow Site Area 4** - Site 4 is an area of approximately 40 acres in size and is located to the west of Tyee Golf Course. Bordering the site to the north is South 196th Street which includes existing residential development. The site is bound by South 200th Street to the south and the proposed WSDOT right of way to the east. Area 4 lies solely within the City of SeaTac and its future zoning designated by the city is Industrial. Access to the site is primarily from South 196th Street and 18th Avenue South. The site is heavily wooded with a mix of Douglas Fir, Western Red Cedar, Alder, Cottonwood, Salal, ferns, and blackberry. The existing topography of the site is described as a hillside with a knoll located approximately in the center of the site, with primary drainage to the golf course.

- **Borrow Source Area 5 and 8 -** Several borrow source areas were identified north of the existing airfield. Because of operational issues, the Port does not propose to excavate material from Borrow Source 5. No material would be excavated from Borrow Source 8 due to the quantity of wetland on that site.

In examining how the sites could be left upon excavation, a number of possible objectives were identified, including:

- **Access and Circulation**
  1. Link the various functional use portions of the site with pedestrian and bicycle trails.
  2. Provide adequate vehicular access to redevelopment. Access could be from South 216th Street, 24th Avenue South, 15th Avenue South, 18th Avenue South, South 200th Street, the proposed SR 509 Extension.
  3. Take advantage of SR 509 alignment for trail locations.
  4. Explore use of the Des Moines Creek natural area for trail use.
  5. In conjunction with commercial redevelopment, explore a multi-purpose trail system throughout the borrow area to optimize pedestrian and bicycle opportunities.

- **Redevelopment Sites**
  1. Adequately buffer the borrow site(s) from adjacent residential areas. As is shown in **Exhibit 5-4-6**, about 96 acres of open space could serve as a buffer to surrounding land uses (Area 1 could provide 34 acres, Area 2 - 17 acres, Area 3 - 21 acres, Area 4 - 24 acres);
  2. Site grading should optimize the amount of borrow material from redevelopment sites.
  3. Contour edges of borrow sites to optimize stands of existing trees to maximize buffering opportunities while minimizing costs to Port of Seattle. The slopes could be terraced with new evergreen and deciduous plants to provide a visual buffer to adjacent land uses. Existing vegetation would be preserved within a 30-foot right-of-way adjacent to redevelopment areas.

4. Maximize opportunities within overall borrow site for redevelopment. Approximately 132 acres of land could be developed for commercial uses.

No specific development plans exist for the borrow source locations after material is excavated. However, the features identified in the preceding section represent possibilities that the Port would pursue in obtaining any permits to excavate the material.

(D) NOISE

Noise impacts will occur in the vicinity of the construction sites associated with the "With Project" alternatives. Earth work and site preparation activities will result in elevated levels of noise generated by the types of equipment used on most construction sites. Noise from this equipment would vary from model to model, and would change according to the operation (type of construction) involved. **Table 5-4-6** lists an estimate of the typical sound level energy from each basic type of construction equipment. The total sound level energy is essentially a product of the machine's sound level, the number of such machines in service, and the average time they operate.

TABLE 5-4-6

CONSTRUCTION EQUIPMENT NOISE

Type	Typical Sound Level dB(A) at 50'
Dump Truck	88
Portable Air	81
Concrete Mixer	85
Jackhammer	88
Scraper	88
Dozer	87
Paver	89
Generator	76
Pile Driver	101
Rock Drill	98
Pump	76
Pneumatic Tools	85
Backhoe	85

Source: *Handbook of Noise Assessment*,, May, D.N. Page 215. Van Nostrand Reinhold Company, New York, 1978

Although pile drivers and rock drills produce the greatest sound levels, it is dump trucks, air compressors, and concrete mixers that, due to their greater number or longer operating times, produce the most total sound energy. However, with a few exceptions, there would be limited off-airport construction-related noise impacts because of the distances of most residential areas from the sound sources at the various construction sites. A pile driver and rock drill are not anticipated to be used in the borrow source areas or in the runway embankment area. Therefore, the primary vehicles to be used in the construction of the embankment would be dump trucks (Option 1 with minimum use of on-site material could result in 66 average off-site truck trips per hour). Therefore, dump truck traffic noise would be the most significant during the construction period.

Based on the maximum hourly number of truck trips prepared for the February, 1996 Final EIS, the FHWA's STAMINA 2.0 model was used to quantify the changes in noise exposure to residential areas located along the haul routes. The analysis from the Final EIS was not updated, as the higher traffic levels associated with the Final EIS (with 109 average hourly one-way trips) was shown to not produce a significant change in roadway related noise levels. The following peak hour average sound level changes were identified, based on the February, 1996 Final EIS average 109 hourly trips:

- With maximum use of on-site material, property located along South 200th Street, between the on-site borrow sources and Des Moines Memorial Drive could experience construction noise levels of as high as 5.5 dBA over existing roadway-related noise levels if South 200th Street is used as a haul route. However, in this area, aircraft noise levels are substantially greater than the peak hour average construction related roadway noise levels;
- Residences facing Des Moines Memorial Drive, between South 200th Street and SR 509 would experience an increase in sound level of about 3.6 dBA due to airport-related construction haul;
- With maximum use of off-site sources, residences facing South 160th Street east of the SR 509 interchange could experience an increased peak hour average roadway-related noise levels of about 7.6 dBA due to airport-related construction haul. Because of this increase noise level, the area between Des Moines Memorial and the new runway embankment is proposed for acquisition.

With the 5-year haul presented earlier, the Option 1 truck trips would be 66 per hour instead of the 109 analyzed above. As less truck traffic would generate less noise, the longer construction duration would reduce hourly and daily noise levels. However, instead of occurring over a 3 year period, the noise exposure would occur over a 5 year period.

While construction related noise could increase by 5 dBA or more above existing or Do-Nothing (a substantial increase) with the 109 one-way truck trips assessed in the February 1996 Final EIS, according to Washington State Department of Transportation guidelines, these impacts are not permanent changes in noise levels, and are, thus, exempt from the 5 dBA criterion. The construction noise impact exemption, however, does not apply during nighttime hours (10 p.m. to 7 a.m.). As a result, the Port will develop the Construction and Earthwork Management Plan to minimize nighttime noise impacts on noise sensitive facilities adjacent to the haul routes. However, even with noise management actions in use during the nighttime hours, residents west of the proposed runway may experience dump truck related construction noise. Consideration was also given to the noise that could be experienced in the residential areas near the borrow source locations. The following summarizes these noise levels:

- Runway Embankment - the earth moving equipment in this area is anticipated to generate a noise level of 91 dBA at 50 feet from the noisiest source. Sound would be reduced to noise levels equivalent to ambient daytime noise in nearby residential areas (about 60 dBA). During periods of low aircraft traffic, residential areas west of Des Moines Memorial Way could experience elevated sound levels from construction activity associated with the third parallel runway embankment.
- Borrow Source Areas - based on the anticipated usage of earth moving equipment, maximum noise levels 50 feet from the equipment could reach 94 dBA. However, given the proposed site grades, buffering, and distances of the sites from residential areas, construction noise levels would be less. Each of the borrow source locations is directly under the flight path of the existing runways and currently receive average noise levels in excess of 70 DNL. Residential areas to the west of Borrow Source Areas 2, 3 and 4 could experience elevated noise as a result of construction activity when aircraft overflights are not present.

(E) AIR QUALITY

Construction will have a short-term impact on local air quality. Air pollution levels during the construction period would be a consequence of one or more of the following activities: Vehicular activity in support of construction; wind erosion of soils; the movement of construction vehicles along haul routes; excavation; and cement and aggregate handling. Air pollution impacts would be most pronounced at the individual construction sites and along the construction haul routes.

The air quality impacts associated with the hauling of construction fill material was evaluated through a separate pollutant dispersion modeling analysis. The analysis presented in the Final EIS is repeated here, and is based on 109 peak hour truck trips, instead of the longer construction period trips of 66 trips per hour. CAL3QHC, a USEPA approved model used to predict pollutant concentrations from motor vehicles, was used to examine construction related pollutant Carbon Monoxide concentrations. Vehicle emission rates for input into the CAL3QHC model were derived from two other USEPA air quality models, MOBILE5A for carbon monoxide emissions and PART5 for particulate matter.

Particulate matter (PM10) is usually the pollutant of greatest concern related to construction activity. To quantify the effects of dispersing the pollutants within the surrounding environs, receptors were modeled at three meters (12 feet) from the edge of the roadways along each of the proposed haul routes.

It should be noted that the methodology used in this analysis relies on the use of modeling default values and input assumptions, as determined in consultation with the Department of Ecology and USEPA. Because of lack of data concerning the Puget Sound Region, this analysis used the more arid (dry) environment associated with Spokane. These assumptions tend to overstate PM10 concentrations associated with construction activity at Sea-Tac Airport.

TABLE 5-4-7

CONSTRUCTION AIR POLLUTION CONCENTRATIONS

	CO Concentrations (ppm)			
	1-Hour		8-Hour	
Haul Route	Do-Nothing	With Project	Do-Nothing	With Project
SR 509 from SR 518 to S. 160th Street	1.4	1.5	1.0	1.1
South 160th Street from SR 509 to Des Moines Memorial Drive	2.1	2.5	1.5	1.7
Des Moines Memorial Dr. from S. 160th Street to 8th Ave. South	1.8	2.1	1.3	1.5
Des Moines Memorial Dr. from 8th Ave. South to 148th Street	1.5	2.0	1.1	1.4
Des Moines Memorial Dr. from S. 200th Street to S. 188th Street	3.2	3.5	2.2	2.4
South 200th St. from Des Moines Memorial to 26th Ave. South	3.5	3.7	2.5	2.6
Unpaved on-Airport Road south airfield	-	0.1	-	0.1
Ambient Air Quality Standard	35	35		9

Haul Route	PM10 Concentrations (ug/m3) 24-Hour Do-Nothing	With Project	Annual Do-Nothing	With Project
SR 509 from SR 518 to S. 160th Street	156	253	31	51
South 160th Street from SR 509 to Des Moines Memorial Drive	105	352	21	70
Des Moines Memorial Dr. from S. 160th Street to 8th Ave. South	84	311	17	62
Des Moines Memorial Dr. from 8th Ave. South to 148th Street	67	318	13	64
Des Moines Memorial Dr. from S. 200th Street to S. 188th Street	154	276	31	55
South 200th St. from Des Moines Memorial to 26th Ave. South	164	309	33	62
Unpaved on-Airport Road south airfield	-	462	-	93
Ambient Air Quality Standard	150	150	50	50

Source: Final EIS, Chapter IV, Section 23 Tables IV.23-6 and IV.23-7.

(1) Carbon Monoxide Concentrations

The use of diesel haul trucks would not be expected to produce substantial carbon monoxide (CO) emissions. As shown in **Table 5-4-7**, the maximum 1-hour and 8-hour CO concentrations along each of the haul routes would be expected to be well below the CO ambient air quality standards. The "With Project" concentrations would all be well below the Ambient Air Quality Standards.

(2) PM10 Concentrations

The high volume of construction truck activity would be expected to generate considerable fugitive dust emissions, or particulate matter especially during dry conditions. Without mitigation or the use of control measures, the results would be particulate emissions above the ambient air quality standards along each of the proposed construction haul routes. **Table 5-4-7** presents the maximum 24-hour and annual PM10 (particulate matter of 10 microns ore smaller) concentrations along each construction route based on arid assumptions.

Based on arid assumptions and the use of no controls, the PM10 concentrations could exceed the 24-hour and annual standards along all routes with the 109 hourly truck trips. If truck trips were reduce by 30 percent (to 66 truck trips). At the reduced trip level (longer construction period) , the annual AAQS would not be expected to be exceeded, but the 24-hour standard could be exceeded during arid conditions along all haul routes.

(3) Mitigation Measures

Control measures for paved roads focus on either preventing material from being deposited on the roads (preventive controls), or removal from the travel lanes of any material that has been deposited (mitigative controls). Preventive measures include policies requiring "wetting" of material being hauled, cleaning vehicles before they leave a construction site, using 'bump strips' or grates to 'shake' dust from vehicles, or by paving the construction site access roads nearest to the paved roads. **Table 5-4-8** lists construction BMP's that would be used to reduce PM_{10} emissions.

For example, vacuum sweeping along each route would reduce particulate matter by almost 40 percent. Flushing the roadways with water followed by sweeping could reduce particulates by over 90 percent if performed frequently. However, the Port's Temporary Erosion Control Plan does not allow for flushing of streets because of potential water quality impacts. Control measures for unpaved roads will include frequently applying water or chemical stabilizers, paving, and traffic control measures limiting vehicle speeds and traffic volumes during dry periods. These measures could achieve up to 80 percent reduction in fugitive dust during dry periods.

(F) SOCIAL

This section summarizes potential social and neighborhood impacts from truck hauling of fill for the construction of the new parallel runway and runway safety areas. As is noted in **Table 5-4-3**, residential neighborhoods are located along a portion of the haul routes from the following off-sites borrow sources:

- Site 2 (Des Moines Memorial Drive/SR 509) residents abut Des Moines Memorial Drive,
- Site 6 (Federal Way) residents along Milton Road;
- Site 7 (Auburn) residents along 41st and Ellingson;
- Site 9 residents along Maltby Road.
- Alternative haul routes could result in truck traffic using International Blvd./SR 99, South 188th Street, South 192nd Street, South 200th Street, South 154th Street, SR 516 (Kent-Des Moines Road) etc. Residential areas about or are in close proximity of these busy roadways.
- The temporary construction traffic only interchanges off SR 509 at South 172nd Street and SR 518 near 24th Avenue South would have residential areas in close proximity of these interchanges.

In addition, residential properties are located along the southern on-site borrow source routes: Des Moines Memorial Drive (the most likely haul route for the southern on-site material) is a minor arterial, with residential development located on the east and west sides of the street. On-site haul routes have been revised to include routes consisting mostly of Port-owned land (see **Exhibit 5-4-1**, which shows potential on-site haul routes). The routes would help to minimize social and neighborhood impacts from truck traffic. South 160th Street, between SR 509 and the Airport, could also potentially be used as a haul route. About 15 residential properties face this street.

Temporary construction impacts would include increased noise, dust, vibration, congestion, and truck traffic near residences, businesses, and institutions located along construction routes near on-site construction areas. Normal vehicular traffic patterns would be disruptive if regional traffic chose to cut-through neighborhoods to avoid congestion along haul routes. Neighborhood cohesion could be adversely affected by increased traffic.

Construction traffic using SR 509, SR 518, and Interstate 5 likely would not result in significant impacts to schools because they are limited access highways, with grade separated crossings. The following schools are located in the vicinity of these limited access haul routes: Dunlap Elementary; Highline High; Woodside Elementary (currently an administrative center); Thorndyke Elementary; Holy Innocents; and Sea-Tac Occupational Skills Center.

The following schools are located near or along haul routes in the immediate Airport area (other than SR 509, SR 518, and I-5) and could be adversely affected: Angle Lake Elementary, Maywood Elementary, Normandy Christian, Sunny Terrace Elementary (currently a mental health facility), Sunnydale Elementary, and Tyee Jr. High School. A number of churches, parks, and nursing homes are located along or in close proximity to these routes.

At this time, haul routes have not been finalized; specific routes will depend upon final borrow source usage, phasing, selected contractor(s) means and methods, and method used to transport fill. Some routes for on-site borrow sources are being investigated that maximize use of Port property. The potential for social impacts at public facilities noted previously as well as residential areas would be reduced with the use of these routes. The use of routes on Port property for On-Site Borrow Sources #1 through 4 could result in potential indirect impacts (primarily noise, fugitive dust, vibration, and truck traffic on nearby roads) on Des Moines Creek Park which could adversely affect public enjoyment of this limited access park area during the construction period. While the park is a designated park facility, limited access is allowed in the area of the on-site borrow sources.

Because of the social disruption that would occur in the general vicinity of the new runway construction activity, a construction mitigation acquisition program has been recommended. This acquisition includes about 70 residential and commercial properties located east of Des Moines Memorial Drive between SR 509 and SR 518. Current Port plans include acquisition of these residential areas and commercial businesses. However, the commercial businesses will be allowed to remain, as they are compatible with the location of the runway, if the owner determines that the construction activities would not have an adverse impact on the business. Only 15 residences would remain in close vicinity to the merge points between on-site and off-site haul traffic. These residences, and those closer to the off-site sources, would experience increased air and noise pollution during the construction period and could, during peak traffic periods experience difficulty in entering and exiting their property.

(G) INDUCED SOCIO-ECONOMIC IMPACTS

The new construction schedule would not likely affect the socio-economic impacts identified in the Final EIS. These include:

	Construction Related Employment
Do-Nothing (Alternative 1)	
Direct Jobs	3,687
Indirect Jobs	4,465
Total	8,152
"With Project" (Alternative 2, 3 and 4)	
Direct Jobs	20,559
Indirect Jobs	24,894
Total	45,453

(G) WATER QUALITY

Potential construction impacts include temporary increases in suspended sediment concentrations caused by an increase of eroded materials entering/reaching Miller and Des Moines Creeks. Construction activities including clearing, grading, and filling at the runway site. The new forecast, construction phasing, and construction duration would not alter the effects of construction on water quality, as described in the Final EIS.

(H) SOLID WASTE

The new forecast, construction phasing, and construction duration would not alter the effects of construction on solid waste, as described in the Final EIS. A substantial amount of demolition and construction waste will be generated. The majority of the waste material will result from off-Airport site building, road, and associated infrastructure demolition, as well as on-site building, road, and taxiway demolition to accommodate new and expanded landside and airside facilities at the Airport.

(I) CUMULATIVE IMPACTS

The completion of the proposed Master Plan Update improvement, in combination with other regional construction projects, could have an impact in the Airport area. As is described in **Appendix C-1 and C-4** of this Supplemental EIS, a number of roadway improvements are anticipated to occur in the Airport area between 1997 and 2005. Construction activity associated with the Master Plan Update improvements and these regional roadway projects could worsen the levels of service afforded at already congested intersections along International Blvd. Contractor construction best management practices for the Airport construction project would be expected to minimize the adverse impacts by using less congested routes.

(J) MITIGATION

Based on the selected hauling plan, the Port of Seattle will develop a Construction and Earthwork Management Plan. **Table 5-4-8** lists general construction best management practices designed to minimize congestion and pollution related effects of construction activity.

Because of the social disruption that would occur in the general vicinity of the proposed new runway construction, a construction mitigation acquisition program will be implemented. This acquisition includes about 70 residential and commercial properties located east of Des Moines Memorial Drive between SR 509 and SR 518.

It is anticipated that the Port of Seattle will coordinate with surrounding jurisdictions and WSDOT on the proposed schedule for improvements to the regional roadways and the relationship of these improvements to the proposed Master Plan Update improvements. The purpose of this coordination would be to coordinate construction activity and to evaluate the merits of accelerating or delaying such improvements if appropriate to minimize the adverse impacts from multiple construction activities.

TABLE 5-4-1

Seattle-Tacoma International Airport
Supplemental Environmental Impact Statement

CONSTRUCTION FILL REQUIREMENTS

Fill Available

On-Site Borrow Source	Available On-Site Fill (Million Cubic Yards) Minimum	Maximum
Area 1	0.00	6.60**
Area 2	0.00	0.65
Area 3	0.00	2.90
Area 4	0.00	2.20
Area 5	0.00	0.00**
Area 8	0.00	0.00
Subtotal	0.00	12.35
Common Excavation	2.90	3.10
Total On-Site Fill Available	2.90	15.45

Fill Requirements

Master Plan Update Construction Activity	Total Fill Requirements (Million Cubic Yards) In-Place	Adjusted
8,500 Foot New Parallel Runway	17.25	19.84
RSA Improvements	0.98	1.13
Relocation of South 154th Street	0.13	0.14
SASA Facilities	2.20	2.53
Subtotal	20.56	23.64
Runway 34R Extension	2.40	2.76
Total Fill Required	22.96	26.40

** Reflects changes in fill availability since publication of the Final EIS. Availability is based on the *Preliminary Engineering Study*, Volume 2, March 1994

Source: INCA Engineers, January 1997.

TABLE 5-4-2
Page 1 of 5

Seattle-Tacoma International Airport
Supplemental Environmental Impact Statement

SUMMARY OF EXPECTED OFF-SITE BORROW SOURCE HAUL ROUTES

SOURCE #1 - SeaTac, King County (See Note 1)

Expected Source Access Route	Jurisdiction/ Agency	Route Classification	Number of Lanes	Pavement Condition	Speed Limit	Existing ADT	Additional Comments
International Boulevard/SR99	WSDOT	Principal Arterial	5 lanes	Very Good	45 mph	33,000	
South 160th Street	City of SeaTac	Minor Arterial	4 lanes	Good	35 mph	9,000	

SOURCE #2 - SeaTac, King County (See Note 1)

Expected Source Access Route	Jurisdiction/ Agency	Route Classification	Number of Lanes	Pavement Condition	Speed Limit	Existing ADT	Additional Comments
Des Moines Memorial Drive South	City of SeaTac	Minor Arterial	2 lanes	Good	35 mph	13,000	

SOURCE #3 - SeaTac/Kent/Tukwila, King County (See Note 1)

Expected Source Access Route	Jurisdiction/ Agency	Route Classification	Number of Lanes	Pavement Condition	Speed Limit	Existing ADT	Additional Comments
Orillia Road	King County	Principal Arterial	2 lanes	Good	35 mph	27,000	
South 188th Street	City of SeaTac	Principal Arterial	4 lanes	Very Good	40 mph	27,000	

SOURCE #4 - Dieringer, Pierce County

Expected Source Access Route	Jurisdiction/ Agency	Route Classification	Number of Lanes	Pavement Condition	Speed Limit	Existing ADT	Additional Comments
East Valley Highway	Pierce County	Principal Arterial	2 lanes	Good Poor	35 mph	11,000	North of Forest Canyon Road South of Forest Canyon Road
8th Street East	Pierce County	Principal Arterial	2 lanes	Fair	35 mph	12,000	
State Route 167	WSDOT	Principal Arterial Fwy	4 lanes	Very Good	55 mph	56,500	
West Valley Highway	City of Auburn	Principal Arterial	4 lanes	Good	40 mph		
State Route 18	WSDOT	Principal Arterial Fwy	4 lanes	Good	55 mph	68,000	Steep Grades
Interstate 5	WSDOT	Principal Arterial Fwy	8 lanes	Fair	55 mph	154,500	

Notes:
1. Limited quality or quantity . Use of Material not anticipated.
2. Local access route congested. Use of Material not anticipated.

