

**South
North**

Transit Corridor Study

South/North Corridor Project

Supplemental Draft Environmental Impact Statement

April 1999



METRO



U.S. Department
of Transportation
Federal Transit
Administration

SOUTH/NORTH CORRIDOR PROJECT
CLACKAMAS AND MULTNOMAH COUNTIES, OREGON
CLARK COUNTY, WASHINGTON

SUPPLEMENTAL DRAFT ENVIRONMENTAL IMPACT STATEMENT

Submitted Pursuant to the National Environmental Policy Act
42 U.S.C. 4322(2)(c)

by the

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL TRANSIT ADMINISTRATION

and

METRO

and

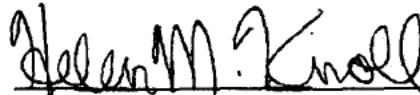
TRI-COUNTY METROPOLITAN TRANSPORTATION DISTRICT OF OREGON

In Cooperation with

U.S. ARMY CORPS OF ENGINEERS, PORTLAND DISTRICT
FEDERAL HIGHWAY ADMINISTRATION
U.S. COAST GUARD

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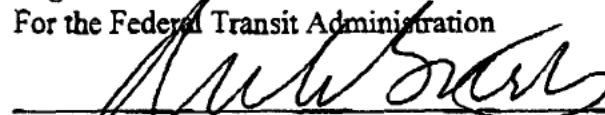


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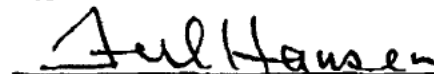


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Abstract

The proposed action is a light rail improvement to the existing urban transportation system in the South/North Corridor in the Portland, Oregon/Vancouver, Washington metropolitan region. The new alternative described in this *Supplemental Draft Environmental Impact Statement* is in addition to those alternatives and options described and evaluated in the *South/North Corridor Project Draft Environmental Impact Statement* (FTA/Metro, February 1998). Additional alternatives considered in the DEIS include a No-Build Alternative, four light rail length alternatives, 16 light rail alignment alternatives and 22 light rail design options. Locations of transit stations, park-and-ride lots and light rail operations and maintenance facilities were also evaluated. This supplemental analysis and the DEIS have considered potential long-term and short-term effects on: transit service, ridership, accessibility, regional and local roadways, freight movements, navigable waterways, land use, economics, neighborhoods, visual and aesthetic resources, ecosystems, water quality and hydrology, geology, noise and vibration, energy, hazardous materials, parklands, historic and cultural resources and public services. The analysis also evaluated the financial feasibility and cost-effectiveness of the alternatives. This supplemental analysis includes assessments of significant impacts that are different than previously identified in the DEIS. The information resulting from this study will be used to amend the adopted Locally Preferred Strategy for the South/North Corridor.

Comments on this document may be submitted in writing or may be made orally at a public hearing. Written comments should be submitted to Mr. Ross Roberts, High Capacity Transit Manager, at the above address. Information on the public hearing and public comment period can also be obtained from Mr. Ross Roberts.

Comments are due by June 14, 1999.

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LIST OF ACRONYMS

BA - Biological Assessment	SDEIS - Supplemental Draft Environmental Impact Statement
BMP - Best Management Practice	Tri-Met - Tri-County Metropolitan Transportation District of Oregon
CBD - Central Business District	UP - Union Pacific
CEQ - Council on Environmental Quality	USC - United States Code
CFR - Code of Federal Regulations	USCG - United States Coast Guard
CRD - Columbia River Datum	USFWS - United States Fish and Wildlife Service
C-TRAN - Clark County Public Transportation Benefit Authority	VMT - Vehicle Miles Traveled
dB - Decibel	vph - vehicles per hour
dba - A-weighted decibel	WSDOT - Washington State Department of Transportation
DEIS - Draft Environmental Impact Statement	
EIS - Environmental Impact Statement	
FEIS - Final Environmental Impact Statement	
FHWA - Federal Highway Administration	
EMME/2 - the travel demand forecasting model used by Metro	
FTA - Federal Transit Administration	
HCT - High Capacity Transit	
LOS - Level of Service	
LPS - Locally Preferred Strategy	
LRT - Light Rail Transit	
LRV - Light Rail Vehicle	
LUFO - Land Use Final Order	
MAX - Metropolitan Area Express (the name for the light rail system)	
MOS - Minimum Operable Segment	
NEPA - National Environmental Policy Act	
NMFS - National Marine Fisheries Service	
O&M - Operations and Maintenance	
ODFW - Oregon Department of Fish and Wildlife	
ODOT - Oregon Department of Transportation	
ROW - Right-of-Way	
RTC - Southwest Washington Regional Transportation Council	

LIST OF PROJECT NOMENCLATURE

This SDEIS discusses the new Full-Interstate Alignment Alternative and compares areas of significant difference with the alignment alternatives previously evaluated in the DEIS. The following provides summary definitions of selected nomenclature relevant to the addition of the new Full-Interstate Alignment Alternative. The Glossary provides definitions of other terms used within this document. A more complete description of the Full-Interstate Alignment Alternative is included in Chapter 2 of this SDEIS.

Alignment Alternative. Alignment alternative specifies the general location of the light rail alignment choice within a given segment of the South/North Corridor.

Eliot Segment. Refers to the segment that extends from the Rose Quarter north, including the Eliot Neighborhood to the Edgar Kaiser Medical Facility.

Full-Interstate Avenue Alignment Alternative. The Full-Interstate Avenue Alignment Alternative refers to the new alignment alternative described and evaluated in this SDEIS and more fully described in Chapter 2.

Full-Length Alternative. The 21-mile, double-tracked light rail alignment, stations, park-and-ride lots and bus and light rail service improvements that would extend from the Clackamas Regional Center, through Milwaukie, southeast Portland, downtown Portland, north Portland and downtown Vancouver to Clark College that was evaluated in the DEIS and selected as the Locally Preferred Strategy by the region.

I-5 Alignment Alternative. The I-5 Alignment Alternative refers to one of the alignment alternatives in North Portland described and evaluated in the DEIS. The I-5 Alternative would run on the west side of I-5 between the Kaiser Medical Facility and the Expo Center.

Interstate Avenue Alignment Alternative. The Interstate Avenue Alignment Alternative refers to one of the North Portland alignment alternatives described and evaluated in the DEIS. The Interstate Avenue Alignment Alternative described and evaluated in the DEIS was in Interstate Avenue between the Kaiser Medical Facility and Kenton, but did not include the portion of Interstate Avenue south of the Kaiser Medical Facility.

Interstate MAX. Interstate MAX is the project name for the new Full-Interstate Avenue Alignment Alternative.

Length Alternative. Length alternatives specify alternatives that vary in the designation of south and north terminus points (and thus, the overall length of the project) for the proposed light rail line. Length alternatives other than the Full-Length Alternative are considered to be interim phases of the full South/North Project and are termed Minimum Operable Segments (MOSs).

No-Build Alternative. The alternative described in the DEIS that would include some incremental improvements to bus service, but no light rail construction. All other light rail alternatives discussed

in the DEIS are compared to the No-Build Alternative.

North Portland Segment. Refers to the segment of the corridor that extends north from the Edgar Kaiser Medical Facility to the Portland Expo Center.

South/North Corridor Project. The full collection of the studies and processes associated with the proposed South/North Light Rail Project. Those studies and processes include the Preliminary Alternatives Analyses, Tier I Narrowing of Alternatives, Design Option Narrowing, Major Investment Study, Cost-Cutting, DEIS, Locally Preferred Strategy, SDEIS, Final EIS, Preliminary Engineering, Final Design and other steps.

P. Preface

This *Supplemental Draft Environmental Impact Statement* (SDEIS) has been prepared in compliance with the *National Environmental Policy Act* (NEPA). The Federal Transit Administration (FTA) has provided partial funding for this study.

FTA is the Federal lead agency for this SDEIS. Metro and the Tri-County Metropolitan Transportation District of Oregon (Tri-Met) are the local lead agencies. The Federal Highway Administration (FHWA), the United States Army Corps of Engineers (Corps) and the United States Coast Guard (USCG) are Federal cooperating agencies on this SDEIS. This SDEIS has been prepared in accordance with FTA guidelines, *Procedures and Technical Methods for Transit Project Planning* (FTA: September 1986, latest revision January 1995); the FTA/FHWA *Metropolitan Planning Rule* (49 CFR Part 613: October 1993); and the FHWA/UMTA *Environmental Impact and Related Procedures* (29 CFR Parts 635, 640, 650, 712, 771 and 790; 49 CFR Part 622: August 1987, 23 CFR Part 771 revised April 1991).

P.1 Federal Transportation Project Development Process

The Federal transportation project development process is intended to be an integral part of a metropolitan area's long-range transportation planning process in order to provide decision makers and the public with better and more complete information before final decisions are made. Early in the process, the regional transportation planning efforts identify corridors and/or subareas with significant transportation problems that may need a major transportation investment. Then, the local lead agency, in cooperation with the FTA and/or the FHWA, completes a corridor study to determine the Locally Preferred Strategy (LPS) to address the transportation problems. The South/North DEIS details the specific steps taken through the Federal transportation project development process on the South/North Transit Corridor Project. The Preface of the *South/North Draft Environmental Impact Statement* (DEIS) provides a more detailed description of the history of the evaluation of transit improvements in the corridor.