TABLE 5-4-2
Page 2 of 5

Seattle-Tacoma International Airport
Supplemental Environmental Impact Statement

SUMMARY OF EXPECTED OFF-SITE BORROW SOURCE HAUL ROUTES

SOURCE #5, #8 - Tacoma, Pierce County (See Note 1)

Expected Source Access Route	Jurisdiction/ Agency	Route Classification	Number of Lanes	Pavement Condition	Speed Limit	Existing ADT	Additional Comments
Marine View Drive/East-West Road	City of Tacoma	Minor Arterial	2 lanes	Fair/Poor	35 mph	8,300	
Taylor Way/54th Avenue East/ Valley Avenue	City of Tacoma	Minor Arterial	5 lanes	Good	35 mph	13,500	
Interstate 5	WSDOT	Principal Arterial Fwy	8 lanes	Fair	55 mph	154,500	

SOURCE #6 - Federal Way, King County (See Note 2)

Expected Source Access Route	Jurisdiction/ Agency	Route Classification	Number of Lanes	Pavement Condition	Speed Limit	Existing ADT	Additional Comments
Milton Road/16th Avenue South	King County	Collector Arterial	2 lanes	Fair/Poor Excellent	35 mph	5,000	South of 375th Street North of South 375th Street
Enchanted Parkway/ State Route 161	WSDOT	Minor Arterial Minor Arterial	2 lanes 5 lanes	Good	35 mph	23,000	South of 351st Street North of South 351st Street
South 348th Street/State Route 18	WSDOT	Principal Arterial	5 lanes	Good	35 mph	51,000	
Interstate 5	WSDOT	Principal Arterial Fwy	8 lanes	Fair	55 mph	154,500	

SOURCE #7 - Auburn, King County

Expected Source Access Route	Jurisdiction/ Agency	Route Classification	Number of Lanes	Pavement Condition	Speed Limit	Existing ADT	Additional Comments
Kersey Way/"R" Street SE	Auburn	Principal Arterial	2 lanes	Good	35 mph	12,200	
Private Truck Route	Private						
Ellingson Road/41st Street SE	Algona/Auburn/ Pacific	Principal Arterial	4 lanes	Good	35 mph	10,800	
State Route 167	WSDOT	Principal Arterial Fwy	4 lanes	Very Good	55 mph	56,500	
West Valley Highway	City of Auburn	Principal Arterial	4 lanes	Good	40 mph		
State Route 18	WSDOT	Principal Arterial Fwy	4 lanes	Good	55 mph	68,000	Steep 6% Grade between I-5 and SR 167 (Westbound Uphill)
Interstate 5	WSDOT	Principal Arterial Fwy	8 lanes	Fair	55 mph	154,500	

TABLE 5-4-2

Seattle-Tacoma International Airport
Supplemental Environmental Impact Statement

SUMMARY OF EXPECTED OFF-SITE BORROW SOURCE HAUL ROUTES

SOURCE #9 - Maltby, Snohomish County

Expected Source Access Route	Jurisdiction/ Agency	Route Classification	Number of Lanes	Pavement Condition	Speed Limit	Existing ADT	Additional Comments
Maltby Road/Yew Road/ Paradise Lake Road/State Route 524	WSDOT	Collector Arterial	2 lanes	Good	35 mph	9,300	
State Route 522	WSDOT	Principal Arterial Fwy	2 lanes 4 lanes	Very Good	55 mph	45,500	North of the SR9 Interchange South of the SR9 Interchange
Interstate 405	WSDOT	Principal Arterial Fwy	6 lanes	Good	55 mph	129,000	

SOURCE #10, #11, #11A - Black Diamond, King County (Source 10, See Note 1)

Expected Source Access Route	Jurisdiction/ Agency	Route Classification	Number of Lanes	Pavement Condition	Speed Limit	Existing ADT	Additional Comments
Black Diamond-Enumclaw Road/ State Route 169	WSDOT	Minor Arterial	2 lanes	Good	50 mph 35 mph	9,000	South of Black Diamond Within Black Diamond
Maple Valley-Black Diamond Road/ State Route 169	WSDOT	Minor Arterial	2 lanes 4 lanes	Fair	50 mph 35 mph	11,000	North of Black Diamond Within Black Diamond
Auburn - Black Diamond Road	King County	Principal Arterial	2 lanes	Good	50 mph 40 mph	7,600	East of Kent-Black Diamond Road West of Kent-Black Diamond Road
State Route 18	WSDOT	Principal Arterial Fwy	4 lanes	Good	55 mph	68,000	Steep 6% Grade between I-5 and SR167 (Westbound Uphill)
Interstate 5	WSDOT	Principal Arterial Fwy	8 lanes	Fair	55 mph	154,500	

TABLE 5-4-2
Page 4 of 5

Seattle-Tacoma International Airport
Supplemental Environmental Impact Statement

SUMMARY OF EXPECTED OFF-SITE BORROW SOURCE HAUL ROUTES

SOURCE #12 - Covington/Kent, King County

Expected Source Access Route	Jurisdiction/ Agency	Route Classification	Number of Lanes	Pavement Condition	Speed Limit	Existing ADT	Additional Comments
Covington - Sawyer Rd	King County	Minor Arterial	2 lanes	Good/Fair	35 mph	11,000	
Kent - Kangley Rd/South 272nd Street/ State Route 516	WSDOT	Principal Arterial	5 lanes	Excellent/ Very Good	35 mph	25,000	
State Route 18	WSDOT	Principal Arterial Fwy	4 lanes 2 lanes	Good	55 mph	49,000	South of Auburn-Black Diamond I/C North of Auburn-Black Diamond I/C Steep 6% Grade between I-5 and SR167 (Westbound Uphill)
Interstate 5	WSDOT	Principal Arterial Fwy	8 lanes	Fair	55 mph	154,500	

SOURCE #13 - North Bend, King County

Expected Source Access Route	Jurisdiction/ Agency	Route Classification	Number of Lanes	Pavement Condition	Speed Limit	Existing ADT	Additional Comments
468th Avenue SE	King County	Collector Arterial	2 lanes	Good/Fair	35 mph	11,000	
Interstate 90	WSDOT	Principal Arterial Fwy	6 lanes	Good	55 mph	70,500	West of North Bend
Interstate 405	WSDOT	Principal Arterial Fwy	6 lanes	Good	55 mph	129,000	

SOURCE #14 - Dupont, Pierce County
SOURCE #15 - Maury Island, King County
SOURCE #15A - Maury Island, Future King County Park
SOURCE #16 - Port Gamble, Kitsap County (Source 16, See Note 1)

Expected Source Access Route	Jurisdiction/ Agency	Route Classification	Number of Lanes	Pavement Condition	Speed Limit	Existing ADT	Additional Comments
East Marginal Way South/SR99	WSDOT	Principal Arterial	7 lanes	Good/Fair	45 mph	43,500	The Borrow Source material would be barged into Duwamish Waterway.
West Marginal Way South (Spokane Street to 2nd Ave SW)	City of Seattle	Principal Arterial	5 lanes	Good/Fair	40 mph	13,300	
West Marginal Way South (S Holden Street to Highland Parkway SW)	City of Seattle	Principal Arterial	6 lanes	Excellent	35 mph	18,500	
State Route 509	WSDOT	Principal Arterial Fwy	4 lanes	Good	55 mph	40,500	

TABLE 5-4-2
Page 5 of 5

Seattle-Tacoma International Airport
Supplemental Environmental Impact Statement

SUMMARY OF EXPECTED OFF-SITE BORROW SOURCE HAUL ROUTES

SOURCES EAST OF INTERSTATE 5

Expected Source Access Route	Jurisdiction/ Agency	Route Classification	Number of Lanes	Pavement Condition	Speed Limit	Existing ADT	Additional Comments
SW Grady Way (from 167 to Interurban Ave)	City of Renton	Principal Arterial	5 lanes	Good	35 mph	41,000	
Southcenter Blvd./ S 154th Street (from Interurban Ave to SR 99)	City of Tukwila	Principal Arterial	4 lanes	Good	35 mph	10,750	
S 188th Street (from I-5 to Des Moines Mem Dr.)	City of SeaTac	Principal Arterial	5 lanes	Good	35 mph	25,000	
S 200th Street (from I-5 to SR 99)	City of SeaTac	Principal Arterial	4 lanes	Good	35 mph	17,100	Accident concerns @ I-5 & Military Rd/S. 200th intersection; Elementary school crossing @ 32nd Ave./South 200th Street
SR 516 (from I-5 to SR 99)	WSDOT	Principal Arterial	5 lanes	Good	35 mph	29,800	
International Blvd. (SR 99) (from SR 518 to SR 516)	City of SeaTac City of Des Moines	Principal Arterial	5 lanes	Good	35 mph	33,000	

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TABLE 5-4-3

Seattle-Tacoma International Airport
Supplemental Environmental Impact Statement

**SUMMARY OF CONSTRUCTION TRAFFIC IMPACTS
REVIEW FOR USE OF OFF-SITE BORROW SOURCES ACCESS ROUTES**

Borrow Source	Feasible Site: Quality/ Quantity	Residential Concerns	Safety Concerns	Roadway Classifications	Roadway Condition	Comments
1	Limited Class C		Satisfactory	Satisfactory	Satisfactory	limited quality or quantity. Use not anticipated.
2	Limited Class C May be on SR 509 Alignment	Des Moines Drive	Satisfactory	Satisfactory	Satisfactory	limited quality or quantity. Use not anticipated.
3	B/C	Along Orillia Road and South 188th	Satisfactory	Satisfactory	Satisfactory	limited quality or quantity. Use not anticipated
4A/4B	Yes		Satisfactory	Satisfactory	Satisfactory	
5	Yes		Satisfactory	Satisfactory	Satisfactory	limited quality or quantity. Use not anticipated.
6	Yes	Along Milton Road	Satisfactory	Satisfactory	Satisfactory	Local access route congested throughout the day. Use not anticipated.
7	Yes, Could Supply All	Along 41st/ Ellingson	Satisfactory	Satisfactory	Satisfactory	
8	Yes		Satisfactory	Satisfactory	Satisfactory	limited quality or quantity. Use not anticipated
9	Yes	Along Maltby Road	Satisfactory	Satisfactory	Satisfactory	Potential Rail Source
10	Yes, Could Supply All		Satisfactory	Satisfactory	Satisfactory	limited quality. Use not anticipated.
11/11A	Yes		Satisfactory	Satisfactory	Satisfactory	
12	Yes		Satisfactory	Satisfactory	Satisfactory	
13	Yes, Could Supply All		Satisfactory	Satisfactory	Satisfactory	
14, 15, 15A	Yes, Could Supply All		Satisfactory	Satisfactory	Satisfactory	
16	Class C		Satisfactory	Satisfactory	Satisfactory	limited quality or quantity. Use not anticipated.

Off-site borrow source construction truck traffic could range from 66 truck trips to 109 truck trips per hour. Exhibit IV.23-2 shows the possible off-site sources.

Source: INCA Engineers, January 1997.

TABLE 5-4-4

Seattle-Tacoma International Airport
Environmental Impact Statement

REGIONAL SYSTEM LEVEL OF SERVICE SUMMARY SHEET

Facility Section		*1994* *Existing Condition* AM	MID.	PM	EVE	NIGHT	*Haul Process 1997-2002* *"Do-Nothing" Without Const. Trucks* AM	MID.	PM	EVE	NIGHT	*Final EIS Maximum Off-Site Haul** AM	MID.	PM	EVE	NIGHT	*Supplemental Max. Off-Site Haul*** AM	MID.	PM	EVE	NIGHT
I-5	NB	E	D	D	B	A	E	D	E	B	A	E	D	E	C	B	E	D	E	C	B
(SR 518 to S 188th St.)	SB	D	E	F	D	A	D	E	F	D	A	D	F	F	E	B	D	E	F	D	B
SR 518	EB	C	C	D	B	A	C	C	E	C	A	D	D	E	C	A	C	D	E	C	A
(I-5 to SR 99)	WB	C	C	D	B	A	C	C	D	B	A	D	D	F	C	B	D	D	E	C	A
SR 518	EB	A	B	B	A	A	A	B	C	A	A	B	C	C	B	A	B	C	C	B	A
(SR 99 to SR 509)	WB	B	B	C	A	A	B	B	C	A	A	D	B	C	A	A	B	B	C	A	A
SR 18	EB	D	C	D	B	A	D	D	D	B	A	E	D	E	C	B	E	D	E	B	B
(I-5 to SR 167)	WB	F	E	F	B	B	F	F	F	C	B	F	F	F	E	E	F	F	F	D	D
SR 509	NB	D	B	C	B	A	E	C	C	B	A	E	C	D	C	B	E	C	C	C	A
(North of SR 518)	SB	B	B	C	A	A	B	B	C	A	A	C	C	E	C	B	C	C	D	C	A
SR 509	NB	B	A	B	A	A	C	A	B	A	A	C	B	C	A	B	C	A	C	A	A
(SR 518 to S. 160th St.)	SB	C	C	D	B	C	D	D	D	B	C	D	D	D	C	C	D	D	D	C	C
SR 167	NB	D	D	C	B	A	E	D	D	B	B	E	E	D	C	B	E	D	D	C	B
(I-405 to SW 34th St., Carr St.)	SB	C	D	E	C	A	D	E	E	C	B	E	E	F	D	B	D	E	F	D	B
I-405	NB	F	E	E	C	B	F	E	E	C	B	F	E	F	D	C	F	E	F	C	B
(SR 167 to I-5)	SB	D	E	F	C	A	D	E	F	D	A	E	F	F	E	B	E	F	F	E	B

* 109 Trucks per Hour, Adjusted for Peaking.
** 66 Trucks per Hour, Adjusted for Peaking.
NB = North Bound on segment
SB = South Bound on segment
Source: INCA Engineers, January 1997.

TABLE 5-4-5
Page 1 of 8

1997-2002 HAUL PROCESS INTERSECTION LEVEL OF SERVICE SUMMARY

Evaluated Intersection	Do-Nothing Alternative	Preferred Alternative with Trucks								
		Route 1			Route 1-A			Route 2		
		1	2A	2B	1	2A	2B	1	2A	2B
Southbound SR 509 Ramps & SR 518	B	B	B	B	B	B	B	B	B	B
Northbound SR 509 Ramps & SR 518	A	A	A	A	A	A	A	A	A	A
Des Moines & EB SR 518 On-Ramp	A	A	A	A	A	A	A	A	A	A
Des Moines & WB SR 518 Off-Ramp	F	F	F	F	F	F	F	F	F	F
Des Moines & 8th Ave South	B	B	B	B	B	B	B	C	B	B
International/SR 99 & S 154th St.	E	E	E	E	E	E	E	E	E	E
24th Ave S & S 154th St.	C	E	D	D	D	D	D	D	D	D
Des Moines & S 156th St.	C	C	C	C	C	C	C	C	C	C
Southbound SR 509 & S 160th St.	D	D	D	D	D	D	D	D	D	D
Northbound SR 509 & S 160th St.	A	A	A	A	A	A	A	A	A	A
Des Moines & S 160th St.	B	B	B	B	B	B	B	B	B	B
Air Cargo Rd & S 160th St.	B	B	B	B	B	B	B	B	B	B
International/SR 99 & S 160th St.	D	D	D	D	D	D	D	D	D	D
Air Cargo Rd & Airport Expressway	B	B	B	B	B	B	B	B	B	B
Air Cargo Rd & S 170th St.	E	F	E	E	E	E	E	E	E	E
Airport Expressway & S 170th St.	B	B	B	B	B	B	B	B	B	B
International/SR 99 & S 170th St.	F	F	F	F	F	F	F	F	F	F
International/SR 99 & S 176th St.	C	C	C	C	C	C	C	C	C	C
International/SR 99 & S 180th St.	D	D	D	D	D	D	D	D	D	D
Southbound SR 509 & S 188th St.	A	A	A	A	A	A	A	A	A	A
Des Moines & S 188th St.	C	C	D	C	C	D	C	C	D	C
28th Ave S & S 188th St.	C	B	B	B	B	B	B	B	B	B
International/SR 99 & S 188th St.	F	F	F	F	F	F	F	F	F	F
Military Rd & S 188th St.	E	E	E	E	E	E	E	E	E	E
Southbound I-5 Ramps & S 188th St.	D	D	D	D	D	D	D	D	D	D
Northbound I-5 Ramps & S 188th St.	F	E	E	E	E	E	E	E	E	E
28th Ave S & S 192nd St.	B	B	B	B	B	B	B	B	B	B
International/SR 99 & S 192nd St.	D	C	C	C	C	C	C	C	C	C
Des Moines & S 200th St.	B	B	B	B	B	B	B	B	B	B
28th Ave S & S 200th St.	C	B	B	B	B	B	B	B	B	B
International/SR 99 & S 200th St.	F	F	F	F	F	F	F	F	F	F
Military Rd & S 200th St. / SB I-5 Ramps	F	E	E	E	E	E	E	E	E	E
Military Rd & Northbound I-5 Ramps	C	C	C	C	C	C	C	C	C	C
Des Moines & Marine View Drive	B	B	B	B	B	B	B	B	B	B
Pacific Highway/SR 99 & S 216th St.	E	E	E	E	E	E	E	E	E	E
Pacific Hwy./SR 99 & SR 516	E	E	E	E	E	E	E	E	E	E
SB I-5 Ramps & SR 516	F	F	F	F	F	F	F	F	F	F

Option 1 - Max off-site (66 trips); Option 2A - Maximum on-site using Route A (26 trips), Option 2B - Maximum On-Site using on-site Route B (26 trips)

Route 1 State Route 518, Airport Expressway, Air Cargo Road, South 156th Street

Route 1A State Route 518, to 20th Avenue South, Temporary Construction Access

Route 2 State Route 518, Des Moines Memorial Drive South, South 156th Street

TABLE 5-4-5
Page 2 of 8

1997-2002 HAUL PROCESS INTERSECTION LEVEL OF SERVICE SUMMARY (CONTINUED)

Evaluated Intersection	Do-Nothing Alternative	Preferred Alternative with Trucks								
		Route 3			Route 4			Route 4-A		
		1	2A	2B	1	2A	2B	1	2A	2B
Southbound SR 509 Ramps & SR 518	B	B	B	B	C	B	B	C	B	B
Northbound SR 509 Ramps & SR 518	A	A	A	A	A	A	A	A	A	A
Des Moines & EB SR 518 On-Ramp	A	A	A	A	A	A	A	A	A	A
Des Moines & WB SR 518 Off-Ramp	F	F	F	F	F	F	F	F	F	F
Des Moines & 8th Ave South	B	C	B	B	B	B	B	B	B	B
International/SR 99 & S 154th St.	E	E	E	E	E	E	E	E	E	E
24th Ave S & S 154th St.	C	D	D	D	D	D	D	D	D	D
Des Moines & S 156th St.	C	C	C	C	C	C	C	C	C	C
Southbound SR 509 & S 160th St.	D	D	D	D	E	D	D	D	D	D
Northbound SR 509 & S 160th St.	A	A	A	A	A	A	A	A	A	A
Des Moines & S 160th St.	B	B	B	B	B	B	B	B	B	B
Air Cargo Rd & S 160th St.	B	B	B	B	B	B	B	B	B	B
International/SR 99 & S 160th St.	D	D	D	D	D	D	D	D	D	D
Air Cargo Rd & Airport Expressway	B	B	B	B	B	B	B	B	B	B
Air Cargo Rd & S 170th St.	E	E	E	E	E	E	E	E	E	E
Airport Expressway & S 170th St.	B	B	B	B	B	B	B	B	B	B
International/SR 99 & S 170th St.	F	F	F	F	F	F	F	F	F	F
International/SR 99 & S 176th St.	C	C	C	C	C	C	C	C	C	C
International/SR 99 & S 180th St.	D	D	D	D	D	D	D	D	D	D
Southbound SR 509 & S 188th St.	A	A	A	A	A	A	A	A	A	A
Des Moines & S 188th St.	C	C	D	C	C	D	C	C	D	C
28th Ave S & S 188th St.	C	B	B	B	B	B	B	B	B	B
International/SR 99 & S 188th St.	F	F	F	F	F	F	F	F	F	F
Military Rd & S 188th St.	E	E	E	E	E	E	E	E	E	E
Southbound I-5 Ramps & S 188th St.	D	D	D	D	D	D	D	D	D	D
Northbound I-5 Ramps & S 188th St.	F	E	E	E	E	E	E	E	E	E
28th Ave S & S 192nd St.	B	B	B	B	B	B	B	B	B	B
International/SR 99 & S 192nd St.	D	C	C	C	C	C	C	C	C	C
Des Moines & S 200th St.	B	B	B	B	B	B	B	B	B	B
28th Ave S & S 200th St.	C	B	B	B	B	B	B	B	B	B
International/SR 99 & S 200th St.	F	F	F	F	F	F	F	F	F	F
Military Rd & S 200th St. / SB I-5 Ramps	F	E	E	E	E	E	E	E	E	E
Military Rd & Northbound I-5 Ramps	C	C	C	C	C	C	C	C	C	C
Des Moines & Marine View Drive	B	B	B	B	B	B	B	B	B	B
Pacific Highway/SR 99 & S 216th St.	E	E	E	E	E	E	E	E	E	E
Pacific Hwy./SR 99 & SR 516	E	E	E	E	E	E	E	E	E	E
SB I-5 Ramps & SR 516	F	F	F	F	F	F	F	F	F	F

Option 1 - Max off-site (66 trips); Option 2A - Maximum on-site using Route A (26 trips), Option 2B - Maximum On-Site using on-site Route B (26 trips)

Route 3 State Route 518, Des Moines Memorial Drive South, South 160th Street

Route 4 State Route 518, State Route 509, South 160th Street

Route 4A State Route 518, State Route 509, South 176th Street, Temporary Construction Access

TABLE 5-4-5
Page 3 of 8

1997-2002 HAUL PROCESS INTERSECTION LEVEL OF SERVICE SUMMARY (CONTINUED)

Evaluated Intersection	Do-Nothing Alternative	Preferred Alternative with Trucks								
		Route 5			Route 6			Route 7		
		1	2A	2B	1	2A	2B	1	2A	2B
Southbound SR 509 Ramps & SR 518	B	B	B	B	B	B	B	B	B	B
Northbound SR 509 Ramps & SR 518	A	A	A	A	A	A	A	A	A	A
Des Moines & EB SR 518 On-Ramp	A	A	A	A	A	A	A	A	A	A
Des Moines & WB SR 518 Off-Ramp	F	F	F	F	F	F	F	F	F	F
Des Moines & 8th Ave South	B	B	B	B	B	B	B	B	B	B
International/SR 99 & S 154th St.	E	E	E	E	E	E	E	E	E	E
24th Ave S & S 154th St.	C	D	D	D	E	D	D	D	D	D
Des Moines & S 156th St.	C	C	C	C	C	C	C	C	C	C
Southbound SR 509 & S 160th St.	D	D	D	D	D	D	D	E	D	D
Northbound SR 509 & S 160th St.	A	A	A	A	A	A	A	A	A	A
Des Moines & S 160th St.	B	B	B	B	B	B	B	B	B	B
Air Cargo Rd & S 160th St.	B	B	B	B	B	B	B	B	B	B
International/SR 99 & S 160th St.	D	E	E	E	D	D	D	D	D	D
Air Cargo Rd & Airport Expressway	B	B	B	B	B	B	B	B	B	B
Air Cargo Rd & S 170th St.	E	E	E	E	F	E	E	E	E	E
Airport Expressway & S 170th St.	B	B	B	B	B	B	B	B	B	B
International/SR 99 & S 170th St.	F	F	F	F	F	F	F	F	F	F
International/SR 99 & S 176th St.	C	C	C	C	C	C	C	C	C	C
International/SR 99 & S 180th St.	D	D	D	D	D	D	D	D	D	D
Southbound SR 509 & S 188th St.	A	A	A	A	A	A	A	A	A	A
Des Moines & S 188th St.	C	E	D	D	C	D	C	C	D	C
28th Ave S & S 188th St.	C	B	B	B	B	B	B	B	B	B
International/SR 99 & S 188th St.	F	F	F	F	F	F	F	F	F	F
Military Rd & S 188th St.	E	E	E	E	E	E	E	E	E	E
Southbound I-5 Ramps & S 188th St.	D	D	D	D	D	D	D	D	D	D
Northbound I-5 Ramps & S 188th St.	F	E	E	E	E	E	E	E	E	E
28th Ave S & S 192nd St.	B	B	B	B	B	B	B	B	B	B
International/SR 99 & S 192nd St.	D	C	C	C	C	C	C	C	C	C
Des Moines & S 200th St.	B	B	B	B	B	B	B	B	B	B
28th Ave S & S 200th St.	C	B	B	B	B	B	B	B	B	B
International/SR 99 & S 200th St.	F	F	F	F	F	F	F	F	F	F
Military Rd & S 200th St. / SB I-5 Ramps	F	E	E	E	E	E	E	E	E	E
Military Rd & Northbound I-5 Ramps	C	C	C	C	C	C	C	C	C	C
Des Moines & Marine View Drive	B	B	B	B	B	B	B	B	B	B
Pacific Highway/SR 99 & S 216th St.	E	E	E	E	E	E	E	E	E	E
Pacific Hwy./SR 99 & SR 516	E	E	E	E	E	E	E	E	E	E
SB I-5 Ramps & SR 516	F	F	F	F	F	F	F	F	F	F

Option 1 - Max off-site (66 trips); Option 2A - Maximum on-site using Route A (26 trips), Option 2B - Maximum On-Site using on-site Route B (26 trips)

Route 5 State Route 518, International Boulevard / State Route 99, South 188th Street, Starling Drive

Route 6 State Route 509, State Route 518, Airport Expressway, Air Cargo Road, South 156th Street

Route 7 State Route 509, South 160th Street

TABLE 5-4-5
Page 4 of 8

1997-2002 HAUL PROCESS INTERSECTION LEVEL OF SERVICE SUMMARY (CONTINUED)

Evaluated Intersection	Do-Nothing Alternative	Preferred Alternative with Trucks								
		Route 7-A			Route 8			Route 9		
		1	2A	2B	1	2A	2B	1	2A	2B
Southbound SR 509 Ramps & SR 518	B	B	B	B	B	B	B	B	B	B
Northbound SR 509 Ramps & SR 518	A	A	A	A	A	A	A	A	A	A
Des Moines & EB SR 518 On-Ramp	A	A	A	A	A	A	A	A	A	A
Des Moines & WB SR 518 Off-Ramp	F	F	F	F	F	F	F	F	F	F
Des Moines & 8th Ave South	B	B	B	B	B	B	B	B	B	B
International/SR 99 & S 154th St.	E	E	E	E	E	E	E	E	E	E
24th Ave S & S 154th St.	C	D	D	D	D	D	D	D	D	D
Des Moines & S 156th St.	C	C	C	C	C	C	C	C	C	C
Southbound SR 509 & S 160th St.	D	D	D	D	D	D	D	D	D	D
Northbound SR 509 & S 160th St.	A	A	A	A	A	A	A	A	A	A
Des Moines & S 160th St.	B	B	B	B	B	B	B	B	B	B
Air Cargo Rd & S 160th St.	B	B	B	B	B	B	B	B	B	B
International/SR 99 & S 160th St.	D	D	D	D	D	D	D	D	D	D
Air Cargo Rd & Airport Expressway	B	B	B	B	B	B	B	B	B	B
Air Cargo Rd & S 170th St.	E	E	E	E	E	E	E	E	E	E
Airport Expressway & S 170th St.	B	B	B	B	B	B	B	B	B	B
International/SR 99 & S 170th St.	F	F	F	F	F	F	F	F	F	F
International/SR 99 & S 176th St.	C	C	C	C	C	C	C	C	C	C
International/SR 99 & S 180th St.	D	D	D	D	D	D	D	D	D	D
Southbound SR 509 & S 188th St.	A	A	A	A	A	A	A	A	A	A
Des Moines & S 188th St.	C	C	D	C	D	D	D	E	D	D
28th Ave S & S 188th St.	C	B	B	B	B	B	B	B	B	B
International/SR 99 & S 188th St.	F	F	F	F	F	F	F	F	F	F
Military Rd & S 188th St.	E	E	E	E	E	E	E	E	E	E
Southbound I-5 Ramps & S 188th St.	D	D	D	D	D	D	D	D	D	D
Northbound I-5 Ramps & S 188th St.	F	E	E	E	E	E	E	E	E	E
28th Ave S & S 192nd St.	B	B	B	B	B	B	B	B	B	B
International/SR 99 & S 192nd St.	D	C	C	C	C	C	C	C	C	C
Des Moines & S 200th St.	B	B	B	B	B	B	B	B	B	B
28th Ave S & S 200th St.	C	B	B	B	B	B	B	B	B	B
International/SR 99 & S 200th St.	F	F	F	F	F	F	F	F	F	F
Military Rd & S 200th St. / SB I-5 Ramps	F	E	E	E	E	E	E	E	E	E
Military Rd & Northbound I-5 Ramps	C	C	C	C	C	C	C	C	C	C
Des Moines & Marine View Drive	B	B	B	B	B	B	B	B	B	B
Pacific Highway/SR 99 & S 216th St.	E	E	E	E	E	E	E	E	E	E
Pacific Hwy./SR 99 & SR 516	E	E	E	E	E	E	E	E	E	E
SB I-5 Ramps & SR 516	F	F	F	F	F	F	F	F	F	F