An Environmental Impact Statement (EIS), either draft or final, can be supplemented when the Federal Government determines that changes to the proposed action could result in significant environmental impacts that were not evaluated in the EIS. An EIS can also be supplemented when new information or circumstances relevant to environmental concerns and bearing on the proposed actions or its impacts would result in significant environmental impacts not evaluated in the previous EIS. Following completion of the NEPA process, the project may qualify for Federal funding and implementation of the project can be initiated.

The new light rail alignment, the Full-Interstate Alignment Alternative evaluated in this document could result in significant differences in some impacts as originally defined in the in the South/North DEIS. The focus of this SDEIS is to identify the areas where the new Full-Interstate Alignment Alternative would have significantly different impacts than those already described in the DEIS.

The DEIS and its supporting documents are supporting documents for this SDEIS, and are hereby incorporated by reference. Supporting documentation for the DEIS is described in detail in the

P.2 Project History

Following is a brief summary of the history of the South/North Light Rail Project since the publication of the DEIS in February 1998. The DEIS document summarized the benefits, costs and impacts associated with the study alternatives and provided citizens, agencies and jurisdictions with information needed to make an informed judgement when selecting the preferred alternative. A detailed summary of the study phases previous to the publication of the DEIS can be found in the DEIS Section P.2 Project History and in Section 2.2, Screening and Selection Process.

During the 45-day public comment period following publication of the DEIS, a series of informational open houses and public hearings were held to gather input regarding adoption of a preferred light rail alignment or Locally Preferred Strategy (LPS). In July 1998, the Metro Council adopted the LPS alignment along with the Land Use Final Order (LUFO), and work commenced on the South/North Final Environmental Impact Statement (FEIS).

In November 1998, Ballot Measure 26-74 (that would have reaffirmed the local financing for South/North light rail, originally approved in 1994 by the voters) was defeated by a narrow margin. In response to the election, in late 1998 and early 1999 the Metro Council held a series of "listening posts" to gather input from the public regarding next steps for regional transportation planning. In March 1999 a group of local business leaders and community leaders asked the region to investigate the development of a new north corridor light rail alignment. The proposed new Full-Interstate Alignment Alternative is the result of the business leaders' and community group's initiative. The new alternative would address many of the concerns expressed during the listening posts, in particular by reducing costs and displacements associated with the LPS alignment.

P.3 Public Participation

An extensive and proactive public involvement program has been conducted throughout the South/North Transit Corridor Study. Section 2.2 of the DEIS provides a description of the public involvement activities implemented in previous steps to screen the alternatives to be evaluated in the DEIS. A full description of the public involvement program, as well as the various oversight committees, can be found in DEIS Appendix A, Community Participation. The following is a brief description of the primary components of the project's public involvement activities since the publication of the South/North DEIS in February 1998.

A 45-day public comment period immediately followed publication of the South/North DEIS in February 1998. During the comment period, four informational open houses and three public hearings were held in various locations throughout the region. Decision makers considered input gathered at the public hearings and throughout the public comment period as part of the broad evaluation of alignment alternatives, and ultimately in the selection of the LPS or single alignment alternative. Metro Council adopted the LPS and the LUFO in July 1998. Community presentations, meetings with individual property owners and other public involvement activities as detailed in the DEIS continued after the LPS was selected as work on the FEIS continued.

After the defeat of Ballot Measure 26-74 in November 1998, Metro sponsored a series of four "listening posts" held throughout the region. During the months following the election, more than 375 individual comments were received at the public hearings, and through correspondence (faxes and letters), telephone calls and e-mail to Metro and Tri-Met. Comments were submitted from throughout the region including Portland, Gresham, Beaverton and Clackamas County. These comments were compiled and analyzed in a single document, *Public Comments: November 1998 through early February 1999 Including the December 1998/January 1999 "Listening Posts."*

Overall, comments generally supported continuing to consider light rail in the South/North Corridor, with the greatest degree of support coming from Multnomah County where two out of three of listening post comments supported a continued light rail effort. Many comments encouraged a multi-modal approach that includes light rail with investments in other modes to improve the public transportation system for the entire region.

P.4 Completion of the Environmental Impact Statement Process

A 45-day public comment period (including a public hearing) will follow the publication of this SDEIS. During the public comment period, members of the public, agencies and jurisdictions will have the opportunity to provide comments to Metro and the FTA. Comments can be made in writing, via facsimile, e-mail or the transportation hotline and/or the public hearing. After the public comment period closes, the LPS and the LUFO may be amended. Development of an FEIS in accordance with NEPA (42 U.S.C. 4322(2)(c)) would commence following completion of the SDEIS process.