Option 1 - Max off-site (66 trips); Option 2A - Maximum on-site using Route A (26 trips), Option 2B - Maximum On-Site using on-site Route B (26 trips)

Route 7A State Route 509, to South 176th Street, Temporary Construction Access

Route 8 State Route 509, South 188th Street, Starling Drive

Route 9 Interstate 5 (from North), South 188th Street, Starling Drive

TABLE 5-4-5
Page 5 of 8

1997-2002 HAUL PROCESS INTERSECTION LEVEL OF SERVICE SUMMARY (CONTINUED)

Evaluated Intersection	Do-Nothing Alternative	Preferred Alternative with Trucks								
		Route 10			Route 11			Route 12		
		1	2A	2B	1	2A	2B	1	2A	2B
Southbound SR 509 Ramps & SR 518	B	B	B	B	B	B	B	B	B	B
Northbound SR 509 Ramps & SR 518	A	A	A	A	A	A	A	A	A	A
Des Moines & EB SR 518 On-Ramp	A	A	A	A	A	A	A	A	A	A
Des Moines & WB SR 518 Off-Ramp	F	F	F	F	F	F	F	F	F	F
Des Moines & 8th Ave South	B	B	B	B	B	B	B	B	B	B
International/SR 99 & S 154th St.	E	E	E	E	E	E	E	E	E	E
24th Ave S & S 154th St.	C	D	D	D	D	D	D	D	D	D
Des Moines & S 156th St.	C	C	C	C	C	C	C	C	C	C
Southbound SR 509 & S 160th St.	D	D	D	D	D	D	D	D	D	D
Northbound SR 509 & S 160th St.	A	A	A	A	A	A	A	A	A	A
Des Moines & S 160th St.	B	B	B	B	B	B	B	B	B	B
Air Cargo Rd & S 160th St.	B	B	B	B	B	B	B	B	B	B
International/SR 99 & S 160th St.	D	D	D	D	D	D	D	D	D	D
Air Cargo Rd & Airport Expressway	B	B	B	B	B	B	B	B	B	B
Air Cargo Rd & S 170th St.	E	E	E	E	E	E	E	E	E	E
Airport Expressway & S 170th St.	B	B	B	B	B	B	B	B	B	B
International/SR 99 & S 170th St.	F	F	F	F	F	F	F	F	F	F
International/SR 99 & S 176th St.	C	C	C	C	C	C	C	C	C	C
International/SR 99 & S 180th St.	D	D	D	D	D	D	D	D	D	D
Southbound SR 509 & S 188th St.	A	A	A	A	A	A	A	A	A	A
Des Moines & S 188th St.	C	E	D	D	E	D	D	E	D	D
28th Ave S & S 188th St.	C	B	B	B	B	B	B	B	B	B
International/SR 99 & S 188th St.	F	F	F	F	F	F	F	F	F	F
Military Rd & S 188th St.	E	E	E	E	E	E	E	E	E	E
Southbound I-5 Ramps & S 188th St.	D	D	D	D	D	D	D	D	D	D
Northbound I-5 Ramps & S 188th St.	F	F	E	E	E	E	E	E	E	E
28th Ave S & S 192nd St.	B	B	B	B	B	B	B	B	B	B
International/SR 99 & S 192nd St.	D	C	C	C	C	C	C	C	C	C
Des Moines & S 200th St.	B	B	B	B	B	B	B	B	B	B
28th Ave S & S 200th St.	C	B	B	B	B	B	B	B	B	B
International/SR 99 & S 200th St.	F	F	F	F	F	F	F	F	F	F
Military Rd & S 200th St. / SB I-5 Ramps	F	E	E	E	F	F	F	E	E	E
Military Rd & Northbound I-5 Ramps	C	C	C	C	C	C	C	C	C	C
Des Moines & Marine View Drive	B	B	B	B	B	B	B	B	B	B
Pacific Highway/SR 99 & S 216th St.	E	E	E	E	E	E	E	E	E	E
Pacific Hwy./SR 99 & SR 516	E	E	E	E	E	E	E	F	E	E
SB I-5 Ramps & SR 516	F	F	F	F	F	F	F	F	F	F

Option 1 - Max off-site (66 trips); Option 2A - Maximum on-site using Route A (26 trips), Option 2B - Maximum On-Site using on-site Route B (26 trips)

Route 10 Interstate 5 (from South), South 188th Street, Starling Drive

Route 11 Interstate 5 (from South), South 200th Street, International Boulevard / State Route 99, South 188th Street, Starling Drive

Route 12 Interstate 5 (from South), Kent-Des Moines Road / State Route 516, International Boulevard / State Route 99, South 188th Street, Starling Drive

TABLE 5-4-5
Page 6 of 8

1997-2002 HAUL PROCESS INTERSECTION LEVEL OF SERVICE SUMMARY (CONTINUED)

Evaluated Intersection	Do-Nothing Alternative	Preferred Alternative with Trucks								
		Route 13			Route 14			Route 15		
		1	2A	2B	1	2A	2B	1	2A	2B
Southbound SR 509 Ramps & SR 518	B	B	B	B	B	n/a	B	B	n/a	B
Northbound SR 509 Ramps & SR 518	A	A	A	A	A	n/a	A	A	n/a	A
Des Moines & EB SR 518 On-Ramp	A	A	A	A	A	n/a	A	A	n/a	A
Des Moines & WB SR 518 Off-Ramp	F	F	F	F	F	n/a	F	F	n/a	F
Des Moines & 8th Ave South	B	B	B	B	B	n/a	B	B	n/a	B
International/SR 99 & S 154th St.	E	E	E	E	E	n/a	E	E	n/a	E
24th Ave S & S 154th St.	C	D	D	D	D	n/a	D	D	n/a	D
Des Moines & S 156th St.	C	C	C	C	C	n/a	C	C	n/a	C
Southbound SR 509 & S 160th St.	D	D	D	D	D	n/a	D	D	n/a	D
Northbound SR 509 & S 160th St.	A	A	A	A	A	n/a	A	A	n/a	A
Des Moines & S 160th St.	B	B	B	B	B	n/a	B	B	n/a	B
Air Cargo Rd & S 160th St.	B	B	B	B	B	n/a	B	B	n/a	B
International/SR 99 & S 160th St.	D	D	D	D	E	n/a	E	D	n/a	D
Air Cargo Rd & Airport Expressway	B	B	B	B	B	n/a	B	B	n/a	B
Air Cargo Rd & S 170th St.	E	E	E	E	E	n/a	E	E	n/a	E
Airport Expressway & S 170th St.	B	B	B	B	B	n/a	B	B	n/a	B
International/SR 99 & S 170th St.	F	F	F	F	F	n/a	F	F	n/a	F
International/SR 99 & S 176th St.	C	C	C	C	C	n/a	C	C	n/a	C
International/SR 99 & S 180th St.	D	D	D	D	D	n/a	D	D	n/a	D
Southbound SR 509 & S 188th St.	A	A	A	A	A	n/a	A	A	n/a	A
Des Moines & S 188th St.	C	C	D	C	C	n/a	C	E	n/a	D
28th Ave S & S 188th St.	C	B	B	B	B	n/a	B	C	n/a	B
International/SR 99 & S 188th St.	F	F	F	F	F	n/a	F	F	n/a	F
Military Rd & S 188th St.	E	E	E	E	E	n/a	E	E	n/a	E
Southbound I-5 Ramps & S 188th St.	D	D	D	D	D	n/a	D	D	n/a	D
Northbound I-5 Ramps & S 188th St.	F	E	E	E	E	n/a	E	E	n/a	E
28th Ave S & S 192nd St.	B	B	B	B	B	n/a	B	B	n/a	B
International/SR 99 & S 192nd St.	D	C	C	C	D	n/a	C	C	n/a	C
Des Moines & S 200th St.	B	B	B	B	B	n/a	B	B	n/a	B
28th Ave S & S 200th St.	C	B	B	B	B	n/a	B	B	n/a	B
International/SR 99 & S 200th St.	F	F	F	F	F	n/a	F	F	n/a	F
Military Rd & S 200th St. / SB I-5 Ramps	F	E	E	E	E	n/a	E	E	n/a	E
Military Rd & Northbound I-5 Ramps	C	C	C	C	C	n/a	C	C	n/a	C
Des Moines & Marine View Drive	B	B	B	B	B	n/a	B	B	n/a	B
Pacific Highway/SR 99 & S 216th St.	E	E	E	E	E	n/a	E	E	n/a	E
Pacific Hwy./SR 99 & SR 516	E	E	E	E	E	n/a	E	E	n/a	E
SB I-5 Ramps & SR 516	F	F	F	F	F	n/a	F	F	n/a	F

Option 1 - Max off-site (66 trips); Option 2A - Maximum on-site using Route A (26 trips), Option 2B - Maximum On-Site using on-site Route B (26 trips)

Route 13 South 154th/156th Street

Route 14 State Route 518, International Boulevard / State Route 99, South 192nd Street

Route 15 State Route 509, South 188th Street, 28th Avenue South, South 192nd Street

TABLE 5-4-5
Page 7 of 8

1997-2002 HAUL PROCESS INTERSECTION LEVEL OF SERVICE SUMMARY (CONTINUED)

Evaluated Intersection	Do-Nothing Alternative	Preferred Alternative with Trucks								
		Route 16			Route 17			Route 18		
		1	2A	2B	1	2A	2B	1	2A	2B
Southbound SR 509 Ramps & SR 518	B	B	n/a	B	B	n/a	B	B	n/a	B
Northbound SR 509 Ramps & SR 518	A	A	n/a	A	A	n/a	A	A	n/a	A
Des Moines & EB SR 518 On-Ramp	A	A	n/a	A	A	n/a	A	A	n/a	A
Des Moines & WB SR 518 Off-Ramp	F	F	n/a	F	F	n/a	F	F	n/a	F
Des Moines & 8th Ave South	B	B	n/a	B	B	n/a	B	B	n/a	B
International/SR 99 & S 154th St.	E	E	n/a	E	E	n/a	E	E	n/a	E
24th Ave S & S 154th St.	C	D	n/a	D	D	n/a	D	D	n/a	D
Des Moines & S 156th St.	C	C	n/a	C	C	n/a	C	C	n/a	C
Southbound SR 509 & S 160th St.	D	D	n/a	D	D	n/a	D	D	n/a	D
Northbound SR 509 & S 160th St.	A	A	n/a	A	A	n/a	A	A	n/a	A
Des Moines & S 160th St.	B	B	n/a	B	B	n/a	B	B	n/a	B
Air Cargo Rd & S 160th St.	B	B	n/a	B	B	n/a	B	B	n/a	B
International/SR 99 & S 160th St.	D	D	n/a	D	D	n/a	D	D	n/a	D
Air Cargo Rd & Airport Expressway	B	B	n/a	B	B	n/a	B	B	n/a	B
Air Cargo Rd & S 170th St.	E	E	n/a	E	E	n/a	E	E	n/a	E
Airport Expressway & S 170th St.	B	B	n/a	B	B	n/a	B	B	n/a	B
International/SR 99 & S 170th St.	F	F	n/a	F	F	n/a	F	F	n/a	F
International/SR 99 & S 176th St.	C	C	n/a	C	C	n/a	C	C	n/a	C
International/SR 99 & S 180th St.	D	D	n/a	D	D	n/a	D	D	n/a	D
Southbound SR 509 & S 188th St.	A	A	n/a	A	A	n/a	A	A	n/a	A
Des Moines & S 188th St.	C	C	n/a	C	C	n/a	C	C	n/a	C
28th Ave S & S 188th St.	C	C	n/a	B	C	n/a	B	B	n/a	B
International/SR 99 & S 188th St.	F	F	n/a	F	F	n/a	F	F	n/a	F
Military Rd & S 188th St.	E	E	n/a	E	E	n/a	E	E	n/a	E
Southbound I-5 Ramps & S 188th St.	D	D	n/a	D	D	n/a	D	D	n/a	D
Northbound I-5 Ramps & S 188th St.	F	E	n/a	E	F	n/a	E	E	n/a	E
28th Ave S & S 192nd St.	B	B	n/a	B	B	n/a	B	B	n/a	B
International/SR 99 & S 192nd St.	D	C	n/a	C	C	n/a	C	C	n/a	D
Des Moines & S 200th St.	B	B	n/a	B	B	n/a	B	B	n/a	B
28th Ave S & S 200th St.	C	B	n/a	B	B	n/a	B	B	n/a	B
International/SR 99 & S 200th St.	F	F	n/a	F	F	n/a	F	F	n/a	F
Military Rd & S 200th St. / SB I-5 Ramps	F	E	n/a	E	E	n/a	E	F	n/a	E
Military Rd & Northbound I-5 Ramps	C	C	n/a	C	C	n/a	C	C	n/a	C
Des Moines & Marine View Drive	B	B	n/a	B	B	n/a	B	B	n/a	B
Pacific Highway/SR 99 & S 216th St.	E	E	n/a	E	E	n/a	E	E	n/a	E
Pacific Hwy./SR 99 & SR 516	E	E	n/a	E	E	n/a	E	E	n/a	E
SB I-5 Ramps & SR 516	F	F	n/a	F	F	n/a	F	F	n/a	F

Option 1 - Max off-site (66 trips); Option 2A - Maximum on-site using Route A (26 trips), Option 2B - Maximum On-Site using on-site Route B (26 trips)

Route 16 Interstate 5 (from North), South 188th Street, 28th Avenue South, South 192nd Street

Route 17 Interstate 5 (from South), South 188th Street, 28th Avenue South, South 192nd Street

Route 18 Interstate 5 (from North), South 200th Street, 28th Avenue South, South 192nd Street

TABLE 5-4-5
Page 8 of 8

1997-2002 HAUL PROCESS INTERSECTION LEVEL OF SERVICE SUMMARY (CONTINUED)

Evaluated Intersection	Do-Nothing Alternative	Preferred Alternative with Trucks					
		Route 19			Route 20		
		1	2A	2B	1	2A	2B
Southbound SR 509 Ramps & SR 518	B	B	n/a	B	B	n/a	B
Northbound SR 509 Ramps & SR 518	A	A	n/a	A	A	n/a	A
Des Moines & EB SR 518 On-Ramp	A	A	n/a	A	A	n/a	A
Des Moines & WB SR 518 Off-Ramp	F	F	n/a	F	F	n/a	F
Des Moines & 8th Ave South	B	B	n/a	B	B	n/a	B
International/SR 99 & S 154th St.	E	E	n/a	E	E	n/a	E
24th Ave S & S 154th St.	C	D	n/a	D	D	n/a	D
Des Moines & S 156th St.	C	C	n/a	C	C	n/a	C
Southbound SR 509 & S 160th St.	D	D	n/a	D	D	n/a	D
Northbound SR 509 & S 160th St.	A	A	n/a	A	A	n/a	A
Des Moines & S 160th St.	B	B	n/a	B	B	n/a	B
Air Cargo Rd & S 160th St.	B	B	n/a	B	B	n/a	B
International/SR 99 & S 160th St.	D	D	n/a	D	D	n/a	D
Air Cargo Rd & Airport Expressway	B	B	n/a	B	B	n/a	B
Air Cargo Rd & S 170th St.	E	E	n/a	E	E	n/a	E
Airport Expressway & S 170th St.	B	B	n/a	B	B	n/a	B
International/SR 99 & S 170th St.	F	F	n/a	F	F	n/a	F
International/SR 99 & S 176th St.	C	C	n/a	C	C	n/a	C
International/SR 99 & S 180th St.	D	D	n/a	D	D	n/a	D
Southbound SR 509 & S 188th St.	A	A	n/a	A	A	n/a	A
Des Moines & S 188th St.	C	C	n/a	C	C	n/a	C
28th Ave S & S 188th St.	C	B	n/a	B	B	n/a	B
International/SR 99 & S 188th St.	F	F	n/a	F	F	n/a	F
Military Rd & S 188th St.	E	E	n/a	E	E	n/a	E
Southbound I-5 Ramps & S 188th St.	D	D	n/a	D	D	n/a	D
Northbound I-5 Ramps & S 188th St.	F	E	n/a	E	E	n/a	E
28th Ave S & S 192nd St.	B	B	n/a	B	B	n/a	B
International/SR 99 & S 192nd St.	D	C	n/a	C	D	n/a	D
Des Moines & S 200th St.	B	B	n/a	B	B	n/a	B
28th Ave S & S 200th St.	C	B	n/a	B	B	n/a	B
International/SR 99 & S 200th St.	F	F	n/a	F	F	n/a	F
Military Rd & S 200th St. / SB I-5 Ramps	F	F	n/a	F	E	n/a	E
Military Rd & Northbound I-5 Ramps	C	C	n/a	C	C	n/a	C
Des Moines & Marine View Drive	B	B	n/a	B	B	n/a	B
Pacific Highway/SR 99 & S 216th St.	E	E	n/a	E	E	n/a	E
Pacific Hwy./SR 99 & SR 516	E	E	n/a	E	F	n/a	E
SB I-5 Ramps & SR 516	F	F	n/a	F	F	n/a	F

Option 1 - Max off-site (66 trips); Option 2A - Maximum on-site using Route A (26 trips), Option 2B - Maximum On-Site using on-site Route B (26 trips)

Route 19 Interstate 5 (from South), South 200th Street, 28th Avenue South, South 192nd Street

Route 20 Interstate 5 (from South), Kent-Des Moines Road / State Route 516, International Boulevard / State Route 99, South 192nd Street

TABLE 5-4-8

Seattle-Tacoma International Airport
Supplemental Environmental Impact Statement

CONSTRUCTION BEST MANAGEMENT PRACTICES (BMPS)

The following construction management practices are typically included in the Port of Seattle's contract specification. It is anticipated that this listing would be included in the requests for bids, and included in contractors construction plans:

A. The Port will monitor all off-site loading operations, haul routes, and on-site operations to ensure compliance with all applicable mitigation provisions.

B. The Contractor will be required to identify and assign a **Haul Route Supervisor**. The Haul Route Supervisor shall be a supervisory person, well-trained, and experienced in handling excavated materials both with "on-highway" and "off-highway" equipment. The Haul Route Supervisor shall be completely familiar with the approved haul routes. The Haul Route Supervisor shall document all activities and answer all complaints regarding spillage, traffic violations, property damage claims, safety, equipment breakdowns, and the terms and conditions of required bonds and permits. The Haul Route Supervisor need not be a full-time employee dedicated to this project. The responsibilities may be shared with other project personnel provided the above-stated qualifications are satisfied.

C. The Contractor will be required to maintain documentation concerning its activities. The Contractor will maintain project records concerning fill material borrow site and haul routes. Before any material is loaded at the fill material source borrow site, the Contractor shall submit the following information: (a) Haul Route to the site and return. (b) Copies of permits, agreements, or letter of understanding from regulatory agencies, towns, cities, or other governmental entities. (c) Description, owner, vehicle number, and license number of each hauling vehicle. (d) Each vehicle operator's name and driver's license number.

D. Vehicles delivering materials to or hauling material, shall **access the site from** [to be inserted] via the contractor's access route. These routes and a specific contractor hauling plan will be reviewed by the Port and approved prior to implementation. When reviewing requested haul routes, the Port will consider the potential impacts on traffic congestion, roadway conditions, impacts on neighboring properties, and other relevant factors. Based on this consideration, and in consultation with other jurisdictions (such as WSDOT and adjacent cities), the Port may accept or reject proposed haul routes or impose conditions on the use of haul routes, including hours of operating and number of vehicles permitted to use the route. The hauling vehicle shall proceed to the project site via the approved haul route. Any deviation from the approved haul route shall be approved by the Haul Route Supervisor and the Port.

E. The Contractor shall provide an asphalt or concrete paved drive for haul truck access to and exit from the construction site. This paved/concrete drive, in conjunction with a rock run-out area, should be 500-1,000 feet continuous from connection to public roads or the project site.

F. Contractors will be required to maintain and repair all equipment in a manner that reasonably minimizes adverse environmental impacts, such as air pollution, noise, and entrainment of dust. Contractors will be required to maintain minimum freeboard on all hauling trucks with continuous monitoring for compliance. The Haul Route Supervisor will ensure that all haul vehicles have effective mufflers at all times and that Jake Brakes are not used except in specifically designated areas.

TABLE 5-4-8 (Continued)

Seattle-Tacoma International Airport
Supplemental Environmental Impact Statement

CONSTRUCTION BEST MANAGEMENT PRACTICES (BMPS)

G. The vehicle operator shall conform to the agreed upon all operational procedures established by the site operator and the Contractor. The procedure shall include but not be limited to, traffic control, turn-outs, turn-arounds, queue time, truck washing facilities, gate security, etc. The contractor will provide all **flagging, signing, lighting**, etc., as required by the applicable jurisdiction (including City of SeaTac, King County, State of Washington or the Port of Seattle) to provide all **reasonable safety measures** to protect all persons using the roads The contractor shall obey all vehicular weight and speed limits established by the applicable jurisdiction. Flagging, signs and all traffic control devices shall conform to WAC 296-155-300, -05, -310 and -315 and specific regulation or requirements of the City of SeaTac. Flaggers must meet the requirements of the State of Washington, Department of Labor and Industries (WAC 296-155-305). All workers engaged in flagging or traffic control shall wear reflective vests and hard hats. Contractors will use truck scales or loading equipment scales at borrow sites to ensure compliance with legal load limits.

   The local jurisdiction may notify the Port if a safety issue arises, and subsequent to the Port and Contractor taking reasonable steps to promptly address the safety issues, may assign a uniformed officer to enforce safety regulations, including overweight vehicle enforcement.

   The Contractor shall appoint one employee as the responsible representative in charge of traffic control and safety. The appointed representative shall have authority to act on behalf of the Contractor and shall be available, on call, twenty-four hours a day throughout the period of construction for the Contract. A twenty-four hour phone number shall be provided to the Port of Seattle for use in case of an off-hour emergency. The Contractor shall provide immediate response to correct any and all deficiencies upon notification and keep a log of the response and actions taken to address deficiencies.

H. The contractor shall continuously **sweep and wash-down** access routes to the construction areas and existing adjacent paving areas. These areas shall be kept free of debris at all times. Sediment shall be removed from roads by shoveling or sweeping and be transported and place within the fill area. Coordinate the sediment disposal area with the Port of Seattle. Street washing shall be allowed only after sediment has been removed. The contractor shall flush and clean storm drainage systems along the haul route within 1,000 feet of the site when so directed by the Port. Water may be used for dust control purposes provided that runoff does not discharge directly into a receiving stream.

I. Any **damage** (including lane striping and lane turtles) along the contractor access/haul routes due to the contractors use for this project shall be repaired immediately. At the completion of the project, all pavements and surfaces along the access routes that were existing at the start of the project shall be restored to their original condition or fees paid in lieu of repairs as agreed by the Port and local jurisdiction. The contractor shall repair any damage to the haul road due to their operations. The contractor shall coordinate and meet the cleaning and repair requirements set by other public agencies for use of their roads for Sea-Tac Airport related work. Existing pavements, facilities, utilities, or equipment which are damaged shall be replaced or reconstructed to original strength and appearance at the Contractor's expense. The Contractor shall take immediate action to replace any damaged facilities and equipment and reconstruct any damaged area which is to remain in service.

TABLE 5-4-8 (Continued)

Seattle-Tacoma International Airport
Supplemental Environmental Impact Statement

CONSTRUCTION BEST MANAGEMENT PRACTICES (BMPS)

J. The contractor shall keep a vacuum sweeper truck and a water truck on site at all times during the working and non-working hours and shall maintain the site **free from dust and objectionable debris**. During the periods of time that there is no construction activity (i.e., between work shifts), the water truck must be ready with on-site contractor's personnel available to respond immediately to a dust problem, as identified by Airport Operations staff or the Port Engineer. At no time shall there be more than a 20 minute response time to calls concerning dust/debris problems during work hours and a 90-minute response time at all other tomes on a 24-hour per day basis. The Contractor's method for dust control will be continuously monitored and if the method is not controlling the dust to the satisfaction of the Port, the Contractor will be required to improve the method or utilize a new method at no additional cost to the Port.

The contractor shall provide whatever means are necessary to prevent foreign object debris (FOD) in aircraft movement areas on a 24-hour basis. Trucks and equipment shall have all loose dirt, rocks, and other materials removed when accessing the Airport Operations Area or when leaving the work area and using public roads. They will be continuously monitored by the Port and if the Contractor's method is not adequate, the Contractor will be required to improve their method or utilize a new method at no additional cost to the Port.

The Contractor shall provide **truck washes, rumble strips, stabilized construction entrances**, shakers or whatever means are necessary to prevent any foreign material from being deposited on public roads.

When Airport roadways and public highways are used in connection with construction under this contract, the Contractor shall remove all debris cluttering the surfaces of such roadways. Trucks and equipment shall have all accumulated dirt, mud, rocks, and debris removed before accessing the site and when leaving the work area. Loads shall be struck flush and secured to prohibit loss of material. If spillage occurs, such roadways shall be swept clean immediately after such spillage to allow for safe operation of vehicles as determined by the Port of Seattle. If the Contractor is negligent in cleanup and Port forces are required to perform the work, the expense of said cleanup shall be paid by the Contractor.