S. Executive Summary

This section provides a summary of the *South/North Corridor Project Supplemental Draft Environmental Impact Statement (SDEIS)*. The SDEIS serves as an addendum to the *South/North Draft Environmental Impact Statement (DEIS)*. The SDEIS evaluates the new Full-Interstate Avenue Alignment Alternative. It summarizes the costs, benefits and impacts associated with the proposed new Full-Interstate Avenue Alignment Alternative that are significantly different from those identified in the DEIS and provides citizens, agencies and jurisdictions with information needed to make informed judgements and decisions when evaluating a potential amendment to the adopted Locally Preferred Strategy (LPS).

This SDEIS has been prepared in compliance with the *National Environmental Policy Act (NEPA)*. The Federal Transit Administration (FTA) is the Federal lead agency, and Metro and Tri-Met are the local lead agencies.

S.1 Project History and Decision-Making Process

The need to examine high capacity transit options in the South/North Corridor was established over two decades of system and subarea planning studies. These study stages have included: System Planning Studies, Preliminary Alternatives Analyses (Pre-AA), Scoping, Tier I – Narrowing of Terminus and Alignment Alternatives, Tier I – Design Option Narrowing, Major Investment Study (MIS) and Tier II DEIS and Cost-Cutting. The DEIS provides a detailed description of the study stages that led to the development of the DEIS.

Following publication of the DEIS in February 1998 and subsequent adoption of the LPS and Land Use Final Order (LUFO) in July 1998, Metro commenced preparation of the *South/North Corridor Project Final Environmental Impact Statement (FEIS)*. In the November 1998 election, voters in the Portland region did not re approve a ballot measure to provide a portion of the local funding for the project.

Following the election, regional and local officials held a series of “listening posts” during which the public provided input on numerous transportation issues including the future of light rail in the South/North Corridor. Following the listening posts, local business and community members urged Tri-Met, the City of Portland and Metro to investigate a modified Interstate Avenue Alignment in the North Corridor Study Area. This modified alignment would combine portions of the Interstate Avenue Alignment Alternative that was studied in the DEIS (between the Edgar Kaiser Medical Facility and the Kenton Neighborhood) with a new route on Interstate Avenue (between the Rose Quarter Transit Center and the Edgar Kaiser Medical Facility) that had not been evaluated in the DEIS. This new alignment is called the Full-Interstate Alignment Alternative or Interstate MAX. The modified alignment could include lower cost, fewer displacements, fewer environmental impacts than the alternatives evaluated in the DEIS, and continued public support.

In March 1999, the FTA determined that an SDEIS would be the appropriate vehicle for examining the new Full-Interstate Alternative.

S.2 Purpose and Need

The Purpose and Need statement for the new Full-Interstate Alignment Alternative remains the same as described in Chapter 1, Purpose and Need of the DEIS.

S.3 Full-Interstate Alignment Alternative

The DEIS describes the No-Build Alternative, four light rail length alternatives, 16 light rail alignment alternatives and 22 light rail design options between the Clackamas Regional Center and Vancouver, Washington. This SDEIS describes an additional light rail length and alignment alternative: the Full-Interstate Alignment Alternative (see Figure S.3-1).

The Full-Interstate Alignment Alternative would result in the construction of 5.63 miles of new light rail track and nine new light rail stations. The alternative would operate on 1.46 miles of existing track between the SW 11th Avenue downtown turnaround and the Rose Quarter Transit Center for a total of 7.09 miles. The alignment includes a new segment not studied in the DEIS, on Interstate Avenue between the Rose Quarter Transit Center and the Edgar Kaiser Medical Center. The alignment north of Kaiser is generally in the same location as the DEIS Interstate Avenue Alternative, with significant design changes to reduce displacements and cost. The new Full-Interstate Alignment Alternative would include the same bus service improvements in the North Corridor as identified with the light rail alternatives described in the DEIS. The Full-Interstate Alignment Alternative would cost \$223.4 million to construct in 1994 dollars.

Chapter 2 of the SDEIS provides a more detailed description of the new Full-Interstate Alignment Alternative.

S.4 Transportation Impacts

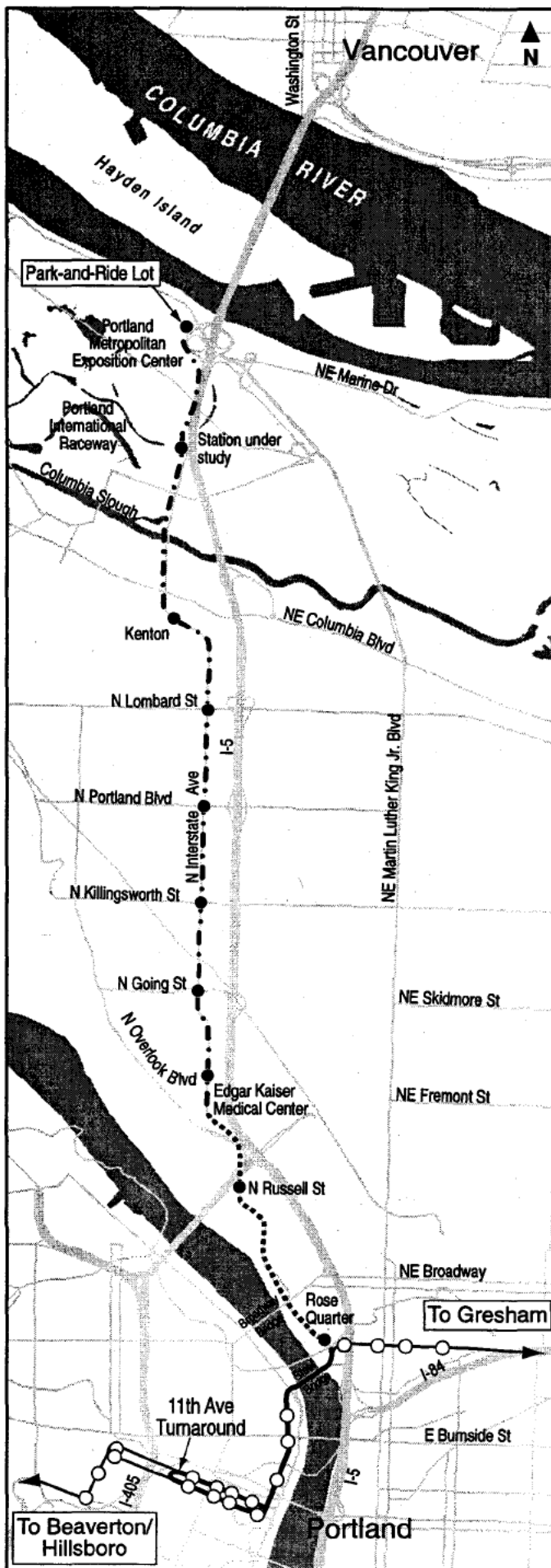
The DEIS describes the transportation impacts of the DEIS alternatives. This section summarizes the transportation impacts of the new Full-Interstate Alignment Alternative.

S.4.1 Transit Impacts

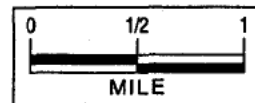
The transit service, transit reliability and operational impacts of the Full-Interstate Alignment Alternative would not differ significantly from the alternatives evaluated in the DEIS. The amount of transit service provided in north Portland with the Full-Interstate Alignment Alternative would be similar to the service concept as described in the DEIS for the Interstate Avenue Alternative and for Minimum Operable Segment Five (MOS 5). The year 2015 operations of this alignment would result in 127 weekday platform hours and 1,287 weekday train miles. In the south portion of the corridor and in the remainder of the region, the transit service used in the analysis is identical to the service described in the DEIS for the No-Build Alternative.

The light rail in-vehicle travel time between the Rose Quarter Transit Center and the Expo Center station with the new Full-Interstate Alignment Alternative would be approximately 14 minutes and 30 seconds.

Figure S.1
Full-Interstate Alignment Alternative



- DEIS Interstate Alignment
- New Full-Interstate Alignment
- Existing MAX Cross-Mall Alignment
- Remainder of Existing MAX Line
- Proposed Full-Interstate Light Rail Stations
- Existing Light Rail Stations



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This would be about two minutes faster than the comparable travel time with the DEIS Interstate Avenue Alternative and similar to the 14 minutes, 50 second time estimated for the DEIS I-5 Alternative.

The transit ridership data with the Full-Interstate Alignment Alternative differs from the DEIS build alternatives in that it reflects only improvements in the north portion of the South/North Corridor. The data shows that the Full-Interstate Alignment Alternative would generate 14,100 light rail trips per average weekday, between downtown and the Expo Center Terminus.

S.4.2 Traffic and Parking Impacts

The amount of traffic diverted from of N Interstate Avenue with the Full-Interstate Alignment Alternative would generally be greater than with the DEIS Interstate Avenue Alternative. As a result of the reduced traffic volumes on N Interstate Avenue, the levels of service at some major intersections would generally be improved over the DEIS Interstate Avenue Alternative and the No-Build Alternative; but east-west traffic movements could experience greater delays due to signal preemption.

Light rail trains preempting signal operations would increase green signal time for northbound and southbound through traffic on N Interstate Avenue. The signal preemption would have two impacts; it would reduce the green light time for east/west travel; and, when coupled with the pedestrian activated signals it would disrupt the north/south signal progression on N Interstate Avenue. The FEIS will consider appropriate mitigation measures.