K. At all times keep objectionable **noise** generation to a minimum by: (1) Equip air compressors with silencing packages. (2) Equip jackhammers with silencers on the air outlet. (3) Equipment that can be electrically driven instead of gas or diesel is preferred. If noise levels on equipment cannot reasonably be brought down to criteria, listed as follows, either the equipment will not be allowed on the job or use time will have to be scheduled subject to approval of the Port of Seattle. Objectionable noise received on neighboring (non-Port-owned) properties is defined as any noise exceeding the noise limits of State Regulations (WAC 173-60-040) or City ordinance, or as any noise causing a public nuisance in residential area, as determined by the Port and community representatives, or by the nuisance provisions of local ordinances. The noise limitations established are as set forth in the following table after any applicable adjustments provided for herein are applied:

	RECEIVING PROPERTY		
Noise Source	Residential	Commercial	Industrial
Airport	50 dBA	65 dBA	70 dBA

Between the hours of 10:00 p.m. and 7:00 a.m. on weekdays and 10:00 p.m. and 9:00 a.m. on weekends the noise limitations above may be exceeded for any receiving property by no more than:

TABLE 5-4-8 (Continued)

Seattle-Tacoma International Airport
Supplemental Environmental Impact Statement

CONSTRUCTION BEST MANAGEMENT PRACTICES (BMPS)

(a) Five dBA for a total of 15 minutes in any one hour period; or (b) Ten dBA for a total if 5 minutes in any one hour period; or (c) 15 dBA for a total of 1.5 minutes in any one hour period.

In addition to the noise controls specified, demolition and construction activities conducted within 1,000 feet of residential areas may have additional noise controls required.

L. To minimize pollution emissions, the Contractor shall:

1. Develop and submit for approval a Contractor Erosion Control Plan (CECP). The CECP shall include all the erosion and sedimentation control features required by: (1) The project specifications. (2) The Temporary Erosion and Sedimentation Control Plan (TESCP); (3) Storm Water Management Manual for the Puget Sound Basin (Volumes I and II). (4) Regulatory agencies and such additional controls made necessary by the Contractor's operation. The Contractor shall maintain a copy of the CECP and all references at the job site.
2. Designate an experienced Sedimentation and Erosion Control Representative (SEC). The SEC shall have authority to act on behalf of the Contractor and shall be available, on call, 24 hours a day throughout the period of construction. A 24 hour phone number shall be provided to the Port of Seattle. The Contractor shall provide immediate response to correct all deficiencies.
3. Coordinate and schedule the installation of the controls, features, and best management practices (BMPs) identified in the Contractor Erosion Control Plan. Coordinate the erosion and sedimentation control work with the other contract work in order to provide continuous erosion and sedimentation control and protection.
4. Maintain the installed BMPs and controls for the duration of the project or as indicated in the contract documents.
5. Provide periodic inspection and response to ensure that the installed BMPs function during any and all storm events. Contractor shall be responsible for erosion and sedimentation control 24 hours a day, seven days a week, including holidays.
6. Remove all temporary controls at the end of the project or when no longer needed as determined by the Port of Seattle.
7. Conduct project operations in accordance with the State National Pollution Discharge Elimination System (NPDES) permit for storm water discharges associated with construction activity.
8. No grading or earthwork shall be started before the CECP is submitted and the Best Management Practice (BMPs) erosion and sedimentation control items are in place and functioning. BMPs once installed shall be maintained for the life of the project or until their erosion and sediment control function has been completed. BMPs shall be reviewed after each major storm event. BMPs shall be maintained during all suspensions of work and all non-work periods.
9. Clearing limits, sensitive/critical areas and their buffers, trees, drainage courses, and wetland areas shall be clearly delineated in the field. Extreme care shall be taken to prevent sediment deposition or contamination of the golf course property, wetland areas, existing drainage courses, or public streets. In the event that these areas suffer degradation in the opinion of the Port of Seattle, the Port Engineer may stop construction activities until the situation is rectified. BMPs intended as sediment trapping measures shall be installed and functional before land disturbing activities take place. Properties and waterways downstream shall be protected from erosion due to increases in the volume, velocity and peak flow rate of storm water from the

TABLE 5-4-8 (Continued)

Seattle-Tacoma International Airport
Supplemental Environmental Impact Statement

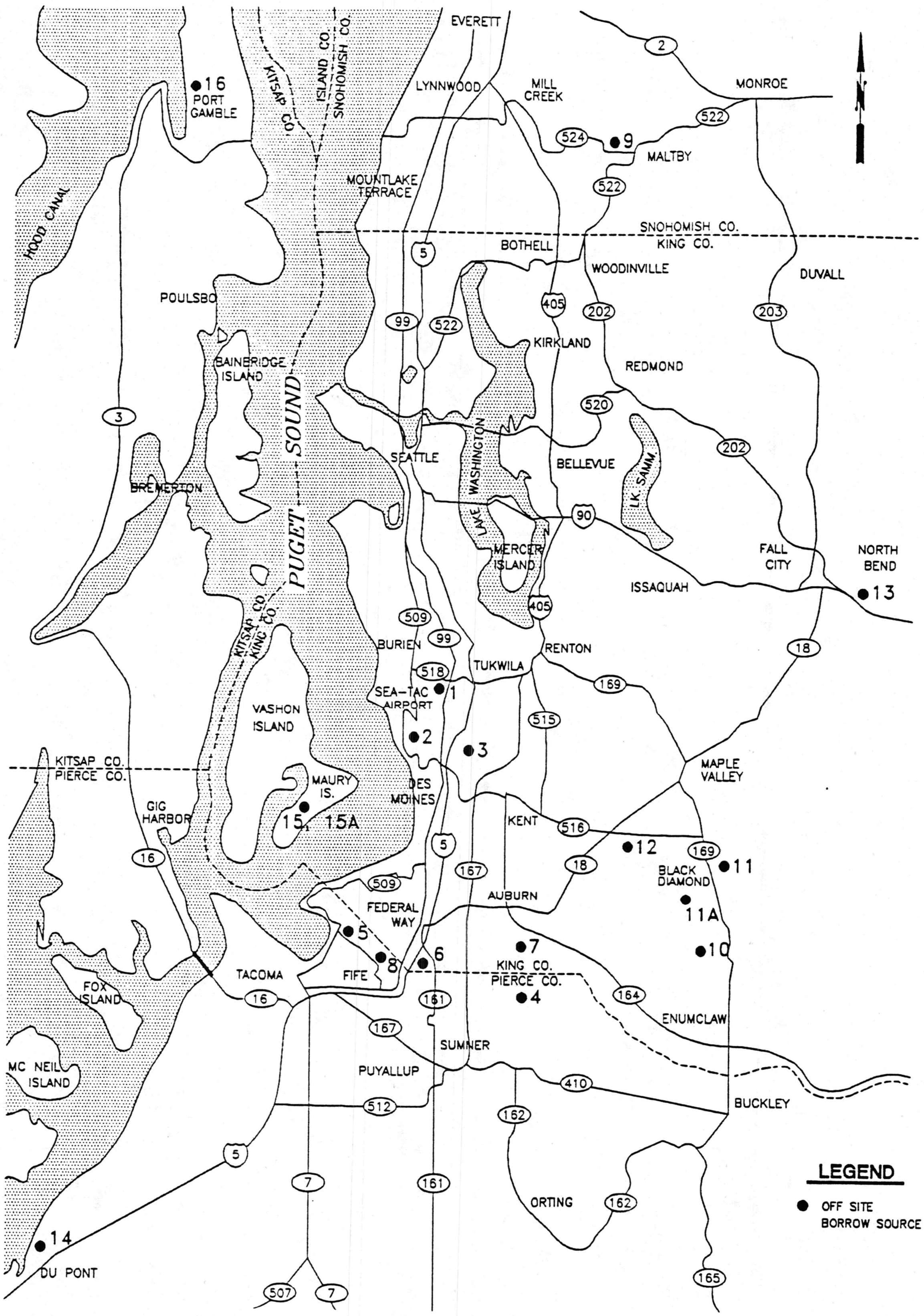
CONSTRUCTION BEST MANAGEMENT PRACTICES (BMPS)

project site. All temporary on-site conveyance channels shall be designed, constructed and stabilized to prevent erosion from the expected velocity of flow from a 2 year, 24 hour frequency storm for the developed condition. When warranted, application for a Temporary Modification of Water Quality Certification, 401 Permit will be made. All requirements of the permit will be adhered to for the duration of the project.

10. All temporary erosion and sediment control BMPs shall be removed within 30 days after final site stabilization is achieved or after the temporary BMPs are no longer needed. Disturbed soil areas resulting from removal shall be permanently stabilized.

11. Dewatering devices shall discharge into a sediment trap or sediment pond. All pollutants other than sediment that occur on-site during construction shall be handled and disposed of in a manner that does not contaminate storm water.

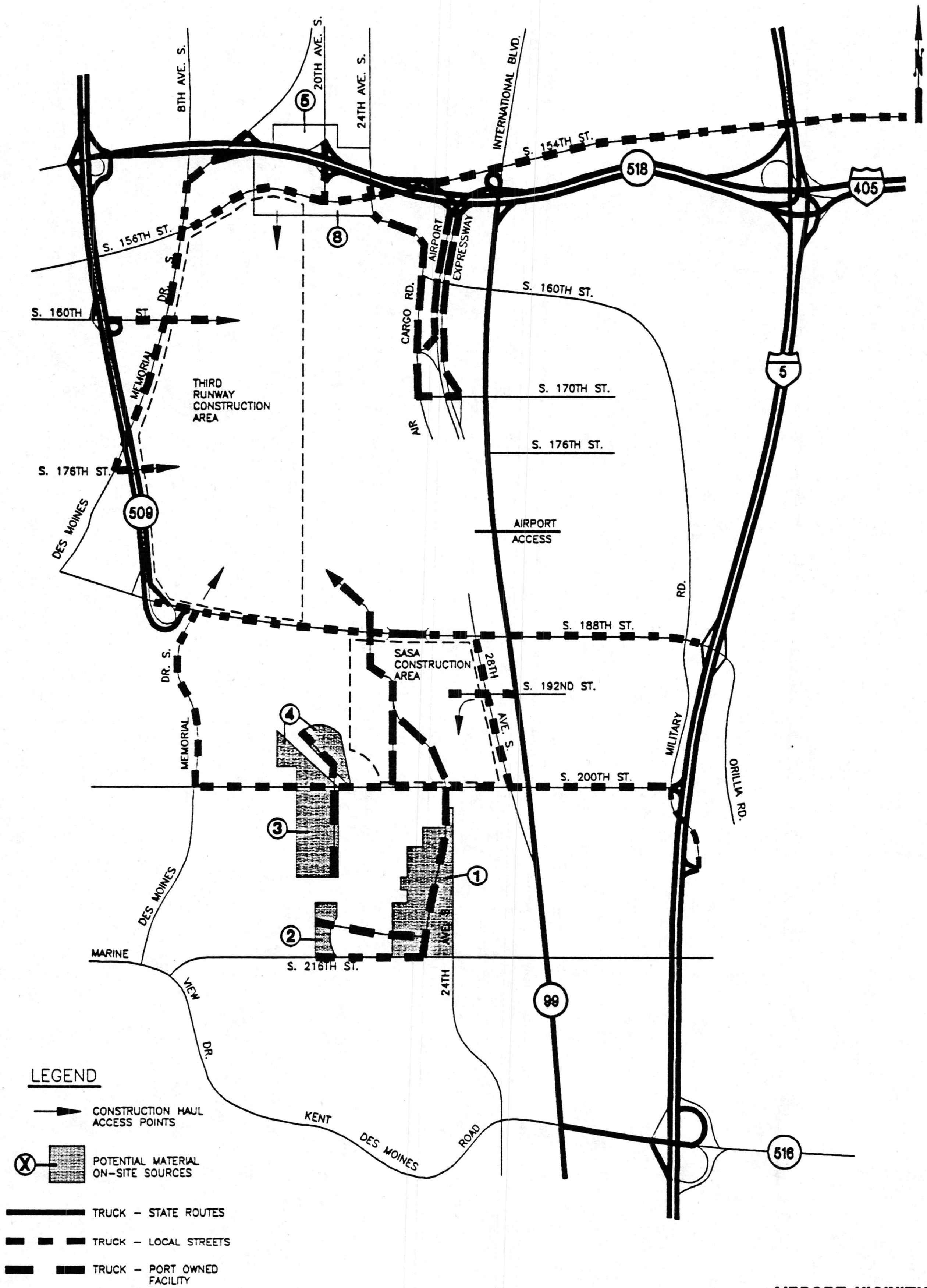
12. A designated maintenance area will be established for all construction sites with appropriate pollution controls. Fueling of Contractor's equipment will be performed away from storm drain inlets in areas designated by the Contractor and reviewed by the Port of Seattle. Extreme care shall be taken to prevent fuel spills. Contractor's representative shall be present at all times when equipment is being fueled. In the event of a spill the Port of Seattle Fire Department shall be called by way of the Port of Seattle. Place oil absorbent pads and drip pans beneath the vehicle being fueled and under parked vehicles (overnight and otherwise). Provide and maintain absorbent materials, shovels, and five gallon buckets at the fueling area for spill cleanup.



SEATTLE-TACOMA INTERNATIONAL AIRPORT
MASTER PLAN UPDATE
ENVIRONMENTAL IMPACT STATEMENT

INCA ENGINEERS INC.

REGIONAL VICINITY MAP & OFF-SITE MATERIAL SOURCES
EXHIBIT 5-4-1

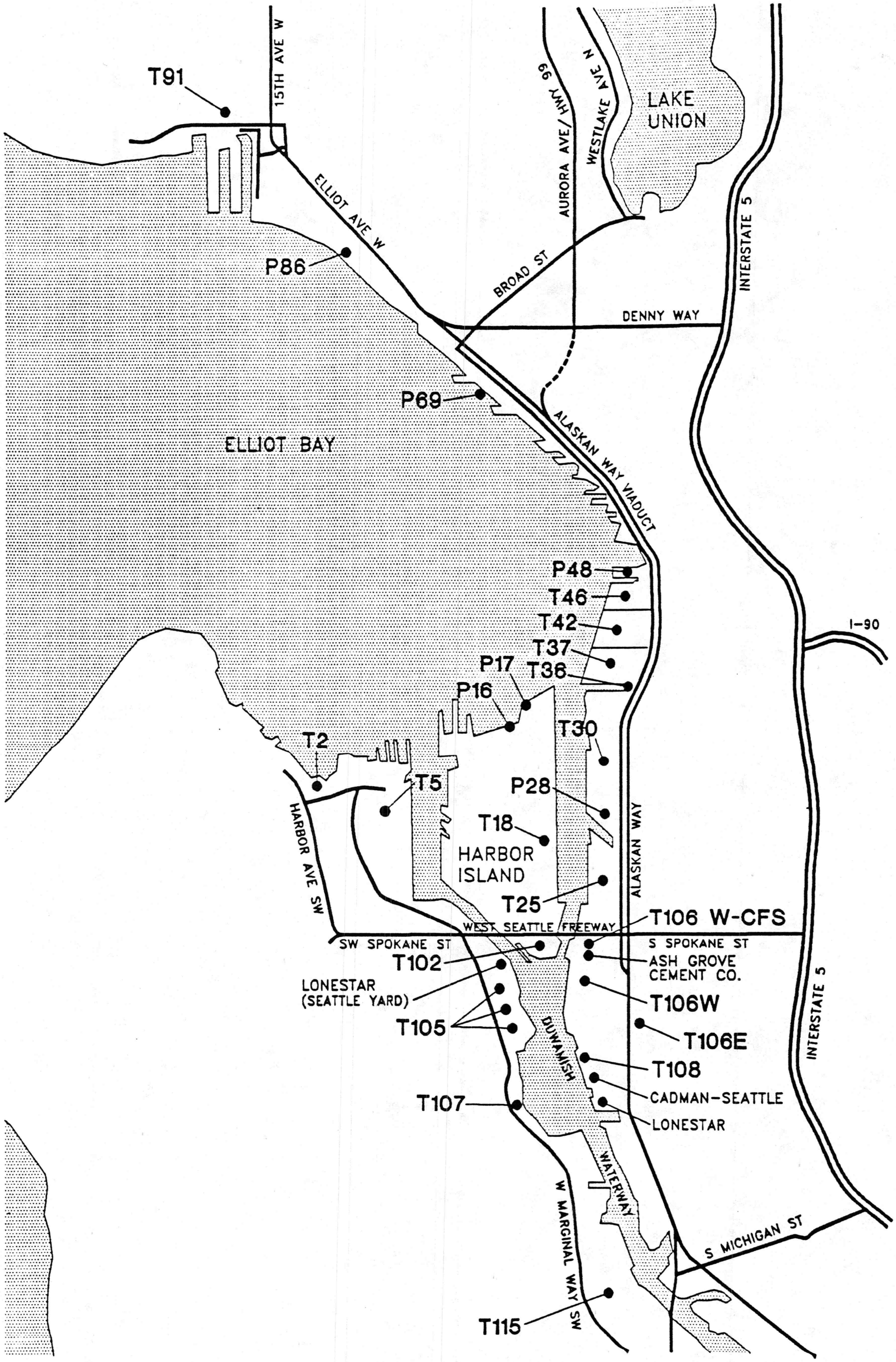


INCA
INCA ENGINEERS INC.

SEATTLE-TACOMA INTERNATIONAL AIRPORT
MASTER PLAN UPDATE
ENVIRONMENTAL IMPACT STATEMENT

AIRPORT VICINITY HAUL ROUTES

EXHIBIT 5-4-2



SOURCE: HNTB ALTERNATIVE DELIVERY STUDY, NOVEMBER 1996.

INCA ENGINEERS INC.

SEATTLE-TACOMA INTERNATIONAL AIRPORT
MASTER PLAN UPDATE
ENVIRONMENTAL IMPACT STATEMENT

POTENTIAL BARGE TRANSFER LOCATIONS
EXHIBIT 5-4-3

EMBANKMENT SECTION
NORTH END OF THIRD RUNWAY

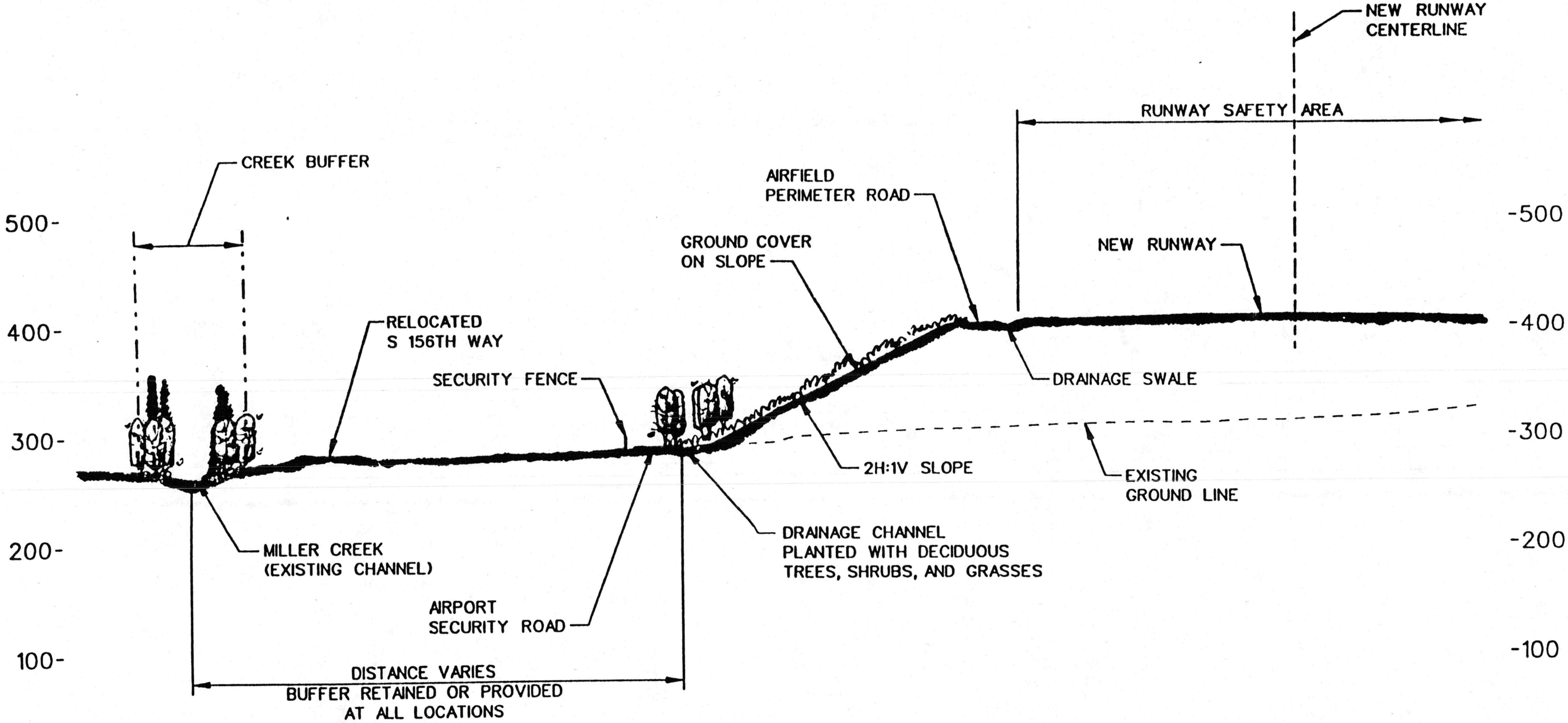
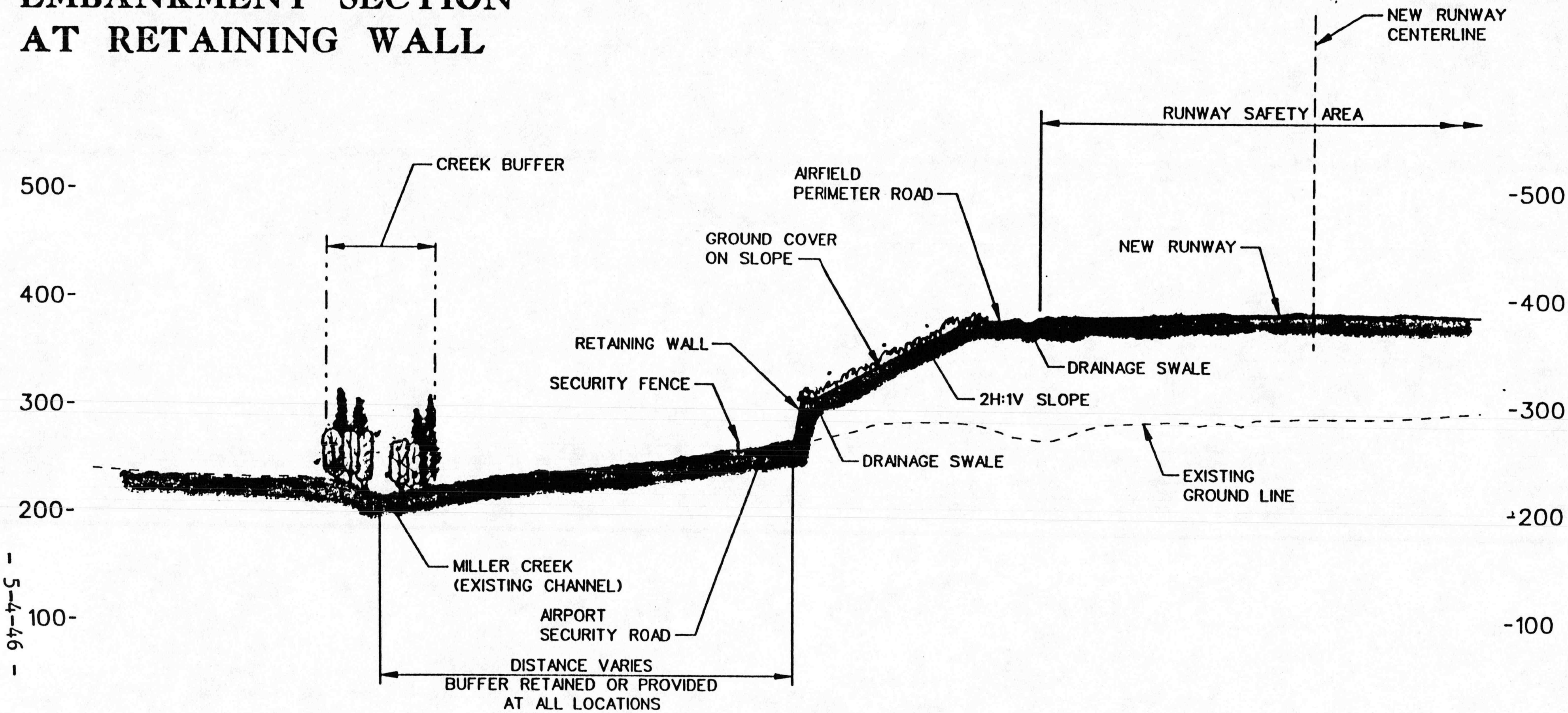
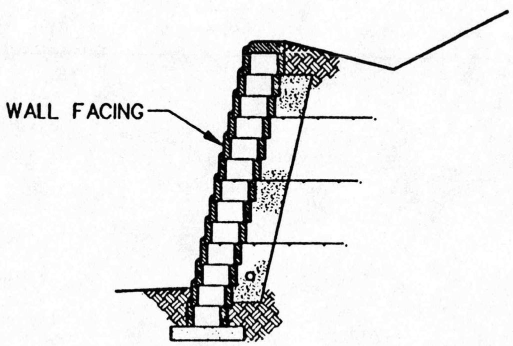


Exhibit 5-4-5A
New Runway Embankment
(North End)