From the Rose Quarter through N Overlook Boulevard (with some trips diverted from N Interstate Avenue) adequate intersection capacity would be provided and the intersection levels of service would generally improve with the Full-Interstate Alignment Alternative compared with the No-Build Alternative.

On, or within one block of N Interstate Avenue, the Full-Interstate Alignment Alternative would displace an estimated 17 more on-street parking spaces than the DEIS Interstate Avenue Alternative.

S.4.3 Freight Access

The Full-Interstate Alignment Alternative could result in impacts to truck movements at four industrial access locations in the corridor. Each of these potential impacts could be mitigated, and mitigation options will be evaluated during the FEIS process.

S.4.4 Navigable Waterways

The new Full-Interstate Alignment Alternative would result in the replacement of the Denver Avenue viaducts with a combined light rail and bridge over Columbia Slough. New piers would be built or existing piers would be reused. In either case, no impact to navigation is anticipated.

S.5 Environmental Consequences

This section summarizes the environmental impacts that would occur with the new Full-Interstate Alignment Alternative that are significantly different from those impacts associated with the DEIS alternatives.

S.5.1 Land Use and Economic Development

At the regional level, the land use and economic impacts associated with the Full-Interstate Alignment Alternative would be similar to those identified in the DEIS, except that a smaller project would cause less short-term (construction) employment and less long-term (operational) employment than the DEIS Full-Length Alternative.

At the local level, there would be one less station in the Eliot Segment. The location of the new proposed Russell Station would serve more industrial land when compared to the mixture of land uses that would be served with the stations associated with the DEIS options in this segment. The new design would allow for portions of N Interstate Avenue to become more like a "Main Street" type of street, consistent with the city of Portland's vision for the area.

S.5.2 Displacements and Social and Neighborhoods

Compared to between 135 and 148 potential displacements with the DEIS build alternatives in north Portland, the Full-Interstate Alignment Alternative would incur no displacements. Neighborhood quality for the north Portland neighborhoods would be significantly enhanced compared to the DEIS build alternatives.

S.5.3 Visual and Aesthetic Resources

North of the Edgar Kaiser Medical Center, the impacts identified for the DEIS Interstate Avenue Alternative could generally be expected to occur with the Full-Interstate Alignment Alternative. However, the loss of large street trees, removal of adjacent structures and visual separation created by the light rail trackway would be minimized. South of the Overlook Station, the Full-Interstate Alignment Alternative would replace the two existing vehicular travel lanes in the center of N Interstate Avenue. The trackway between major intersections would be constructed of tie and ballast, compared to the paved trackway associated with the DEIS Interstate Avenue Alternative.

S.5.4 Air Quality

Similar to the other DEIS build alternatives, the Full-Interstate Alignment Alternative would result in an improvement in regional air quality measures when compared to the No-Build Alternative, due primarily to reduced automobile use.

S.5.5 Noise and Vibration

The Full-Interstate Alignment Alternative would result in nine additional traffic noise impacts, no

additional light rail noise impacts, one additional wheel squeal impact and 2 additional light rail vibration impacts compared to the DEIS Interstate Avenue Alternative, primarily due to the reduction in displacements. The minor noise impact of a one to two decibel increase over the existing condition at Overlook Park would not result in an adverse impact to the park.

S.5.6 Ecosystems

Like the DEIS Interstate Avenue Alternative, the Full-Interstate Alignment Alternative would result in 0.93 acres of fill in the wooded wetland located just south of the Expo Center and east of N Expo Road. The Full-Interstate Alignment Alternative could also result in the replacement of existing piers in Columbia Slough to support the reconstructed Denver Viaduct. The potential impacts of the pier replacement and mitigation of potential ecosystems impacts will be addressed during the FEIS preparation and Preliminary Engineering Phases through coordination with the appropriate resource agencies.

S.5.7 Water Quality and Hydrology

Water quality and hydrology impacts resulting from the Full-Interstate Alignment Alternative would be minimal, and similar to those described for the DEIS Interstate Avenue Alternative. With mitigation, the Full-Interstate Alignment Alternative would not result in significant hydrologic, flooding or water quality impacts.

S.5.8 Energy

Compared to the No-Build Alternative, a small reduction of regional energy consumption would occur with the Full-Interstate Alignment Alternative.

S.5.9 Geology

The Full-Interstate Alignment Alternative would have no long-term impacts to geology or soils. Minor effects could include changes in topography and drainage patterns, slight settlement of near surface soils, and changes in slope stability.

S.5.10 Hazardous Materials

Because the Full-Interstate Alignment Alternative would be located primarily within existing road right-of-way, the risk of impact to probable hazardous materials sites in the predominantly industrial area is low. In order to minimize impacts associated with either unidentified contamination encountered during construction or known hazardous substances, A Hazardous Materials Mitigation Plan will be developed during the completion of Preliminary Engineering and preparation of the FEIS.

S.5.11 Historic, Archeological and Parkland Resources

With exception of the segment between the Rose Quarter Transit Center and the Edgar Kaiser

Medical Center, impacts to historic resources with the Full-Interstate Alignment Alternative would be similar to those identified in Chapter 6 of the DEIS for the Interstate Avenue Alternative. In the segment between the Rose Quarter Transit Center and Kaiser where three new resources have been identified, a preliminary evaluation of effect has determined that there would be "no effect" from the Full-Interstate Alignment Alternative.

S.5.12 Construction Impacts

Construction of the Full-Interstate Alignment Alternative would result in temporary impacts to existing traffic and transit, land uses, employment, neighborhoods, noise and vibration, geology and soils, water quality and hydrology, ecosystems and hazardous materials sites in the Eliot and North Portland Segments.

S.6 Evaluation of Alternatives

By making comparisons at the alignment alternative level, it is possible to capture the differences between the Full-Interstate Alignment Alternative and the other alternatives evaluated in the DEIS. The full range of evaluation criteria are not applicable to an alignment alternative and are not described in detail in the SDEIS.

The capital cost of the Full-Interstate Alignment Alternative is \$46 million (1994\$) less expensive than the LPS alignment (\$81 million in year of expenditure dollars). Compared to the DEIS Interstate Avenue Alternative, the new alternative would result in between 71 and 148 fewer business and residential displacements and one less station. The Full-Interstate Alignment Alternative would provide better access to the Albina Industrial Area and commercial uses at N Russell and Interstate, but provide reduced access to Emanuel Hospital and the residential section of the Eliot Neighborhood.

S.6.1 Financial Analysis

The Full-Interstate Alignment Alternative would cost approximately \$350 million in year of expenditure dollars. The financing plan for the project is shown in Table S.6-1. Capital funding would be provided through Federal Section 5309 New Start funding and local match. System operating costs for the Full-Interstate Alignment Alternative would be \$1.1 million less than transit operating costs in the DEIS No-Build Alternative.

An alignment alternative is fiscally feasible (on a systemwide basis) if ongoing revenues would be sufficient to meet the estimated total system costs and to maintain a sufficient working capital reserve to meet two months of operating expenses. Tri-Met's goal is to maintain three-months working capital. The Full-Interstate Alignment Alternative would maintain a three-month or better working capital reserve throughout the planning period. Therefore, the test for financial feasibility would be met, as well as Tri-Met's goal.

**Table S.6-1
Summary of Capital Financing Plan for the
New Full-Interstate Alternative**

	Full-Interstate Alternative
Project Capital Cost ¹	\$350.0
Project Revenues ²	
New Starts Federal Funds –U	\$246.0
Regional STP Funds – A	\$24.0
Regional Compact Funds –U ³	\$80.0
Total Project Revenue	\$350.0
Interim Borrowing Needs⁴	\$58.7

Source: Tri-Met: April 1999.

Note: STP = Surface Transportation Program.

¹ Costs and revenues are in millions and year-of-expenditure dollars.

² U = this revenue is currently unavailable; and A - this revenue is currently available.

³ The Regional Compact consists of contributions from Tri-Met and the City of Portland

⁴ The issuance and interest costs associated with the interim borrowing is included in the total project costs.

S.7 Issues to be Resolved

The analysis and preparation of the information found in the DEIS and this SDEIS is an important component of the South/North Project. There are numerous issues to be resolved, and this section identifies some of the more important and immediate landmarks ahead.

S.7.1 Modification of the Locally Preferred Strategy

The DEIS and SDEIS and comments received through the public review period will provide the basis for local jurisdictions to recommend and adopt alignments that could modify the Locally Preferred Strategy (LPS). The adoption of an amended LPS by the Metro Council would come after independent recommendations are made by the South/North Project Citizens Advisory Committee, the Tri-Met Board of Directors, the City Council of Portland, and Metro's Joint Policy Advisory Committee on Transportation (JPACT). Metro would prepare a revised LPS report that documents the selection and would forward the LPS report to FTA to complete the local decision step in the Federal environmental process.

S.7.2 Implementation of the Financing Plan

The financial analysis in the SDEIS shows that the light rail alternatives would require significant revenue that is not currently available. The financial analysis also identifies required new levels and proposed sources of revenue. New Federal funds would be secured through the Federal Section 5309 authorization and appropriation cycles and through the normal FTA grant process. The local funds identified as Regional STP Funds and Regional Compact Funds in Table S.6-1 will need to be secured through the actions of the Metro Council and execution of the Regional Compact.

The completion of the financial plan also includes completing all Federal NEPA and FTA requirements and the execution of a Full Funding Grant Agreement (FFGA) with FTA. Definitions

of all items that are considered eligible for Federal funding must be identified in the FFGA.