JANUARY 17, 1997

EMBANKMENT SECTION AT RETAINING WALL



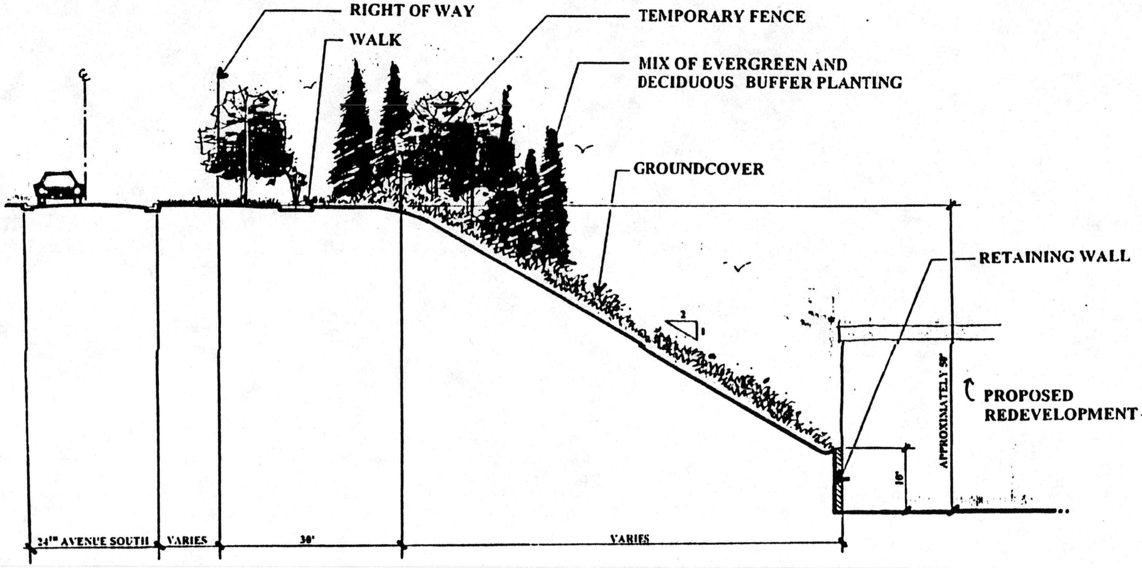


POSSIBLE RETAINING WALL CONCEPT

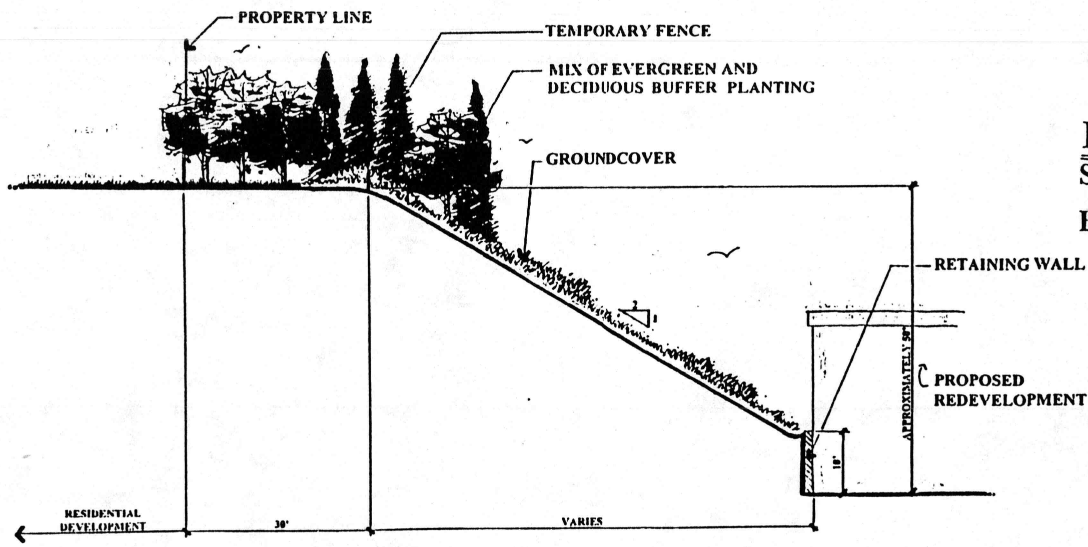
Exhibit 5-4-5B
New Runway Embankment
(Retaining Wall)

JANUARY 17, 1997

REDEVELOPMENT CONCEPT SECTIONS



SECTION A - A



SECTION B - B

PORT OF SEATTLE
SEATAC INTERNATIONAL AIRPORT
BORROW SITE REDEVELOPMENT

Exhibit 5-4-6
South On-Site Borrow Source Redevelopment Concept

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SECTION 5-5

BIOTIC COMMUNITIES, WETLANDS AND FLOODPLAINS

Chapter IV of the Final EIS (located in Volume I) presents the impacts of the Master Plan Update improvements relative to biotic communities (including creeks), wetlands, floodplains. Since the issuance of the Final EIS, information concerning two key areas has been produced:

- Submission of the wetland fill Section 404 permit application to the U.S. Army Corps of Engineers and further definition of wetland mitigation and Miller Creek relocation mitigation; and
- Survey of raptors in the area of the third runway.

This section of the additional environmental analysis presents the new information.

The Final EIS (Chapter IV, Section 16) states:

> Approximately 40 percent of the detailed study area is occupied by Sea-Tac Airport and is characterized by frequently mowed grassland bisected by service roads and taxiways. This area provides little wildlife habitat value. Wildlife habitat surrounding the airfield consists of fragmented habitat, which is composed of forest, shrub, and grassland with scattered wetlands. These areas are subject to a variety of airport-related disturbances as well as increasing residential, commercial, and industrial development. Each of the "With Project" alternatives would remove approximately the same amounts of vegetation (about 712 acres total). Of that total, the majority is managed grassland (about 303 acres), which provides little wildlife habitat value. In addition, about 269 acres of forest, 78 acres of shrub, 52 acres of unmanaged grassland, and 10 acres of wetlands would be removed under each "With Project" alternative.
>
> About 3,700 feet of Miller Creek and its tributaries would require realignment and relocation to complete the runway. About 200 feet of Des Moines Creek would require relocation due to the 600 ft extension of Runway 34R. About 2,200 feet of open channel on Des Moines Creek would require relocation due to the South Aviation Support Area. The 200-foot section of Des Moines Creek that would be affected by the extension of Runway 34R is within the area that would be realigned as mitigation for SASA. Proposed mitigation would reduce potential impacts on the hydrology, water quality, and aquatic habitat and biota of Miller and Des Moines Creeks and Puget Sound.

The findings of the Final EIS remain current. The following summarize the status of other processes and information developed as part of the mitigation planning, further investigations were undertaken concerning wetland impacts, and stream relocation, and possible use of the site by raptors.

1. Wetland Impacts and Relocation of Miller Creek

In December 1996, the Port submitted an application to the Army Corps of Engineers for a permit to fill wetlands at Sea-Tac Airport associated with the Master Plan Update improvements in compliance with the Clean Water Act, Section 404. The 404 permit application submitted to the Corps of Engineers includes a completed Joint Aquatic Resources Project Application (JARPA) form, in a report entitled "JARPA Application for Proposed Improvements at Seattle Tacoma

International Airport" dated December 1996. Copies of this document, that includes the jurisdictional delineation of wetlands at Sea-Tac, the proposed Wetland Mitigation Plan, the proposed mitigation for relocation of Miller Creek, and accompanying tables and drawings are available for review at the Port of Seattle Engineering Office at Sea-Tac Airport and the Northwest Mountain Region FAA Office in Renton, Washington at the addresses noted on the cover of this Supplemental EIS. These documents are hereby incorporated by reference.

The Final EIS noted that about 10.4 acres of wetland would be filled in order to complete the proposed improvements. Since issuance of the Final EIS, the Port has refined its evaluation of the projects affecting wetlands, including identification of nearly two (2) additional acres of wetland impacts, documented its review of in-basin mitigation options, and further defined plans for development of a wetland mitigation site in Auburn.

Based on a refined evaluation of the wetlands, the following impacts were identified:[1/]

Project Element	New Data	Final EIS
Runway impacts		
Embankment	5.46	5.48
Borrow Source impacts	1.92	2.38
Runway Safety Areas 16L/R	2.34	Included above
Runway 34R Extension	0.00	0.00
Terminal/Landside		
N. Employee Parking lot	0.81	0.81
Development in SASA	1.70	1.70
Total	12.23	10.40

As is noted in Chapter 2 (page 2-19) two alternatives are possible for the relocation of S/154th/S. 156th around the Runway Safety Areas for 16L/16R. Option 1 would result in the relocation of the road just around the existing RSA, and connect to the existing alignment of the road (it would not address the alignment of the third parallel runway). This option would affect 2.34 acres of wetland. Option 2 would account for the new parallel runway, and would relocate the roadway as shown in the Preferred Alternative (Exhibit 3-3) around the RSA's for all three runways. Wetlands impacted by Option 2 would include the 2.34 acres from Option 1 plus an additional 0.73 acres that is included in the runway impacts above (5.46 acres noted for the embankment includes the 0.73 acres for the road relocation), for a total of 3.04 acres.

To mitigate for the unavoidable impacts to wetlands, the Port proposes to create new wetlands on a 47-acre site of an approximately 69-acre parcel located within the city limits of Auburn, Washington. Wetland mitigation at the Airport, within the watersheds where the impacts may occur, is not feasible for three reasons: (1) most of the area surrounding the Airport is developed, and not enough available land exists in the watershed to create compensatory mitigation wetlands without relocation of additional business and residences; (2) the FAA has indicated that "wildlife attractions" within 10,000 ft of the edge of any active runway is not recommended; and (3) wildlife control activities in wetlands near the airport would conflict with wetland habitat mitigation goals. Because of wildlife attraction issues, the Port cannot commit to maintaining sites on or near the Airport as wetland habitat mitigation

[1/] The quantity of wetland to be filled is based on the best information available at this time. The Port and FAA do not have access to all property to be acquired for construction of the third runway. It is possible that some additional wetland areas could be identified when access is available to all property in the acquisition area.

in perpetuity. If a wetland site were to become a safety concern because of its attraction to wildlife, particularly birds, and jeopardize aircraft safety, the Port would be compelled to remove the hazard, including flora and/or fauna. However, the hydrologic functions the wetlands perform would be replaced at the Airport with the proposed storm water management facilities, relocation of the drainage channels, and relocation of affected portions of Miller Creek.

Because much of the wetland mitigation was established based on FAA guidance, the FAA Advisory Circular, approved on May 1, 1997 has been included in its entirety at the end of this section.

(A) Impacts to Wetlands

Implementation of the proposed Sea-Tac Airport Master Plan Update improvements would impact all or portions of 36 wetlands. The total area of wetland impact is 12.23 acres. Most impacts would occur during the first phase (1997-2000) of implementation, which includes construction of the new parallel runway, north employee lot, site preparation of the land known as SASA, and runway safety area upgrades. The wetland mitigation would compensate for all anticipated wetland impacts attributed to full implementation of the proposed Master Plan Update improvements. **Table 5-5-1** lists the impacts by wetland location and type.

The ecological characteristics of wetlands within the proposed impact areas have been evaluated and incorporated into the mitigation design to ensure that mitigation compensates for unavoidable wetland impacts from the entire Master Plan Update. Due to similarities in vegetation, many of the affected wetlands serve similar physical and biological functions and have been grouped for ecological assessment. Wetlands within the impact area occur in the Des Moines Creek and Miller Creek drainage basins, where natural habitats (including wetlands) are fragmented by urban development. In addition to substantial fragmentation of habitat, the small size of most impacted wetlands suggests that they function independently rather than as a natural ecological system.

According to the Washington State Natural Heritage Program information system and field studies, no rare plants, high-quality native wetlands, or high-quality native plant communities occur in the study area. Nineteen vegetation communities were identified in the proposed Master Plan Update study area, including nine (9) wetland and ten (10) upland vegetation communities. The wetland vegetation communities include forested wetland, shrub wetland, and emergent wetland.

Wetland Functions and Values: The biological and physical functions of wetlands within the study area were assessed to identify important qualities that should be replicated by the mitigation design.

Impacts associated with the Master Plan Update improvements are to small (<0.5 acre) wetlands that are isolated from other significant aquatic or semi-aquatic habitat, and occur in a landscape fragmented by streets, commercial, residential, or airport development. Therefore, for most functions, the wetlands were not considered to provide high function. Emergent wetlands (some with associated shrub habitat) were rated low for the following functions: export of production; baseflow support; and control of floodflow. Forested wetlands (some with associated shrub habitat) received a low functional value for export of production and stormwater runoff storage functions.

The wildlife habitat functions are generally significant to the local vicinity (rather than to a larger landscape or watershed) because urban development isolates the area for many species of wildlife, and the size of many of the wetlands are smaller than the habitat requirements of many mammal and bird species. The biological functions of wetlands are further limited by the lack of permanent open water, the short duration of seasonal ponding or soil saturation, and the high occurrence of non-native plant species in some emergent wetlands. The wildlife habitat value increases where trees and/or shrubs are adjacent to the grass-dominated emergent areas.

TABLE 5-5-1

Seattle-Tacoma International Airport
Supplemental Environmental Impact Statement

CLASSIFICATION, SIZE, AND IMPACTS TO WETLANDS

Wetland Number	Classification[1]	Wetland Size (Acres)	Total Impact[5] (Acres)	Vegetation Cover Types Impacted (Acres) Forested	Shrub-Scrub	Emergent
1	Forested	0.07	0.07	0.07	–	–
2	Forested/Emergent (60/40)	0.74	0.74	0.44	–	0.29
3	Forested	0.56	0.19	0.19	–	–
4	Forested	5.02	0.46	0.46	–	–
5	Forested/Shrub-Scrub (10/90)	4.58	1.69	0.17	1.52	–
6	Shrub-Scrub	0.87	0.00	–	–	–
7	Forested/Open Water/Emergent	6.70	0.00	–	–	–
8	Shrub-Scrub/Emergent	4.95	0.00	–	–	–
9	Emergent/Forested (60/40)	2.85	0.13	0.05	–	0.08
10	Shrub-Scrub	0.31	0.00	–	–	–
11	Forested/Emergent (80/20)	0.50	0.47	0.37	–	0.09
12	Emergent/Forested (80/20)	0.21	0.21	0.04	–	0.16
13	Emergent	0.05	0.05	–	–	0.05
14	Forested	0.19	0.19	0.19	–	–
15	Emergent	0.28	0.28	–	–	0.28
16	Emergent	0.06	0.06	–	–	0.06
17	Emergent	0.03	0.03	–	–	0.03
18	Forested	0.12	0.12	0.12	–	–
19	Forested	0.57	0.57	0.57	–	–
20	Shrub-Scrub/Emergent (90/10)	0.06	0.06	–	0.06	0.01
21	Forested	0.22	0.22	0.22	–	–
22	Emergent/Shrub-Scrub (90/10)	0.06	0.06	–	0.01	0.05
23	Emergent	0.78	0.78	–	–	0.78
24	Emergent	0.14	0.14	–	–	0.14
25	Forested	0.06	0.06	0.06	–	–
26	Emergent	0.02	0.02	–	–	0.02
27	Emergent[2]	0.00	0.00	–	–	–
28	Open Water/Shrub-Scrub (0/100)	18.10	0.06	–	0.06	–
29	Forested	0.74	0.74	0.74		–
30	Forested/Shrub-Scrub (80/20)	0.50	0.50	0.40	0.10	–
31	Emergent	0.05	0.00	–	–	–
32	Emergent	0.05	0.05	–	–	0.05
33	Forested/Shrub-Scrub/Emergent/Open Water	17.60	0.00	–	–	–
34	Open Water	1.40	0.00	–	–	–
35	Emergent	0.21	0.18	–	–	0.18
36	Forested/Emergent	0.30	0.00	–	–	–
37	Forested/Shrub Scrub (70/30)	2.41	1.68	1.17	–	0.50
38	Emergent/Shrub Scrub[3]	0.00	0.00	–	–	–
39	Forested	0.07	0.00	–	–	–
40	Forested	0.09	0.09	0.09	–	–
41	Emergent	0.09	0.08	–	–	0.08

Wetland Number	Classification[1]	Wetland Size (Acres)	Total Impact[5] (Acres)	Vegetation Cover Types Impacted (Acres)		
				Forested	Shrub-Scrub	Emergent
42	Emergent	0.50	0.00	–	–	–
43	Emergent/Shrub-Scrub/Forested/Open Water	30.3	0.00	–	–	–
44	Forested/Shrub-Scrub	0.70	0.00	–	–	–
45	Emergent	5.00	0.00	–	–	–
46	Open Water	0.06	0.00	–	–	–
47	Open Water	0.20	0.00	–	–	–
48	Emergent	0.02	0.00	–	–	–
49	Emergent	0.02	0.03	–	–	0.03
50	Shrub-Scrub	0.03	0.12	–	0.02	–
51	Forested	2.41	0.48	0.48	–	
52	Forested/Shrub-Scrub (90/10)	1.00	1.00	0.90	0.10	–
53	Forested	0.60	0.60	0.60	–	–
54	Shrub-Scrub/Open Water	25.70	0.00	–	–	–
55	Shrub-Scrub	0.04	0.04	–	0.04	–
TOTAL[4]		**143.86**	**12.23**	**7.34**	**2.00**	**2.88**

1 All wetland are palustrine based on USFWS classification system. Where more than one cover type is present, the percent impact to each cover type is shown in parenthesis.

2 Fill of this wetland completed with an approved Section 404 Nationwide 26 permit.

3 This wetland was determined not to be a regulated wetland by the City of Sea-Tac and the Corps of Engineers.

4 Values are rounded to two significant figures. Actual values/totals may differ slightly due to the effects of rounding.

5 Exact areas of wetland impact are subject to minor changes due to final engineering design and completion of wetland delineations on private property.

Hydrologic functions (such as floodflow storage, groundwater discharge, and storm water detention) are potentially important at the watershed level, because, when present, they may affect hydrologic and habitat conditions in off-site locations, especially fish habitat in Miller and Des Moines Creeks. Forested wetlands, on groundwater seeps adjacent to Miller and Des Moines Creeks, help to support the baseflow of the creeks by providing seasonal or perennial sources of water. Some of the forested wetlands associated with the creeks temporarily store floodwaters, which alleviates the severity of downstream flooding, and streambank erosion. Other wetlands help reduce peak flows by collecting and storing storm runoff, reducing the rate and volume of water that reaches the stream systems during storms. The on-site wetlands have a limited ability to provide these functions, largely due to their small size, the lack of direct connections to the creeks, or topographic conditions that limit seasonal detention of stormwater.

The groundwater recharge function of wetlands appears to be limited throughout much of the site. Many wetlands occur on compact till soils (Alderwood Series) above the Miller Creek and Des Moines Creek ravines. The wetlands have formed in shallow depressions where a perched water table has developed on low permeability till. Due to the low permeability of the till layer, it is unlikely these wetlands contribute significantly to recharge of groundwater.

These functional assessments were used in developing the appropriate mitigation for the proposed improvements at Sea-Tac Airport.

As was noted earlier, wetland impacts will occur due to the three specific development actions: 1) development of the third parallel runway and use of on-site borrow sources, 2) Relocation of S. 154th Street due to the Runway Safety Areas; 3) development of the North Employee Parking Lot (north of SR 518); and 4) Development of the area known as the

South Aviation Support Area (SASA). The following summarize the alternatives to these projects:

(1) **Third Parallel Runway/Use of On-Site Borrow**

The following alternatives were considered for the third parallel runway and borrow source areas:

- Use of Other Modes of Transportation - Three forms of other modes of transportation were considered (Auto/Bus, Rail, and Telecommunication) and are described on Page 3-1 and 3-2 of this Supplemental EIS. As discussed, less than 5% of passengers could use alternative of modes of transportation. A reduction in traffic by 5% would not eliminate the need for the proposed project. Therefore, while this alternative is feasible,[2] it would not address poor weather operating requirements of the Airport. The FAA's 1995 Capacity Enhancement Study found that currently, poor weather related delay causes the airlines increased operating costs of about $24 million annually. When aircraft operations reach 425,000 (now forecast to occur by 2003), delay levels would reach about 82,000 hours at a cost of $132 million annually. When activity reaches 525,000 operations (now forecast to occur around the year 2019), delay levels would reach 283,000 hours at a cost of $454 million.[3]
- Use of Other Airports or Construction of a New Airport - A substantial amount of study and deliberation over an 8 year period has been conducted concerning the development of a new/replacement airport or a supplemental airport. The regional consideration of this alternative showed that this is not a feasible alternative because: 1) there is not sponsor for such an undertaking, 2) regional consensus is that there is no "feasible" site, and 3) neither the lack of sponsor nor the conclusion of the PSRC's regional planning process appears to depend on the level of air travel demand in the region.
- Activity/Demand Management - The primary objective of activity management alternatives is to increase airport efficiency by the airport operator's establishment of pricing or regulatory actions, thereby delaying or eliminating the need for future airport development. The Flight Plan Study concluded that "... demand management measures will at best delay for a few years the need for capacity improvements. For purposes of this analysis, therefore, it was assumed the maximum demand management set of measures will delay capacity improvements for five years." This conclusion has been supported by the PSRC Expert Panel on Noise and Demand/System Management in their December 8, 1995 final order on system/demand management. Therefore, as this action would not satisfy the need, current poor weather demands would remain and would continue to grow in the future. While this is feasible, it is not a prudent alternative because of the delay costs incurred at Sea-Tac. The FAA's 1995 Capacity Enhancement Study found that currently, poor weather related delay causes the airlines increased operating costs of about $24 million annually. When aircraft operations reach 425,000 (now forecast to occur by 2003), delay levels would reach about 82,000 hours at a cost of $132 million annually. When activity reaches 525,000 operations (now forecast to occur around the year 2019), delay levels would reach 283,000 hours at a cost of $454 million.
- Other Development at Sea-Tac Airport - Several alternative runway layouts (locations, lengths, and orientations) were considered. As was shown, only a parallel air carrier length runway, with a 2,500 foot separation from 16L/34R would satisfy the poor weather operating needs. An air carrier runway of any length, with the anticipated demand for air travel that is now forecast, would likely result in 1.5 DNL or greater noise levels at these historic sites. Runways with a separation of less than 2,500 feet were considered, these

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[2] Feasible for this analysis is defined as a action that can be enacted through sound engineering principles.

[3] *Seattle-Tacoma International Airport, Capacity Enhancement Plan Update*, FAA, July 1995. Page 19.

locations could not be used during poor weather conditions and thus the existing poor weather delay would not be addressed. While this is a feasible alternative, it is not prudent due to the delay levels that would be experienced. The FAA's 1995 Capacity Enhancement Study found that currently, poor weather related delay causes the airlines increased operating costs of about $24 million annually. When aircraft operations reach 425,000 (now forecast to occur by 2003), delay levels would reach about 82,000 hours at a cost of $132 million annually. When activity reaches 525,000 operations (now forecast to occur around the year 2019), delay levels would reach 283,000 hours at a cost of $454 million.

About 1.92 acres of wetland impacts are associated with the excavation of fill material from on-site sources. Alternatives to the wetland fill would be use of off-site sources. The Final EIS,[4/] as well as Section 5-4 of this Supplemental EIS, describe the impacts that would result from the construction haul, including social impacts, noise impacts, air quality impacts, etc. Impacts to the wetlands at these on-site borrow source locations could be avoided, but would result in environmental related tradeoffs, primarily construction related surface transportation. The following contrast the wetlands at each of the on-site borrow source locations:

On-Site Borrow Source	Fill Available (MCY)	Wetlands (Acres)	Possible Daily 1-Way Trips
#1	6.60	0.68	225
#2	0.65	0.0	22
#3	2.90	1.24	99
#4	2.20	0.0	75
#5	1.75	0.81	60
#8	0.30	20.7	11

The Port of Seattle has agreed to not excavate material from On-Site Sources #5 and #8. Impacts to wetlands associated with Borrow Area #5 could occur regardless of excavation for the runway, as the site is planned for use as a future employee parking lot, as is discussed later in this section. Therefore, the project scope has been designed to avoid 20.7 acres of wetland associated with Borrow Area #8. Further trade-offs could occur by not excavating fill from other on-site sources, but would result in use of off-site material and the associated off-airport truck trips. For each 1million cubic yard of material imported from off-airport sites, about 45,460 truck trips would result, which could amount to an average 33 truck one-way trips per day (or about 3 one-way trips during a peak hour). Because of the negative impacts associated with off-airport truck trips, and the ability to provide equal or better wetland resource through mitigation, avoidance of wetland fill of the on-site sources is not prudent.

- Use of Technology - As is shown, no technology exists (or appears eminent) that would address the poor weather operating constraints experienced at Sea-Tac. While a Localizer Directional Aid (LDA) would address visual flight rule conditions, it would not address the instrument flight rule conditions (poor weather) and it would likely result in increased noise exposure at other residential and locally significant historic sites. Because half of the poor weather constraint would not be addressed, delay would result. While this alternative is feasible, it is not a prudent alternative. The FAA's 1995 Capacity Enhancement Study found that currently, poor weather related delay causes the airlines increased operating costs of about $24 million annually. When aircraft operations reach 425,000 (now forecast to occur by 2003), delay levels would reach about 82,000 hours at

[4/] *Final Environmental Impact Statement for Proposed Master Plan Update Development Actions at Seattle-Tacoma International Airport*, FAA and Port of Seattle, February, 1996.

a cost of $132 million annually. When activity reaches 525,000 operations(now forecast to occur around the year 2019), delay levels would reach 283,000 hours at a cost of $454 million.

- Delayed or Blended Alternatives - This alternative has become the Preferred Alternative, as the new construction schedule for the runway would entail it being available 5 years later than was addressed in the Final EIS.

- Do-Nothing - as is discussed, the Do-Nothing alternative would prevent the adverse impact to the 4(f) properties, but would not satisfy the purpose and need and as a result poor weather related arrival delay would increase. The FAA's 1995 Capacity Enhancement Study found that currently, poor weather related delay causes the airlines increased operating costs of about $24 million annually. When aircraft operations reach 425,000 (now forecast to occur by 2003), delay levels would reach about 82,000 hours at a cost of $132 million annually. When activity reaches 525,000 (now forecast to occur around the year 2019), delay levels would reach 283,000 hours at a cost of $454 million. Therefore, it is not a prudent alternative.

(2) **Runway Safety Areas (RSAs)**

The following alternatives were considered for the Runway Safety Areas:

- Declared Distances/Displace the runway threshold: Recognizing that airports may incur difficulty in achieving the full RSA standard, the FAA has enacted declared distance criteria. With the declared distance criteria, the FAA requires that an airport declare which portions of the runway are available for take-off and landing, so that the full 1,000-foot safety areas are provided for operations on the runway. Those portions of the runway declared not usable for takeoff and landings are then considered part of the RSA. The following declared distance/displaced thresholds were considered:

  - **Runway 16R**:

    -- *(Alternative RSA-1A)* A 250-foot displacement to the threshold of Runway End 16R. This alternative would include a partial grading and filling for 750 feet of the area north of the existing runway threshold. With the 250-foot displacement, the full 1,000-foot long RSA would be provided. This alternative would avoid the northward relocation of South 154th Street, but would require the construction of a retaining wall along the roadway and relocation of approach lights and other navigational aides. However, when in north flow (arrivals on 34L or departures on 34L) the ASDA (accelerate-stop distance available) and LDA (landing distance available) would be reduced by 250 feet. In south flow, a reduced LDA of 250 feet would occur. The Port estimated that this option would cost between $3-6 million to complete. For these reasons, this alternative was found unreasonable.

    -- *(Alternative RSA-2A)* A 450-foot displacement to the threshold of Runway End 16R. This alternative is the same as the above, except with an expansion of the existing RSA out to 550 feet, using a 450 displacement of the north runway end to achieve the requisite 1,000 feet. While other lengths could occur, this distance would avoid the development of the retaining wall. As a result, a 450-foot reduced LDA to the south on Runway 16R would occur. The Port estimated that this option would cost between $1.0 and $3.0 million to complete.

    The reduced landing distances would restrict the usage of taxiway M to some aircraft, thus increasing the runway occupancy. For these reasons, this alternative was found unreasonable.

-- *(Alternative RSA-3A)* A 770-foot displacement to Runway End 16R. This alternative would use the existing 230 feet of full-width RSA with a 770-foot displacement. This alternative would result in a 770-foot reduction in the LDA to the south and a 770-foot reduction in the ASDA to the north. A relocation to South 154th would not be required. The Port estimated that this option would cost between $0.5-1.5 million to complete.

Because of the reduced available runway length, aircraft landing would not be able to use the existing taxiway exits in an efficient manner. Thus runway occupancy would be increased or additional taxiway exits would need to be developed. For these reasons, this alternative was found unreasonable.

- **Runway 16L**:

-- *(Alternative RSA-1B)* A 300-foot displacement to 16L (which is currently displaced 490 feet - thus the existing displacement would be reduced), and a slight build out of the 16L RSA to 700'. As a result of the displacements, the south flow LDA would be reduced to 11,600 and the ASDA would be 11,900 feet. In north flow, the LDA would be reduced to 11,600 and the ASDA would be reduced to 11,600 feet. Due to the length requirement of 12,500 feet identified in the Master Plan Update, displacement of this runway was not considered a realistic alternative.

Relative to declared distances, the FAA noted to the Port in a February 1993 letter "The FAA strongly recommends that declared distances not be used at Seattle-Tacoma International Airport. Aircraft operations during low visibility conditions are a major concern. Declared distance lighting would be required in addition to low visibility lighting and result in a confusing lighting system during low visibility operations. We recommend you consider relocating the threshold to adjoin the starting boundary of the RSA".[5/] For these reasons, these alternatives were not found reasonable. However, because the Port must address the RSA compliance issue, if clearance, grading and filling were not undertaken, the declared distances would be the Do-Nothing action.

- Clearance, grading, filling and development of the requisite areas for 1,000 feet beyond the existing pavement end: These alternatives would result in the conventional configurations for the RSAs.

  - Runway 16R *(Alternative RSA-4A)*: To provide the necessary area, the north RSA would require the relocation of South 154th Street around the RSA. About 2.34 acres of wetland would be affected by the relocation of South 154th Street around a corrected RSA for this runway. While the road could be tunneled under the RSA, the cost of such tunneling is prohibitive, about $40 million. Consideration was given to avoiding the tunnel, and attempting to minimize the impacts of the RSA by developing a retaining wall. The cost of a retaining wall to avoid the tunnel would cost about $12.5 million more than the Preferred Alternative to avoid the impacts to wetlands, but would result in 1.13 acres of wetland impact.

[5/] Letter from Paul Johnson, Civil Engineer, Seattle Airports District Office to the Port of Seattle, February 19, 1993

The following contrasts the costs of the South 154th Street relocation options:

Scenario	Wetland Impact (ac)	Cost
Tunnel - Avoid Wetlands	0.00	$46.2 million
Retaining Wall - Minimize Impacts	1.13	$19.3 million
Preferred Alternative	2.34	$6.8 million

Source: HNTB, December 1996

As compliance with RSA standards must occur, the only other alternative would be use of the declared distances, which is not prudent with the Region's low-visibility conditions as discussed earlier, or the fill of wetlands with mitigation provided by equal or higher quality wetlands as is proposed.

- Runway 16L *(Alternative RSA-4B)*: Currently Runway 16L is displaced 460 feet due to trees that once penetrated the approach surfaces to the runway. Therefore, two options exist: 1) maintain the current threshold and clear and grade the requisite 1,000 feet or 2) remove the displacement and clear and grade the requisite area. The first option would require clearing and grading for 310 feet, while the second option would require 800 feet. In either case, South 154th Street and the airport service road would require relocation. While neither of the options for this runway end would affect wetlands, the relocation of South 154th Street would require coordination with the RSA for 16R.

- Delayed Alternative - As is noted earlier, SEPA requires the consideration of the benefits and disadvantages of delaying implementation of the proposed alternative. Delaying implementation of actions to addressing the RSA issues is not possible, due to the FAA grant assurances. Therefore, the only non-development options would be the establishment of declared distance procedures and displaced runway thresholds.

- Do-Nothing/No-Build [6] This alternative would maintain the current RSA dimensions, which do not meet FAA requirements. As this option may result in the FAA bringing an RSA enforcement action against the Port of Seattle, it is not a reasonable alternative. The result of a Do-Nothing alternative would be the requirement that displaced thresholds be developed, as described previously. While this option is considered to be a last resort action for airports with low visibility conditions, it is technically feasible; declared distances are not recommended due to the low visibility lighting confusion that pilots could experience. Each displacement would require relocation of approach lights and other navigation aides.

(3) North Employee Parking Lot

As a landside related project, the following alternatives were considered:

- Use of Other Modes of Transportation Alternatives - Alternative modes of transportation were evaluated in terms of their capability to meet the needs of freight shippers and travelers who presently use Sea-Tac Airport. Based upon the characteristics of freight shipments and travelers from Sea-Tac, alternative modes of

[6] Technically, the literal Do-Nothing is not an option for addressing the RSA issues. The Port of Seattle has two options for addressing RSAs, both of which require some action: grade and develop off the ends of the runways or establish declared distance procedures. The Do-Nothing alternative presented in this EIS reflects the non-development action (declared distances).

transportation, such as rail (traditional or high speed) or automobile/bus, cannot be realistically considered as providing a suitable solution to needs identified in this study at Sea-Tac Airport.

- Use of Other Airports or Development of a New Airport Alternatives - An extensive study of the development of a replacement or supplemental airport was conducted by the Puget Sound Regional Council. This study found: "The Executive Board concludes that there are no feasible sites for a major supplemental airport within the four-county region and that continued examination of any local sites will prolong community anxiety while eroding the credibility of regional governance."[7] Based on the analysis presented earlier and the findings of the Puget Sound Regional Council, it is unlikely that use of other airports or development of a new airport are reasonable alternatives to serving future air travel demands.

- Activity/Demand Alternatives - Another group of alternatives which are frequently suggested when considering airport development include traffic demand management and activity restrictions. As was described in a preceding section, activity alternatives would not reduce demand such as to prevent the need for improvements at Sea-Tac Airport.

- Landside Development at Sea-Tac Airport Alternatives -Chapter 3 of this Supplemental EIS, beginning on Page 3-14 discusses the alternatives to this project.

- Delayed/Blended Alternative - Delaying implementation of the SASA would result in the Do-Nothing for some period. This alternative is not a reasonable alternative as it would not satisfy the need.

- Do-Nothing/No-Build Alternative - The Do-Nothing alternative would result in the Airport remaining as it is today. Therefore, future operational congestion and delay would not be relieved, and would increase. Although this alternative may not be prudent, it is feasible, and therefore, is one of the alternatives considered throughout the Environmental Impact Statement.

(4) **Development of SASA**

The following summarize the alternatives to satisfying future terminal/landside improvements that envision the development of cargo and maintenance functions in the area known as the South Aviation Support Area:

- Use of Other Modes of Transportation Alternatives - Alternative modes of transportation were evaluated in terms of their capability to meet the needs of freight shippers and travelers who presently use Sea-Tac Airport. Based upon the characteristics of freight shipments and travelers from Sea-Tac, alternative modes of transportation, such as rail (traditional or high speed) or automobile/bus, cannot be realistically considered as providing a suitable solution to needs identified in this study at Sea-Tac Airport.

- Use of Other Airports or Development of a New Airport Alternatives - An extensive study of the development of a replacement or supplemental airport was conducted by the Puget Sound Regional Council. This study found: "The Executive Board concludes that there are no feasible sites for a major supplemental airport within the four-county region and that continued examination of any local sites will prolong

[7] PSRC Executive Board Resolution EB-94-01.

community anxiety while eroding the credibility of regional governance."[g] Based on the analysis presented earlier and the findings of the Puget Sound Regional Council, it is unlikely that use of other airports or development of a new airport are reasonable alternatives to serving future air travel demands.

- Activity/Demand Alternatives - Another group of alternatives which are frequently suggested when considering airport development include traffic demand management and activity restrictions. As was described in a preceding section, activity alternatives would not reduce demand such as to prevent the need for improvements at Sea-Tac Airport.

- Landside Development at Sea-Tac Airport Alternatives - The following summarizes options to addressing cargo and maintenance facilities.

  Centralized Cargo Option - About 176 acres of land would be required to centralize the cargo facilities in a single complex. To centralize the facilities, it is assumed that the existing cargo facilities would be abandoned and redeveloped at another location on-airport. Two locations for centralized facilities were identified: the area known as the South Aviation Support Area (SASA) and a north site. Because of the site characteristics and size requirements and cost, the complete redevelopment of a new centralized cargo complex is not practical.

  Decentralized Cargo Option - The decentralized cargo option would result in supplementing existing cargo facilities at new sites on-airport. Decentralized cargo facilities could be developed within the existing cargo development (to the north of the Main Terminal), further north on existing airport property or in the SASA. Within the existing cargo area, all of the year 2005 needs can be served and about 67% of the year 2010 cargo building area needs can be accommodated and about 57% of the hardstand needs. The post year 2005 forecast needs can then be accommodated in the SASA.

  Aircraft Maintenance - As is described in the Final EIS and Record of Decision of the South Aviation Support Area (SASA), three principal objectives will be met through the development of the SASA: to accommodate displaced line maintenance facilities, to accommodate future line maintenance facilities, and to accommodate a major base maintenance facility. That EIS addressed three sites for the development of aircraft maintenance needs: northeast, far north and southeast. The northeast was rejected as there is insufficient land to develop the requisite 84 acres. The far north site (located north of SR 518, west of 24th Avenue South) was rejected because of the cost of developing a taxiway bridge over SR 518, and fill requirement costs.

  Because of the need to use portions of the SASA site for supplemental cargo facilities, the extent of aircraft maintenance facility development in the SASA would be dictated by the displacement caused by alternative terminal development.

- Delayed/Blended Alternative - Delaying implementation of the SASA would result in the Do-Nothing for some period. This alternative is not a reasonable alternative as it would not satisfy the need.

- Do-Nothing/No-Build Alternative - The Do-Nothing alternative would result in the Airport remaining as it is today. Therefore, future operational congestion and delay would not be relieved, and would increase. Although this alternative may not be

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[g] PSRC Executive Board Resolution EB-94-01.

prudent, it is feasible, and therefore, is one of the alternatives considered throughout the Environmental Impact Statement.

(B) Evaluation of Mitigation In the Same Basin

The recommended preference for selecting wetland mitigation sites in Washington is as follows: (1) on-site and in-kind; (2) off-site, within the watershed, and in-kind; (3) off-site, out of the watershed, and in-kind; and (4) off-site, out of the watershed, and out-of-kind. The proposed mitigation represents option 3 (off-site, out of the watershed, and in-kind). Mitigation within the Sea-Tac Airport operations area (on-site) was eliminated from consideration, because the siting criteria for the first and second preferences could not be met. In addition, on-site mitigation could be subject to degradation from wildlife control for safety reasons, or on-going airport operations.

In evaluating option 2 (off-site, within the same watershed), the Miller Creek basin and Des Moines Creek basins were examined for suitable mitigation development. All undeveloped, non-forested, non-wetland sites with average slopes less than 5% were identified in both basins. Based on these criteria, 19 potential mitigation sites were identified, six (6) of which are between airport runways and taxiways at Sea-Tac Airport and cannot be used for wetland mitigation. The suitability of the thirteen remaining sites (although all are within the 10,000-ft radius of concern for wildlife hazards to aircraft) for wetland mitigation was evaluated further. **Exhibit 5-5-1a and 5-5-1b** shows the sites considered.

For this level of analysis, it was assumed that each site identified could be modified to perform hydrologically, so evidence of high water tables was not considered. Large sites (in this instance greater than 30 acres) are preferred because combining the functions of several small, isolated wetlands in a single large wetland mitigation site enhances the probability of achieving mitigation goals, ensuring long-term protection, and ultimately providing wetland functions to compensate for project impacts. A site at least 30 acres in size would allow an average mitigation ratio of 2:1 with adequate buffers. Compensating for wetland impacts on more than one site offers fragmented habitat blocks of less overall value. However, in order to adequately address the issue of mitigation within the watersheds, smaller sites (at least 10 acres) were also evaluated.

Field verification of each site identified primary limiting factors for wetland mitigation within the watersheds:

1. Most of the potential sites are too small to support the compensatory mitigation on one site, which would result in two or more sites without habitat connectivity to each other or to other habitat areas;
2. The watersheds are largely urbanized and most of the potential sites are fragmented by homes, roadways, or other development; and
3. Proximity to the existing and proposed runways creates a potential hazard between birds and aircraft.

Table 5-5-2 lists the evaluation considerations for each of the 19 areas.

The primary reason for pursuing mitigation outside the airport area is due to potential bird strike incidents. Increased aircraft operations frequently results in conflicts between aircraft and birds. Bird strikes and jet-engine bird ingestion have caused in the worst situations, aircraft to crash and resulted in loss of human life, or in lesser cases millions in dollars of aircraft damage. Such examples include a Boeing E-3 that crashed at Elmendorf Alaska in September 1995 after it ingested about 30 Canada geese on departure, resulting in the crash of the aircraft, killing all 24 on board.

Jet engines are more vulnerable to birds than prop aircraft. Although the larger engines are designed to withstand ingesting an occasional small bird, a large bird or large number of smaller birds sucked into a jet aircraft engine can do significant damage and/or disable the engine. When flying at 200 miles per hour, a two-pound gull can produce the force equal of over 10,000 pounds. In a jet flying at 600 mph, the same gull would produce a force of 36 tons. Bird strikes in North America are most frequent during the months of August through October. Between 1986 and 1990, nearly 7000 bird strikes were reported in North America. According to the FAA's Aeronautical Information Manual, 90 percent of bird strikes occur when aircraft are under 3,000 ft altitude, which typically occurs with 3-5 miles of an airport. Over 50 percent of the strikes were reported when aircraft are below 100 feet altitude (above the airfield), or within 1,000 feet of touchdown.

A variety of birds find airport lands attractive for feeding, roosting, and loafing. Large soaring or flocking birds, such as raptors, gulls and blackbirds represent the greatest hazards. Airports serve as attractants to birds for reasons ranging from the airport being a large undeveloped land source in an urban area, to the actual bird attractant properties of the airport itself. Runways draw birds during colder seasons, as pavement is typically warmer than grass, and birds settle around the heat. Second, a wet runway reflects its adjacent airfield lighting. At night, this causes the pavement to resemble a lake, attracting shoreline birds. Because of the natural attraction provided by airport facilities, FAA discourages airports from providing further attractions of water, feeding and resting habitat.

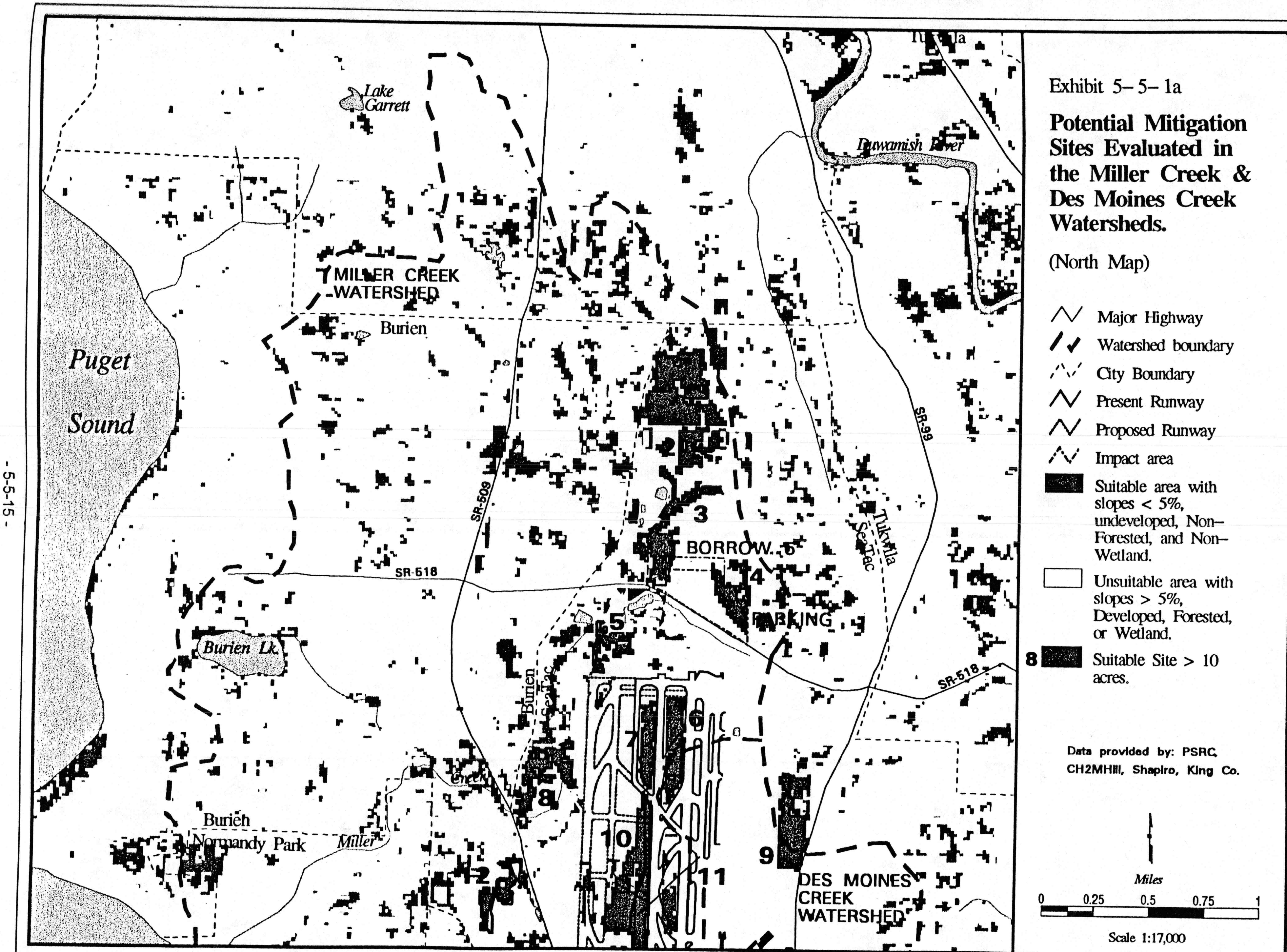
At Sea-Tac Airport, approximately 20 bird strike incidents occur each year.[9] Currently, the Port of Seattle is attempting to decrease the bird strike hazards by removing large trees that have grown near the runways and by relocating populations of Canada geese from Tyee Valley Golf Course. Creation of additional wildlife habitat that would increase use of the area by birds would not meet the goals of the Master Plan Update improvements in which landing and take-off safety is a major consideration.

(C) Proposed Wetland Mitigation in Auburn

The 47-acre mitigation site is part of a 69-acre parcel located within the City of Auburn immediately west of the Green River. The undeveloped parcel has been farmed in the recent past and currently supports a mix of upland pasture grasses and forbs that are common to abandoned agricultural land in the Puget Sound basin. Approximately 4.3 acres of emergent wetland was delineated during previous site investigations and is included in the 47-acre portion of the site proposed for mitigation (only 0.27 acres of these wetlands would be impacted by the mitigation). The wetland mitigation would be located a minimum of 200 ft west of the ordinary high water mark of the adjacent Green River.

The site is bound by a variety of land uses including agriculture to the north and south; undeveloped land, multi-family housing, and a drive-in theater to the west; and the Green River, patches of riparian forest, and undeveloped, forested slopes on the east side of the Green River. King County is proposing to construct a trail along the Green River, east of the proposed mitigation project. The site is currently zoned single-family residential (R2) by the City of Auburn and the 1995 Comprehensive Plan designation is single-family. The site is nearly level but gently slopes to the northwest, with elevations ranging from 45 ft in the northwest corner to 52 ft along the eastern property boundary. The mitigation site is within the boundaries of the Draft Mill Creek Special Areas Management Plan (SAMP).

[9] Port of Seattle records, December 1996.



January 16, 1997

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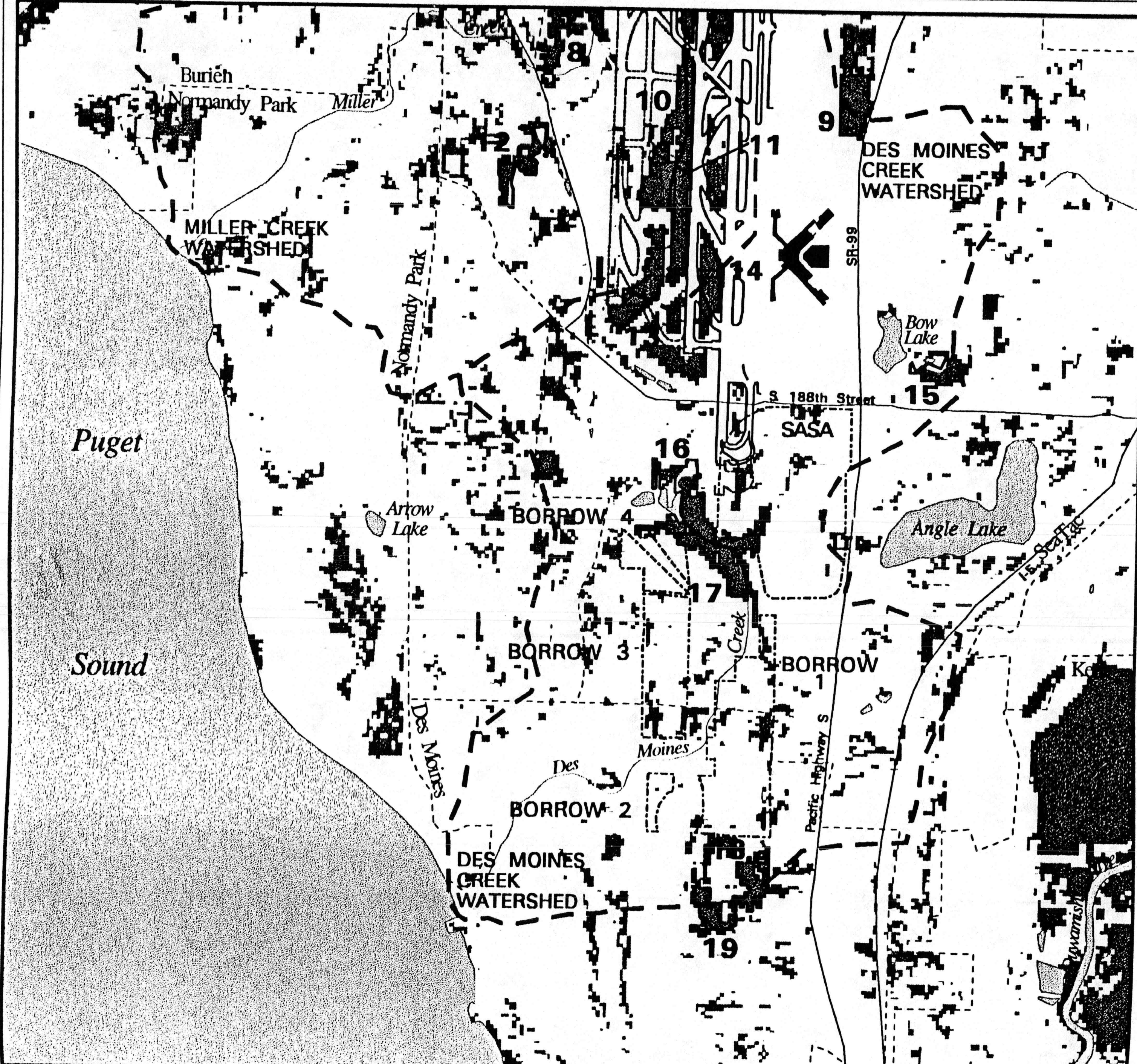

Exhibit 5-5-1b

Potential Mitigation Sites Evaluated in the Miller Creek & Des Moines Creek Watersheds.

(South Map)

- Major Highway
- Watershed boundary
- City Boundary
- Present Runway
- Proposed Runway
- Impact area
- Suitable area with slopes < 5%, undeveloped, Non-Forested, and Non-Wetland.
- Unsuitable area with slopes > 5%, Developed, Forested, or Wetland.
- 8 Suitable Site > 10 acres.

Data provided by: PSRC, CH2MHill, Shapiro, King Co.

Miles

0 0.25 0.5 0.75 1

Scale 1:17,000

January 16, 1997

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The overall wetland mitigation goal is to compensate for unavoidable wetland impacts by in-kind replacement of habitat. This would be accomplished by creating a diverse replacement habitat with a net gain in functional value and acreage. Specifically, mitigation goals are as follows:

1 Create about 21 acres of palustrine forested, scrub/shrub, and emergent wetland at an average replacement ratio of 1.5:1;

2 Consolidate impacts of many lower functioning wetlands into one large wetland ecosystem on a single site with long-term protection. Maximize habitat value of the new wetland by providing habitat connections or corridors to other significant habitat areas;

3 Provide in-kind wildlife habitat replacement while maximizing public safety and minimizing wildlife hazards to aircraft; and

4 Mitigate for all impacted hydrologic functions (water quality, flood storage, and stormwater storage) within the Miller Creek and Des Moines Creek watersheds, with an overall replacement ratio of at least 1:1.

Table 5-5-2 lists the goals of the mitigation site. The off-site wetland mitigation site is designed to provide in-kind replacement of wetland habitat functions affected by the proposed Master Plan Update improvements. Although not related to impacts of the proposed Master Plan Update improvements, additional Green River floodplain storage capacity would be created as part of the design process to assist issues being faced by the City of Auburn.

Wildlife Habitat - Construction of the forested, shrub, and emergent wetlands would create conditions that provide habitat for a variety of wildlife species. Habitat structure and availability would change as vegetation matures over the next several decades, and the wildlife species using the site are expected to change over time.

Post-construction habitat structure in proposed forested wetlands would be similar to regenerating forest, and would develop mature forest habitat attributes after several decades. The shrub understory would enhance the development, of habitat structure. Songbird use, in early stages of habitat development, would include foliage and bark-gleaning species (kinglet, chickadee, bushtit, vireo) that forage in the area. In later years, Oregon ash, vine maple, willow, red cedar, and hemlock seed production would be used by additional songbird species. Small mammals would likely forage on the forest floor for seeds and invertebrates, even though optimal habitat conditions would not occur for one or more decades. As a tree canopy begins to develop, it would provide nesting habitat and cover for predator avoidance.

Post-construction habitat structure in shrub wetlands would generally be similar to that of forested systems during the first several years of development. However, since shrub communities would periodically be flooded, ground-dwelling animals would be less common. The shrub community would reach functional maturity in 15 to 25 years following planting.

Emergent communities would provide resting and foraging habitat for shore and water birds within one (1) year of planting. Following two (2) to three (3) years, most of the intended wildlife functions should be present, and following five (5) to ten (10) years, relatively mature communities should be present.

Tree-nesting songbirds (such as thrushes, vireos, and warblers) are expected to use horizontal branches for nesting when the canopy closes enough to provide cover. Leaf litter and forest detritus would begin to accumulate, providing habitat for the invertebrates that amphibians (such as ensatina), small mammals, and ground-foraging birds feed on. Small mammals, in turn, are likely to become food for predators, such as barred owls. Over the course of several decades, competition for light, or disease would result in mortality. Dead and decaying trees would provide woody debris and snag habitat for flickers, woodpeckers, and small cavity-nesting birds.

The shrub and emergent wetlands should reach stable habitat conditions earlier than the forested wetland community. Shrub wetland communities should produce forage and nesting opportunities within two to ten years. Swainson's thrush and Wilson's warblers use moist shrub habitats for nesting and foraging. Berries produced by salmonberry, elderberry, and red-osier dogwood are used by several songbird species to supplement fall and winter diets. Shrews and other small mammals would consume insect and aquatic invertebrates that thrive in shrub and emergent wetlands. Wading birds, such as great blue herons and bitterns, can feed on small mammals and amphibians.

Although flooded emergent wetlands can provide substantial forage opportunities for ducks, habitat use would vary with proximity to upland predator cover. Waterfowl, which are wary of dense shrubs that allow predators to approach undetected, prefer interspersion of flooded emergent vegetation and open water. Slough sedge, spike rush, and scouring rush are all species preferred by dabbling ducks and geese during migration. Narrow-leaf burreed is preferred by dabblers and migrating wood ducks. As decaying vegetation builds up in flooded areas, shovelers, pintails and other diving species could use growing populations of plankton, algae, aquatic insects, and snails. Additionally, some amphibious species, such as Pacific giant salamander, northwestern salamander, and rough-skinned newt commonly migrate through terrestrial habitats and could use the mitigation site.

Construction of the mitigation wetland would require the excavation of about 375,000 cubic yards of soil. A basin would be excavated that would range in depth from 4 to 12 feet. Approximately one-third of the material would be selectively stockpiled on the site for use as backfill. The remaining material would be available for uses, including fill for nearby area developments, or possibly as part of the fill requirement at Sea-Tac Airport.

Stormwater runoff could cause erosion of the soils disturbed during ground clearing, excavation, and stockpiling of earth materials. Stormwater runoff may also carry other pollutants, such as oil or fuel, from construction equipment and vehicles into nearby water courses. Mitigation measures to control impacts from stormwater runoff during construction could include the following: 1) protection of disturbed areas by covering stockpiled soils with plastic and exposed soils with straw; 2) minimization of the extent and duration of exposed soils with revegetation as soon as possible; 3) use of silt fences, hay bales, sediment traps or other construction Best Management Practices to control eroded sediment from leaving the site; and 4) construction equipment would be well maintained to ensure that they are not leaking fuel or oil.

The construction equipment accessing the site would be expected to use South 277th Street and Auburn Way North. If material were transported to Sea-Tac, it would then use the haul routes discussed in **Section 5-4 "Construction Impacts"**. If it were used to satisfy fill requirements for other regional developments, access would be expected from Auburn Way to that site. Because Auburn Way is a major arterial, with significant average daily traffic levels, the addition of as many as 30-40 truck trips per hour would not be expected to have a significant effect (the truck trips would represent less than 3% of total traffic) on surface transportation conditions on any major arterial or highway in the vicinity of the mitigation site. No changes would be expected in levels of service on these roadways.

The Final EIS summarized a site assessment that was performed for this mitigation site. No new additional information has arisen concerning that assessment.

These and related topics are discussed in more detail in the document "Wetland Mitigation Plan for Proposed Master Plan Update Improvements at Seattle-Tacoma International Airport" dated December 1996, which is attached to the JARPA application noted previously.

(D) Proposed Relocation of Miller Creek

The proposed Master Plan Update improvements include fill activities that would directly affect three areas in the Miller Creek watershed due to the proposed third parallel runway embankment. The Miller Creek basin encompasses about 8 square miles and includes a small portion of Sea-Tac Airport, as well as parts of the cities of SeaTac and Burien. Sea-Tac Airport covers an estimated 5% of the entire basin. The Miller Creek watershed consists of drainage channels that originate at Arbor, Burien, and Tub lakes; surface water and seep drainages from the north end of Sea-Tac Airport; and overflows from the Reba Regional Stormwater Detention Facility and Lora Lake. The creek generally flows south and southwest toward Puget Sound. The areas of this basin that would be affected include:

1. Area 1 includes approximately 980 feet of Miller Creek. The affected portions extend approximately 1,000 feet south of Lora Lake.
2. Area 2 includes Class III drainage channels totaling 2,080 feet, that originate as seeps in the Airport Operations Area (AOA) then flow west to Miller Creek.
3. Area 3 includes 200 feet of the Class III headwaters of Walker Creek. These waters, which originate from seepage and storm water runoff at the corner of 12th Avenue South and South 176th Street, flow northwest to SR 509.

The primary mitigation goal is to replace the basic characteristics and functions of the three portions of Miller Creek and its associated drainage channels that would be affected by the proposed airport improvements. Miller Creek in Area 1 is no longer in a natural stream channel because the creek has been dredged and straightened for farmland reclamation and wetland drainage. Land development, roadway construction, and past airport development have also altered the segment. The goal of the Miller Creek relocation (Area 1) is to provide a new stream channel of at least the same length as the existing channel, with enhanced features.

A farm ditch located in the project area flows parallel to Miller Creek for approximately 800 feet. The ditch provides positive drainage for the westerly portion of the farm, connecting to the main channel near South 156th Way. A small segment of the side channel (approximately 250 feet) would be impacted by the fill; however, because this segment is at the upper end of the side channel, drainage and conveyance would not be affected. No habitat would be impacted, since the channel flows intermittently in response to rain, and has little riparian habitat due to farming. For these reasons, no mitigation is proposed.

Area 2 consists of two small intermittent drainage channels with an indication of minor seepage. Area 3, the headwater of Walker Creek, contains a short segment of drainage channel. All three drainage channels have been affected by existing airport drainage, perimeter road crossings, or channelization. The mitigation goal for Areas 2 and 3 is replacing the drainage function of the channels.

The proposed Miller Creek channel would be constructed near the bottom of a broad, flat valley located south of Lora Lake. The existing 1,080-ft-long main channel of Miller Creek would be displaced approximately 200 feet to the west. The new Miller Creek channel would be constructed near the lowest path through the broad flat trough that defines the creek floodplain in the project area, with the channel edge offset from the proposed fill a minimum of 25 feet to provide a buffer. Channel slope and minimum flow depth would influence final channel alignment. The new creek would connect with the existing Miller Creek channel downstream at the earliest possible point to minimize stream relocation impacts. Channel relocation guidelines presented below may vary due to the limited space available between Lora Lake and the proposed fill area. High flows would be diverted through Lora Lake in the upper segments of the proposed Miller Creek channel.

Careful consideration of the benefits that Miller Creek and the three drainage channels now provide was given when determining the required features for the post-mitigation stream. Streams and waterways can provide many important functions such as conveying surface water and storm water, including flood waters, and providing in-stream and riparian habitat for fish and other water-dependent animals. The proposed mitigation plan ensures that present uses are not reduced and that other beneficial uses be included or enhanced. Beneficial use criteria provide design considerations and require consistency with the overall mitigation plan. Goals are prioritized from the most critical function that the existing channel provides to enhancements that would improve channel habitat. A list of impact compensation goals describes the decision-making priorities for the proposed relocated creek. If goals conflict, the higher priority takes precedence.

Miller Creek Goals

Goal 1: The creek would continue to provide base flow conveyance.

Goal 2: The new Miller Creek channel would provide improved fish habitat.

Goal 3: The mitigation would accommodate peak flows up to the 100-year flow; no net reduction of 100-year floodplain storage or floodway conveyance.

Goal 4: Minimum flow velocity should minimize fine sediment deposition.

Goal 5: The channel would replace or increase riparian habitat.

Goal 6: The channel cannot include expansive, long-standing water pools or wetlands that could potentially attract wildlife.

Goal 7: The proposed Miller Creek corridor should accommodate passive recreational uses, such as walking trails

Beneficial uses of the three Miller Creek drainage channels include flow conveyance, base flow seepage, water quality benefits from natural filtration, and limited habitat. Mitigating fill impacts would include:

Drainage Channel Goals

Goal 1: The mitigation drainage channel would continue to provide adequate flow conveyance.

Goal 2: The mitigation drainage channel would collect seepage to maintain base flows.

Goal 3: The new drainage channel would provide an open channel of equivalent length as the existing drainage channels.

The mitigation site was chosen because it is relatively close to the edge of the third parallel runway embankment, therefore, requires the shortest stream relocation length. Also, extremely flat site conditions dictate that the proposed channel be as short as possible to provide the maximum possible channel slope. The proposed realigned creek would be located as close to the base of the proposed fill slope of the new parallel runway as possible. The downstream end of the channel would connect with the existing Miller Creek channel at the earliest possible point to minimize stream relocation impacts. The channel edge would be a minimum of 25 feet from the base of the slope, to accommodate a riparian buffer. However, because of the limited space between Lora Lake and the proposed embankment, narrower buffers might be required in this area. To compensate for the restrictive high flow area, flows in excess of channel capacity are planned to be diverted from the main channel of Miller Creek into Lora Lake and then reintroduced at the lake outlet channel.

The drainage channel mitigation site was selected as the only appropriate option for recreating the equivalent drainage length for the filled drainage channels. The existing channels could not be left undisturbed or reconstructed on the fill slope because of fill stability requirements.

Approximately 9,630 cubic yards of floodplain storage would be lost in the proposed fill area due to the Master Plan Update improvements. Approximately 10,000 cubic yards of floodplain storage and floodway conveyance would be created, not including storage for the proposed stream channel.

* * *

Potential environmental impacts of relocating Miller Creek and its tributaries are discussed in an attachment to the JARPA 404 permit application titled "Relocation Plan for Proposed Master Plan Update Improvements at Seattle-Tacoma International Airport" dated December 1996. This document, which includes a detailed mitigation plan, was submitted as part of the Section 404 permit for the wetland mitigation site and Miller Creek relocation. This document is on file with the U.S. Army Corps of Engineers, Seattle District Office and is the subject of the 404 public hearing process. Among other topics, that document discusses potential impacts to fish and wildlife, aquatic habitat, floodplain, and riparian vegetation.

2. RAPTOR SURVEY

The Final EIS found that a number of species of fauna exist in the airport area. Among these were a number of bird species that are known to inhabit the area where the third parallel runway would be completed. However, no threatened or endangered species were identified: the U.S. Fish and Wildlife Service concurred with this finding. The Final EIS also indicated that no raptors nest in the area where the third parallel runway would be located. However, subsequent to the publication of the Final EIS, several residents notified the Port of Seattle that raptors, specifically the Red-tailed hawk (*Buteo jamaicensis*), were seen nesting in that area. As a result of these comments, the Port commissioned a survey of the area to determine if raptors were nesting in forested areas west of the Airport.

Appendix M of the Final EIS states the following:

> "Bird species observed in this habitat include European starling, barn swallow, tree swallow, goldfinch, and white-crowned sparrow. Predatory birds and mammals, such as red-tailed hawk, Cooper's hawk, and coyote, commonly hunt in open grassland areas and may utilize these portions of the site."

> "Mixed deciduous/coniferous forest in the portion of the project area west of the AOA provides habitat for a variety of wildlife due to its vegetative diversity and availability of forage and nest sites. This forested habitat is downslope from the airport flight operations area and is less disturbed than the Lake Reba wetland complex or other forested areas within the immediate vicinity of the AOA. Several species of songbirds utilize the area for foraging and nesting including northern flicker, downy woodpecker, bushtit, American robin, black-capped chickadee, Steller's jay, and song sparrow. Mammals likely to use this portion of the site include opossum, raccoon, coyote, shrew-mole,

Townsend's vole, deer mouse, masked shrew, and striped skunk. Several eastern gray squirrels and coyote scat were observed during field surveys."

"Approximately 187 acres of second-growth deciduous forest lies in the central portion of the South Borrow Area. This area encompasses Des Moines Creek Park and provides the most valuable wildlife habitat in the project area. Because of its size, high snag density, and vegetative and structural diversity, this woodland parcel provides habitat for interior-dependent wildlife species and neo-tropical migrant songbirds, including the pileated woodpecker. The pileated woodpecker is currently listed as a State candidate species for protection, because of limited breeding areas and feeding territories.[10] Pileated woodpeckers typically inhabit dense, mature forests with significant numbers of large snags and fallen trees. Nest trees west of the Cascades are generally Douglas fir or grand fir snags with bark and broken tops.[11] Two potential nest trees are located upslope from the west bank of Des Moines Creek. Pileated woodpeckers forage for insects on large snags, logs, or stumps. Recently excavated snags provide evidence of foraging activity in this area. ... Snags and large trees in this area provide perch sites for raptors. A red-tailed hawk was observed perched on a snag upslope from Des Moines Creek. At dusk on the same day, a great-horned owl was observed perched in a large Douglas fir tree near the same snag. Several band-tailed pigeons were observed along the edge of this forested habitat during field surveys conducted in December 1994. "

"The large complex of wetlands surrounding Lake Reba (Regional Stormwater Detention Facility) and Lora Lake, located immediately north of the airport runways in the North Borrow Area, contains open water, emergent, scrub-shrub, and forested wetlands that potentially provide quality habitat for a variety of wildlife. High vegetative diversity and availability of forage and nest sites makes this area some of the most valuable wildlife habitat in the study area. Additional significant habitat features commonly occurring in this area include snags and downed woody debris. However, significant noise from aircraft limits use of the area to disturbance-tolerant species. Low altitude fly-over by aircraft occur frequently, because of the areas' proximity to runways. Bird species observed in this area during field visits include black-capped chickadee, bushtit, American robin, European starling, dark-eyed junco, song sparrow, and common flicker. These species are year-round residents and utilize this area for foraging and breeding. Several bird nests were observed in the forested wetland areas surrounding Lake Reba and Lora Lake. Disturbance-sensitive, migratory bird species such as Swainson's thrush, olive-sided flycatcher, and orange-crowned warbler may forage during late summer and fall migrations. Consultation with a Port of Seattle biologist confirmed use of the site by raptors, especially red-tailed hawks. No known nesting activity occurs on the site; however, red-tailed hawks and other raptors such as Northern harrier, sharp-shinned hawk, and Cooper's hawk, utilize grassland and forested areas of the site for foraging and perching.[12] Snags and downed trees along wetland edges are used as perch sites for these species. Red-tailed hawks were frequently observed flying over the site and perching on the Airport directional towers near Lake Reba."

"Emergent marsh adjacent to SR 518 and north of Lake Reba supports a variety of wildlife species. This area is bordered by forested wetland and shrubland on all sides except for the northern side, where it borders SR 518. The convergence of forest, shrub, and emergent marsh habitats in this area provides an abundance of habitat niches for birds, small mammals, and amphibians. Numerous small mammal tunnels were observed in ground vegetation throughout this area. The abundance of small mammals in this area provides quality foraging habitat for predatory birds and mammals. Raptors were frequently observed circling this area during field visits."

"Open-water habitats in the project area, such as Tub Lake and Angle Lake, and their associated wetlands provide valuable habitat for an assemblage of species similar to that of the Lake Reba complex. High structural diversity, high snag density, large amounts of woody debris, and downed trees provide an abundance of habitat niches for many species. These areas provide quality breeding and foraging habitat for migratory and resident waterfowl. Bald eagles use open water and wetland habitats at Angle Lake for foraging and perching. In 1995, a pair of bald eagles attempted to nest on private property along the northern edge of Angle Lake. The nesting attempt was unsuccessful (e.g., no young were produced); however the pair still occupies the area. Additional information on the eagle

[10] *Management Recommendations for Priority Species.* Washington State Department of Wildlife, 1991.
[11] *Home Range and Habitat Use of Pileated Woodpeckers, Western Oregon.* Mellen, T.K., Oregon State University, 1987.
[12] Personal communication with author. Bullman, Dennis, Port of Seattle, June 2,1994.

nest and an analysis of potential effects of the proposed project on the eagle pair would be presented as an addendum to the Biological Assessment in the Final EIS."

On September 23, 1996 a ground survey was conducted of Port-owned land to the west of the existing parallel runways. This area, as identified in the EIS, consists of mixed vegetation including mixed forest and shrub/grassland. All trees capable of supporting a raptor nest and greater than 15 feet tall were examined from all aspects using binoculars. The tree trunk was examined from beneath the canopy and the area under the tree was also examined for feces and prey remains. Squirrel nests were also examined for nest modifications to ensure that sharp-shinned hawks were not occupying the nests. The conclusion of the survey is that raptors are not nesting in this area.

Raptors reported in the area include the sharp-shinned hawks *(Accipiter straitus)*, Coopers hawk *(Accipiter cooperi)*, Red-tailed hawk (*Buteo jamaicensis*), Northern harrier *(Circus cyaneus),* and American kestrel *(Falco spaverius)*. The most commonly reported raptor is the Red-tailed hawk, which usually nests in deciduous trees in mixed open forest, and nests in conifers have been seen. Nests are usually placed in the divergence between limbs of the tree, and are composed of twigs, branches, and some live foliage. Nests can usually be found between 15 to 70 feet above the ground. The Red-tailed hawk exhibits territorial fidelity over multiple nesting seasons and each territory may contain more than one alternative nest.

Sharp-shinned hawks have also been observed in the area. Their nests are usually associated with dense mixed or coniferous forest habitat, with nests made of fine twigs, conifer needles, and deciduous leaves. These nests are usually located near the trunk of a conifer.

Northern harriers nest in open prairie, savannah, or wetland areas. The mixed vegetation in the Airport area is not well suited to the northern harrier habitat. Harriers usually forage over open areas with low ground cover.

American kestrels are cavity-nesters and prefer open areas with scattered trees.

No raptor nests were found in the study area. Three squirrel nests were examined and determined to not be used by sharp-shinned hawks. One sharp-shinned hawk was observed in the study area, and one Red-tailed hawk was also observed soaring over the area. Raptor use of the area is likely limited to foraging. All of the raptors noted use a perching strategy for foraging and likely use the area as a vantage point over the open vegetation of the Airport.

In removing trees from Airport property, the Port will comply with the Endangered Species Act, the Migratory Bird Treaty Act, and other legal requirements should applicable species be identified.

While no raptors were identified, other wildlife species observed included cedar waxwing, common flicker, Stellar's Jay, black capped chickadee, bushtit, house finch, American goldfinch, Hutton's vireo, European starling and rock dove. None of these species are threatened or endangered.

TABLE 5-5-2

Seattle-Tacoma International Airport
Supplemental Environmental Impact Statement

SUMMARY OF WETLAND IMPACTS AND COMPENSATORY DESIGN OBJECTIVES

Project Impact	Compensatory Design Objectives	Potential Acreage Provided[1]	Compensation Ratio[1]
Fill of 7.34 acres of forested wetland and loss of associated wildlife habitat.	Provide in-kind replacement of forested wetland vegetation cover and increase overall wildlife habitat value.	14.68 acres of forested wetland	2.0:1
Fill of 2.01 acre of shrub wetland and loss of associated wildlife habitat.	Provide in-kind replacement of shrub wetland vegetation cover and increase overall wildlife habitat value.	2.01 acres of shrub wetland	1.0:1
Fill of 2.88 acres of emergent wetland and loss of associated wildlife habitat.	Provide in-kind replacement of emergent wetland vegetation cover and increase wildlife habitat value.	4.32 acres of emergent wetland	1.5:1
Loss of water quality functions.	On-site replacement of surface water functions would be included in the engineering design of the proposed Master Plan Update improvements. The design features would include 3-celled wetponds (with a maximum 48-hour detention), wet vaults, bioswales, and detention, as necessary to meet or exceed all BMPs.	Best Management Practices for stormwater quality would be followed.	NA
	Additional mitigation to provide flood storage capacity in the Green River drainage basin.	Approximately 30 to 60 acre-ft of flood storage capacity.	NA
Loss of degraded wetland buffers.	In-kind replacement for upland buffer impacts and additional mitigation for wildlife using both wetland and non-wetland habitats.	Approximately 3 acres of forested upland buffer.	NA

1 Acreages of mitigation and compensation ratios are identified as potential since verification of wetland impacts is in process and because ratios would be subject to negotiation.

NA = Not applicable.
Source: Parametrix, December 1996.

TABLE 5-5-3
SUMMARY OF POTENTIAL MITIGATION SITES ANALYZED WITHIN THE MILLER CREEK AND DES MOINES CREEK WATERSHEDS

Site	Watershed	Acres	Existing Conditions	Mitigation Limitations
1	Miller Creek	55	The site is within the direct flight path to the Airport. It is within an abandoned residential area and is being developed as the North SeaTac Park (which includes play fields, a picnic shelter, restrooms, a playground, parking, and trails), pursuant to an agreement between the Port of Seattle and the City of SeaTac.	Use of the site for wetland mitigation would eliminate use of much of the site as community park. The site is approximately 6,400 ft north of the existing runways. Enhancement of wildlife habitat in this area would increase wildlife hazards to aircraft.
2	Miller Creek	14	The area is within the direct flight path to the Airport. It is in an abandoned residential area with scattered deciduous trees, blackberries, grasses, and weeds. The site drains from east to west into Tub Lake.	Some slopes on the site are steeper than mapped in the GIS data base, and only approximately 5 acres of the site are suitable for wetland creation. The site is 4,500 ft north of the existing runways, and enhancement of wildlife habitat in this area would increase wildlife hazards to aircraft.
3	Miller Creek	33	The area is in an abandoned residential area in the direct flight path to the Airport. Vegetation is largely comprised of blackberries, ornamental trees, grasses, and weeds. The smaller, northern portion of the site connects to the Tub Lake wetland on one side, with an approximate rise in elevation of 30 to 50 ft on other sides. The southern portion of the site is also topographically higher than the Tub Lake wetland.	The site is fragmented by three streets, which could be detrimental to wildlife using a created wetland at this site. The site is approximately 2,600 ft north of the nearest existing runway. Creation of wetland habitat at this site would increase wildlife hazards to aircraft.
4	Miller Creek	17	The area is at a topographic high point in the direct flight path of airplanes landing and taking off from the airport. There are patches of mixed deciduous and ornamental trees. A large water tower lies in the northern portion of the site.	The area is not large enough to mitigate wetland impacts at one site, and there is no wildlife corridor to the other potential sites or other habitat areas. The site is within the fenced airport security area which would preclude use of the wetland by some forms of wildlife including deer, coyote, and fox. The site is within the area of proposed Master Plan Update Improvements where warehouse and parking is proposed. This site is approximately 2,300 ft north of the nearest runway. Wetland creation would not be feasible due to the close proximity of low-flying aircraft and increased wildlife hazards.

TABLE 5-5-3(Continued)

SUMMARY OF POTENTIAL MITIGATION SITES ANALYZED WITHIN THE MILLER CREEK AND DES MOINES CREEK WATERSHEDS

Site	Watershed	Acres	Existing Conditions	Mitigation Limitations
5	Miller Creek	11	The site is on a slope within the fenced airport security area. Patches of deciduous and ornamental trees are scattered throughout the site.	The majority of the site would be developed as part of the Master Plan Update Improvements. It appears that only about one or two acres would remain after construction. The close proximity to existing airport operations (approximately 2,000 ft from existing runways and 1,000 ft from the proposed runway) results in increased wildlife hazards to aircraft.
6 and 7	Miller Creek	45	These sites are grassy areas between the existing runways and taxiways within the airport operation area.	Locating wetland habitat within the airport operation are not feasible for safety reasons.
8	Miller Creek	23	This site consists of landscaped yards in a semi-rural residential area west of the airport. Miller Creek flows through portions of the relatively flat site.	The eastern portion of this site is within the fill footprint for the proposed runway. The remaining portion of the site is not large enough to mitigate for the wetland impacts associated with the project. The mitigation area would be isolated from other habitat areas by 154th Street South, the airport, and SR 509, which would not be conducive to optimal wildlife habitat. The mitigation area would be 3,100 ft southwest of the end of the nearest existing runway and 2,100 ft southwest of the end of the proposed runway. The site is approximately 1,000 ft directly west of the edge of the proposed runway. The close proximity of airport operations increases the wildlife hazard to low-flying aircraft.
9	Des Moines Creek	24	The site is a cemetery.	It would not be reasonable to locate wetland mitigation in a cemetery. The proximity of the site (3,600 ft southeast of the end of the nearest runway and 2,600 ft east of the edge of the nearest runway) to runways presents a wildlife hazard to aircraft.
10, 11, 13, and 14	Miller Creek (sites 10 and 13) and Des Moines Creek (sites 11	100	These sites are located between and adjacent to the existing runways and taxiways. They are grassy areas mowed and maintained for airport safety reasons.	Locating wetland habitat within the airport operations area is not feasible due to safety reasons.

TABLE 5-5-3(Continued)

SUMMARY OF POTENTIAL MITIGATION SITES ANALYZED WITHIN THE MILLER CREEK AND DES MOINES CREEK WATERSHEDS

Site	Watershed	Acres	Existing Conditions	Mitigation Limitations
	and 14)			
12	Miller Creek	16	This relatively flat area consists of large expanses of lawn bordered by roads, houses, and a large scrub/shrub wetland.	Wetland mitigation at this site would require displacement of additional residents. The site is not large enough to mitigate all of the wetland impacts at one location. The area is bordered by major roadways (SR 509 and Des Moines Way South) on two of the three sides, which would not be conducive to optimal wildlife habitat. Mitigation would be about 1,800 ft west of the proposed runway and approximately 4,500 ft from either end of the proposed runway. The close proximity of the proposed runway to mitigation increases the wildlife hazard to aircraft.
15	Des Moines Creek	11	Site 15 is a horse pasture surrounded on three sides by steep slopes. A scrub/shrub wetland, which connects to Bow Lake, lies on the western side of the pasture. Single family homes, a trailer park, and a hotel overlook the site.	Less than half of the site would be available for wetland mitigation due to the surrounding topography and the presence of existing wetland. The close proximity of a trailer park, hotel, and single-family homes; and the small size of available upland area make this site undesirable for wetland habitat mitigation. The site is roughly 5,200 ft east of the ends of the existing runways, and 4,700 ft east of the edge of the nearest runway.
16	Des Moines Creek	35	Site 16 is located in the direct flight path and consists of the northern portion of Tyee Valley Golf Course. Currently, a safety area for Runway 34R, which encroaches on the golf course, is under construction.	Much of the area is included in the Master Plan Update Improvement area (including the safety area under construction and the SASA). If the preferred alternative for the airport expansion is implemented, there would not be enough suitable land remaining for wetland creation. Mitigation at this site may not be protected in perpetuity due to the close proximity of airport operations. It is approximately 1,500 ft south of Runway 34R which would increase wildlife hazards to aircraft.
17	Des Moines Creek	23	This site is the southern portion of Tyee Valley Golf Course. It is bordered by a mixed	The site would be confined by ongoing disturbances or developments including the airport, the SASA area, and borrow

TABLE 5-5-3 (Continued)

SUMMARY OF POTENTIAL MITIGATION SITES ANALYZED WITHIN THE MILLER CREEK AND DES MOINES CREEK WATERSHEDS

Site	Watershed	Acres	Existing Conditions	Mitigation Limitations
			forest to the west and south, residential and recreational to the east, and the northern portion of the golf course to the north. Des Moines Creek divides the northern and southern portions of the golf course.	areas for construction of the proposed runway, which is not conducive for wildlife habitat replacement. It is 2,100 ft directly south of the end of runway 34R, which results in increased wildlife hazards to aircraft. There is not enough land to mitigate wetland impacts on one site that could be protected in perpetuity.
18	Des Moines Creek	16	This site consists of grass pastures and landscaped yards adjacent to a forested area on the west side, and residential areas to the north, east, and south. Most of the site is on a topographically high area.	The necessary acreage required for compensatory mitigation could not be attained at this site. It is fragmented by homes and active roads, and residents would have to be displaced for mitigation. The site is approximately 4,900 ft south of the existing runways, and increases wildlife hazards to aircraft.
19	Des Moines Creek	12	Site 19 consists of landscaped yards and some pasture area with large forested area to the north. Most of the site is topographically high.	Several roads and homes fragment this site. Mitigation would require displacing several residents, businesses, and possibly vacating roads. The necessary acreage required for compensatory mitigation could not be attained at this site. Site 19 is approximately 5,200 ft south of the existing runways, and increases wildlife hazards to aircraft.

Source: Parametrix December 1996.

SECTION 5-6

LAND USE IMPACTS

[LAND USE COMPATIBILITY, DOT SECTION 4(F), AND ARCHAEOLOGICAL, CULTURAL, AND HISTORIC SITES]

Chapter IV of the February, 1996 Final EIS contains several sections that describe land use related impacts associated with the proposed Master Plan Update improvements. This section of the additional environmental analysis summarizes the impacts of the new forecast relative to these land use issues. Specifically addressed are:

- Population, and housing units affected by aircraft noise
- DOT Section 4(f) impacts
- Impacts to archaeological/cultural and historic sites

Tables 5-6-1 and 5-6-2 contrast the noise impacts to these facilities from the new forecasts versus the impacts associated with the Master Plan Update forecasts. **Appendix F** summarizes the comments received on the Draft Supplemental EIS and responds to comments.

1. POPULATION, HOUSING UNITS AND NOISE SENSITIVE FACILITIES AFFECTED BY AIRCRAFT NOISE

Aircraft noise is generally regarded to be the primary impact of an airport on surrounding land uses. This section summarizes the population, housing units, and noise-sensitive facilities that are affected by noise from existing airport operations (1994), and by those of the Master Plan Update improvements for future years 2000, 2005 and 2010.

(A) Existing Conditions

The Final EIS (Chapter IV, Section 2) presents a detailed description of existing noise related land use impacts. Existing land use impacts are categorized into two groups: residential uses and noise-sensitive facilities. All residential land uses, with the exception of motels and hotels, are considered to be sensitive to aircraft noise levels above 65 DNL (Day-Night Average Sound Level). Schools, nursing homes, hospitals, churches, libraries, and some public parks are also considered noise sensitive, as defined by FAA land use compatibility guidelines.

There are currently 31,800 people residing in 13,620 housing units affected by 65 DNL or greater noise levels. Of these people, the greatest proportion (34 percent, or 10,780 people) reside in the City of Des Moines. An almost equal proportion (31 percent, or 9,920 people) reside in unincorporated areas of King County, north and south of the Airport.

Table 5-6-2 shows that the following noise-sensitive facilities are affected by 65 DNL or greater noise levels under existing conditions: 28 schools, 24 churches, 2 libraries, and 3 nursing homes. While 12 parks or recreational areas are affected by 65 DNL and greater sound levels, only two are affected by 75 DNL or greater noise levels, the normal threshold of compatibility for such uses.

TABLE 5-6-1

Seattle-Tacoma International Airport
Master Plan Update Additional Environmental Analysis

POPULATION IMPACT COMPARISON

Impacts Assuming New Aviation Forecasts

	60-65 DNL	65-70 DNL	70-75 DNL	75 DNL +	Total 65 DNL & greater	Total 60 DNL & greater
Existing	53,210	26,230	5,570	0	31,800	85,010
2000						
Alt 1 (Do-Nothing)	36,710	10,330	950	30	11,310	48,020
Alt 2 (Central) *	36,690	10,330	950	30	11,310	48,000
Alt 3 (North)	36,690	10,330	950	30	11,310	48,000
Alt 4 (South) *	36,690	10,330	950	30	11,310	48,000
2005						
Alt 1 (Do-Nothing)	35,880	9,640	780	30	10,450	46,330
Alt 2 (Central) *	34,360	9,640	700	100	10,440	44,800
Alt 3 (North)	34,360	9,640	700	100	10,440	44,800
Alt 4 (South) *	34,360	9,640	700	100	10,440	44,800
2010						
Alt 1 (Do-Nothing)	38,890	10,990	920	30	11,940	50,830
Alt 2 (Central) *	38,060	11,960	1,070	190	13,220	51,280
Alt 3 (North)	38,060	11,960	1,070	190	13,220	51,280
Alt 4 (South) *	38,060	11,960	1,070	190	13,220	51,280

* Estimated based on the Final EIS.

Final EIS Analysis Using Master Plan Forecasts

	60-65 DNL	65-70 DNL	70-75 DNL	75 DNL +	Total 65 DNL & greater	Total 65 DNL & greater
Existing	53,210	26,230	5,570	0	31,800	85,010
2000						
Alt 1 (Do-Nothing)	32,320	8,250	750	0	8,970	41,320
Alt 2 (Central)	32,800	9,220	670	0	9,890	42,690
Alt 3 (North)	32,810	9,220	670	0	9,890	42,700
Alt 4 (South)	32,810	9,220	670	0	9,890	42,700
2010						
Alt 1 (Do-Nothing)	33,680	8,690	760	0	9,450	43,130
Alt 2 (Central)*	34,280	9,190	680	0	9,870	44,150
Alt 3 (North)	34,290	9,180	680	0	9,860	44,150
Alt 4 (South)	34,290	9,180	680	0	9,860	44,150
2020						
Alt 1 (Do-Nothing)	37,250	9,860	940	0	10,800	48,050
Alt 2 (Central)*	35,970	10,480	790	0	11,270	47,240
Alt 3 (North)	35,940	10,450	790	0	11,240	47,180
Alt 4 (South)	35,980	10,480	790	0	11,270	47,250

Source: Landrum & Brown and Gambrell Urban, December 1996

TABLE 5-6-2

Seattle-Tacoma International Airport
Master Plan Update Additional Environmental Analysis

COMPARISON OF NOISE SENSITIVE FACILITY IMPACTS

IMPACTS ASSUMING THE NEW AVIATION FORECASTS

	Impacted by 65 DNL and greater Noise Exposure				
	Schools	Churches	Libraries	Hospitals/ Nursing Homes	Public Parks/Recreation
DNL 65 & Greater					
Existing	28	24	2	3	12
2000 Alt 1 (Do-Nothing)	15	13	1	1	10
2000 Alt 2, 3 & 4	15	13	1	1	10
2005 Alt 1 (Do-Nothing)	13	13	1	1	10
2005 Alt 2, 3 & 4	9	10	1	0	10
2010 Alt 1 (Do-Nothing)	15	13	1	1	11
2010 Alt 2, 3 & 4	13	11	1	1	10

IMPACTS ASSUMING THE MASTER PLAN UPDATE FORECASTS

	Impacted by 65 DNL and greater Noise Exposure				
	Schools	Churches	Libraries	Hospitals/ Nursing Homes	Public Parks/Recreation
DNL 65 & Greater					
Existing	28	24	2	3	12
2000 Alt 1 (Do-Nothing)	12	12	0	1	4
2000 Alt 2, 3 & 4	7	10	1	0	4
2010 Alt 1 (Do-Nothing)	11	12	0	1	4
2010 Alt 2, 3, & 4	8	10	1	0	4
2020 Alt 1 (Do-Nothing)	13	13	1	1	4
2020 Alt 2, 3 & 4	11	10	1	1	5

Source: Gambrell Urban, Shapiro and Associates, Inc., and Landrum and Brown, 1996.

TABLE 5-6-3
(Page 1 of 2)

Seattle-Tacoma International Airport
Master Plan Update Additional Environmental Analysis

POPULATION RELATED NOISE IMPACTS ASSUMING NEW FORECASTS

	2000		2005		2010	
	Do-Nothing	**Alternative 3**	**Do-Nothing**	**Alternative 3**	**Do-Nothing**	**Alternative 3**
Jurisdiction						
60-65 DNL						
Burien	2,820	2,810	2,960	3,640	3,480	3,740
Des Moines	8,440	8,440	8,720	9,260	8,640	10,470
Federal Way	5,630	5,630	4,880	3,510	5,800	3,330
Kent	880	880	840	670	900	710
SeaTac	5,870	5,870	5,900	4,000	6,350	4,470
Seattle	1,480	1,480	1,410	1,660	1,980	3,250
Tukwila	-	-	-	-	-	-
Unincorp. King Co.	11,590	11,580	11,170	11,620	11,740	12,090
Subtotal	**36,710**	**36,690**	**35,880**	**34,360**	**38,890**	**38,060**
65-70 DNL						
Burien	680	680	650	1,540	680	2,220
Des Moines	5,060	5,060	4,460	3,300	5,180	3,500
SeaTac	1,760	1,760	1,690	2,070	1,920	2,250
Unincorp. King Co.	2,830	2,830	2,840	2,730	3,210	3,990
Subtotal	**10,330**	**10,330**	**9,640**	**9,640**	**10,990**	**11,960**
70-75 DNL						
Burien	100	100	80	10	100	300
Des Moines	220	220	120	40	160	-
SeaTac	580	580	550	650	580	770
Unincorp. King Co.	50	50	30	-	80	-
Subtotal	**950**	**950**	**780**	**700**	**920**	**1,070**
75+ DNL						
SeaTac	30	30	30	100	30	190
Subtotal	**30**	**30**	**30**	**100**	**30**	**190**
65 DNL and Greater						
Burien	780	780	730	1,550	780	2,520
Des Moines	5,280	5,280	4,580	3,340	5,340	3,500
SeaTac	2,370	2,370	2,270	2,820	2,530	3,210
Unincorp. King Co.	2,880	2,880	2,870	2,730	3,290	3,990
Subtotal	**11,310**	**11,310**	**10,450**	**10,440**	**11,940**	**13,220**

Source: Landrum & Brown, and Gambrell Urban using 1990 Census

TABLE 5-6-3
(Page 2 of 2)

Seattle-Tacoma International Airport
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HOUSING RELATED NOISE IMPACTS ASSUMING NEW FORECASTS

	2000		2005		2010	
	Do-Nothing	**Alternative 3**	**Do-Nothing**	**Alternative 3**	**Do-Nothing**	**Alternative 3**
Jurisdiction						
60-65 DNL						
Burien	1,340	1,340	1,420	1,780	1,680	1,800
Des Moines	3,450	3,450	3,570	3,810	3,550	4,400
Federal Way	2,860	2,860	2,570	2,020	2,930	1,940
Kent	360	360	340	250	370	270
SeaTac	2,500	2,500	2,510	1,740	2,740	1,980
Seattle	690	690	660	760	900	1,500
Tukwila	-	-	-	-	-	-
Unincorp. King Co.	4,860	4,860	4,670	4,780	4,930	4,970
Subtotal	**16,060**	**16,060**	**15,740**	**15,140**	**17,100**	**16,860**
65-70 DNL						
Burien	280	280	260	660	280	990
Des Moines	2,230	2,230	2,000	1,460	2,280	1,480
SeaTac	710	710	690	820	780	890
Unincorp. King Co.	1,150	1,150	1,150	1,130	1,290	1,620
Subtotal	**4,370**	**4,370**	**4,100**	**4,070**	**4,630**	**4,980**
70-75 DNL						
Burien	40	40	30	-	40	140
Des Moines	110	110	0	10	70	-
SeaTac	270	270	250	280	270	320
Unincorp. King Co.	20	20	10	-	40	-
Subtotal	**440**	**440**	**340**	**290**	**420**	**460**
75+ DNL						
SeaTac	10	10	10	40	10	80
Subtotal	**10**	**10**	**10**	**40**	**10**	**80**
65 DNL and Greater						
Burien	320	320	290	660	320	1,130
Des Moines	2,340	2,340	2,050	1,470	2,350	1,480
SeaTac	990	990	950	1,140	1,060	1,290
Unincorp. King Co.	1,170	1,170	1,160	1,130	1,330	1,620
Subtotal	**4,820**	**4,820**	**4,450**	**4,400**	**5,060**	**5,520**

Source: Landrum & Brown, and Gambrell Urban using 1990 Census

Reductions in tax revenues would be offset long term by positive net gains in future tax receipts as property is more intensely developed in the Airport vicinity. Local sales tax revenues will be generated by people directly employed at Sea-Tac Airport and induced revenues by airport activity (e.g., taxable spending on goods and services by people employed at the Airport, air cargo businesses, hotel and commercial uses).

5. WATER QUALITY IMPACTS

Changing the Airport's landscape, as would happen with the proposed Master Plan Update alternatives, could affect the hydrology of the airport area as well as the downstream systems. The "With Project" alternatives (Alternatives 2, 3, and 4) would include earthwork and the addition of impervious land surface area. This decreases the amount of rainfall infiltrating the soil and increases stormwater runoff flow rates and volumes.

About 61 acre-feet of new on-site detention storage volume would be required for the proposed developed areas that drain to Miller Creek, and 31 acre-feet of storage for areas draining to Des Moines Creek. These detention volumes would attenuate peak runoff rates from the Airport to provide protection from downstream flooding for storms having up to a 100-year return period. New impervious areas would increase annual runoff volumes to Miller Creek by 6 to 8 percent and volumes to Des Moines Creek by 1 to 2 percent. Most of the additional volume would flow through the downstream systems at rates that have low erosion potential. Higher runoff volumes could be partially offset by stormwater infiltration where on-site soils are suitable.

The Master Plan Update Final EIS (Chapter IV, Section 10) included a storm water management plan to mitigate storm water flow rate impacts associated with the proposed Master Plan Update improvements. The plan included proposed sizes and locations for storm water control facilities. To identify the facilities for analysis in the Final EIS, a number of assumptions were made. These assumptions included runoff model parameters (for example, future land use of currently undeveloped property), applicable regulations, the final design of the various Master Plan Update improvements, and the location of discharge points (outfalls) and detention ponds. The plan was developed using a conservative, worst-case approach, as is appropriate for environmental documents. In other words, the control facilities were designed using assumptions that would result in the greatest probable detention requirements. Changes in any of these assumptions would change the storm water management plan. In most cases, detention requirements and the size of the detention facilities would decrease because of the original conservative assumptions. Also, existing storm water control facilities may be modified to mitigate future project storm water impacts.

As engineering design work on the Master Plan Update improvements continues, the storm water control requirements will become more precisely known, and as a result it may be possible to reduce the detention needs.

Although pollutant loading will increase somewhat because of greater amounts of stormwater runoff associated with the "With Project" alternatives, implementation of mitigation would prevent significant pollution or degradation of surface and groundwater resources.

In early 1997, the Port completed its Comprehensive Stormwater Review, in accord with the NPDES requirements. Key findings of this study, titled Sea-Tac International Airport Storm Drainage System Comprehensive Plan, dated February 1997 are:

- "The capacity of the existing SDS (Storm Drainage System), which was developed over a period of approximately 50 years, was for the most part, sized to handle the 10-year storm event. Future SDS projects will be sized to handle the 25-year, 24-hour event, the generally accepted design standard...
- Despite the historic lower design standard upon which the present SDS was sized, hydraulic modeling results indicate that about 95.5% of the SDS is capable of handling at least the 25-year, 24-hour storm event. Hydraulic modeling result indicate that the hydraulic capacity would be exceeded during the 25-year, 24-hour storm event in 7,900 feet of SDS piping (about 4.5% of the system), located in various sections of the system. The design capacities of these segments would be exceeded by 20 percent or more for 15 to 60 minutes....
- As indicated in the report, the SDS was evaluated using 1974 as the base condition. Due primarily to the transfer of contributing area from the SDS to the Industrial Waste System (IWS), the area of the SDS that drains to Des Moines Creek has decreased by approximately 98 acres (about 12%) since the 1974 base condition.... Since 1974, approximately 55 acres of the area of the SDS draining to Des Moines Creek have been converted from pervious to impervious due to paving and building construction. Approximately 17 acres draining to Miller Creek were converted from pervious to impervious.
- The estimated peak flows for design storms have decreased in the southeast and southwest basins and increased slightly in the north basin since the 1974 predeveloped base condition. From the analysis, it is apparent that existing SDS basin detention facilities at the Lake Reba Regional Detention Facility at the north end and the Northwest Ponds and Tyee Pond on the south end are adequate to meet current STIA detention requirements. As a result, additional detention is not required to reduce peak flows in any of the major SDS drainage basins." (Pages 1-2 through 1-4)

This report, titled *Sea-Tac International Airport Storm Drainage System Comprehensive Plan*, dated February 1997 is hereby incorporated by reference and is available for review during normal business hours at the FAA Offices in Renton ,Washington and the Port of Seattle Offices at Sea-Tac Airport.

In addition, the Port of Seattle is participating in a basin plan for the Des Moines Creek Basin along with King County, City of SeaTac and City of Des Moines. It is anticipated that this plan will be finalized in 1997 and will identify improvements within the basin to address conditions such as creek flow, erosion, water quality, fish passage blockage, and cooperative planning and implementation actions. The plan has identified several conceptual options that may result in the development of a detention facility at the site of the Port's Northwest Ponds (south of South 188th Street).

Based on concerns of Seattle Water Department (now known as the Seattle Public Utilities), the Port undertook additional groundwater and geotechnical investigations concerning soil characteristics, including permeability and adsorptive capacity. This analysis found:

> "Permeability (or hydraulic conductivity) and adsorptive capacity of soil are significant factors because they largely control the rate at which contaminants can infiltrate and migrate in the subsurface....Near surface soils across the site largely consist of till or a thin layer of fill and recessional outwash over till. .. The till (or till-like outwash) underlying the site consists of a very dense mixture of silt, sand, and gravel. The ability of till to transmit water is very low. This is due in part to its relatively high silt content typically ranging between 25 percent and 40 percent ... and to its compression beneath thousands of feet of glacial ice after deposition... Calculating hydraulic conductivity from available grain size data ... resulted in permeability values in the range of 3 to 4 x 10^{-5} cm/sec. ... These data and the wide recognition of Vashon Till as a low permeability aquitard, show that the till underlying the site has a very low permeability... We therefore conclude there is low potential for contaminants released during construction in the fill/outwash area to infiltrate..."

"Summary and Mitigation Recommendation: We conclude the proposed parking lot has a very low potential to impact groundwater quality in the Shallow Aquifer. This conclusion is based on the fact that threats to groundwater quality are largely governed by the degree to which surface water can be contaminated and then infiltrate and reach underlying groundwater. ... The extremely small fraction of surface water that does manage to bypass all of the above (drainage system, pavement basecourse, trench backfills, topsoil horizon, etc.) will have to migrate downward through up to 80 feet of dense till before reaching the Shallow Aquifer. In our opinion, the rate and volume of this movement would be so slow that it would pose essentially no risk to groundwater quality." *Draft Groundwater Quality Impact Evaluation Proposed North Employee Parking Lot, Seattle Tacoma International Airport,* AGI Technologies, April 1997.

Thus, this analysis confirmed the findings of the Final EIS concerning the potential for aquifer contamination. The draft report, titled "Draft Groundwater Quality Impact Evaluation Proposed North Employee Parking Lot Seattle-Tacoma International Airport" dated April 1997 is hereby incorporated by reference. Copies of this report are available for public review during normal business hours at the FAA Offices in Renton, Washington and at the Port of Seattle Offices at Sea-Tac Airport.

Additional coordination is expected to occur with the Seattle Public Utilities concerning the development of the parking lot at this site. Construction and operational BMPs will be used to address concerns voiced by the Utility. These include:

- Prohibiting fuel or bulk material storage on the parking lot unless it is strictly inert material;
- Prohibit vehicle washing and maintenance activities on the parking lot;
- Carefully design sealing methods for all joints and pipe connections, and establish quality assurance check during construction to confirm that sealing has been accomplished in accordance with project specifications;
- Design bio-swales for optimum petroleum hydrocarbon degradation;
- Control agriculture chemical (landscaping fertilizer) application, particularly during the initial planting;
- Regular maintenance of the drainage system, focusing on the removal of sediments from catch basins and detention vaults and oil from oil/water separators;
- Require contractor to prepare and implement a construction spill response plan;
- Require the contractor to centralize equipment fueling and repair operations and to construct on-site spill containment measures for the operations area; and
- Establish fill placement specifications which lower fill permeability to the greatest degree practicable

In addition, it is expected that a guard will be available in the parking lot to ensure that activities are not conducted in the lot or adjoining area that could result in contamination. The Port will also place signage in the lot to notify users that the lot is in near proximity to the Utilities wellhead. Because of the presence of the wellhead in this area, the Port and Seattle Public Utilities are expected to continue coordination to ensure that contamination does not occur.

6. COASTAL ZONE MANAGEMENT AND COASTAL BARRIERS

The Airport Master Plan alternatives will conform to all applicable Coastal Zone Management Program policies. The Port will certify that the Master Plan Update improvements conform to all applicable Coastal Zone Management and Shoreline Management policies.