S.7.3 Completion of the Proposed Mitigation Plans

Design, determination of impact, and estimates of cost for any major project proceed from conceptual to preliminary to final as the project advances to construction. At this SDEIS stage of the process, numerous impacts have been identified and many mitigation measures have already been identified or incorporated into the preliminary design and cost estimates or committed by the project. Examples include: conformance with the Oregon State Historical Preservation Officer (SHPO) and the Advisory Council on Historic Preservation (ACHP) to ensure compatible design of light rail facilities with affected historic resources; and avoidance and minimization of impacts and appropriate mitigation for impacts to wetlands areas.

In addition, the South/North Project has committed to further ways to mitigate or finalize the mitigation of certain impacts. Examples or areas requiring further study and commitment include: final designs regarding landscaping and architectural design treatment of project facilities including track finish; traffic capacity problems at intersections where there would be significant project impacts on traffic; final definition of noise and vibration mitigation measures; revised alignment in the area south of the Expo Center to avoid and minimize impacts to wetlands and final definition of wetland replacement plan; final determination of the need for replacement piers in the Columbia Slough and final determination of in-water construction windows and best management practices; a Memorandum of Agreement (MOA) negotiated between the Project and SHPO and reviewed and concurred by the ACHP; demonstrated compliance with all Federal "Section 4(f)" requirements concerning parklands and historical properties through completion of a formal "Final Section 4(f) Statement;" and development of a traffic management plan for the construction phase.

1. Purpose and Need

The Purpose and Need for the Full-Interstate Alignment Alternative remains the same as that described in Chapter 1 of the *South/North Corridor Draft Environmental Impact Statement (DEIS)*. The specific relationship of this new alternative to the DEIS Purpose and Need is described below.

The *Purpose and Need* chapter of the DEIS describes the study area, which includes the entire South/North Corridor from Clackamas County, Oregon to Vancouver, Washington. The relevant portion of the corridor for this alternative, from downtown Portland to the Columbia River, is included in the DEIS description. The description of the transportation system serving the area today remains unchanged. The transportation and land use plans and policies applicable to Oregon described in the DEIS Purpose and Need affect this alternative. The existing and future transportation problems in the Corridor remain unchanged from the DEIS, although transportation and land use conditions between downtown Portland and the Columbia River most directly apply to this alternative. The objectives for this alternative are identical to those contained in the DEIS Purpose and Need.

2. Alternatives Considered

The purpose of Chapter 2 is to describe the improvements associated with the new Full-Interstate Alignment Alternative and indicate differences from the DEIS Interstate Avenue Alignment Alternative previously evaluated in the South/North DEIS.

2.1 Introduction

Section 2.2 describes the screening and selection process for the South/North Project resulting in the addition of a new alignment alternative. Section 2.3 describes the new Full-Interstate Alignment Alternative, Section 2.4 provides the capital cost estimates for the new Full-Interstate Alignment Alternative, and finally Section 2.5 describes the operating and maintenance cost estimates for the Full-Interstate Alignment Alternative.

2.2 Screening and Selection Process

The DEIS fully documents the need to examine high capacity transit (HCT) options in the South/North Corridor, as well as the selection process to narrow transportation modes, alignment choices and design. These major steps include system planning that occurred between 1982 and 1990, Preliminary Alternatives Analysis between 1991 and 1993, Tier I Analysis between 1993 and 1995, Narrowing of Terminus and Alignment Alternatives, Tier II Design Option Narrowing in 1995 and a Cost-Cutting Process in 1996. Different corridors as well as different modes such as busways, commuter rail and river transit were all examined during these studies.

The screening and selection process resulted in several potentially viable alternatives studied in detail in the South/North DEIS (published in February 1998). In July of 1998, the Full-Length Alternative from Clackamas Town Center to Clark College in Vancouver, Washington was selected as the Locally Preferred Strategy (LPS). The alignment between Clackamas Town Center and the Rose Quarter Transit Center was identified as the first segment to be constructed with additional segments to follow.

In the November 1998 election, voters in the Portland metropolitan region rejected a ballot measure that would have reaffirmed the region's 1994 authorization to sell Tri-Met General Obligation bonds, to be repaid with local property tax revenue. These General Obligation bonds would have provided a substantial portion of the local match funding for the South/North Project. Following the November election a series of "Listening Posts" were held by regional and local elected officials during which the public provided input on numerous transportation issues including the future of light rail in the South/North Corridor. Following the Listening Posts, local business and community members urged Tri-Met, the City of Portland and Metro to investigate a modified Interstate Avenue Alignment in the North Corridor Study Area. This modified alignment would combine portions of an alignment already studied in the DEIS with a new route segment on N Interstate Avenue that had not been evaluated in the DEIS. This new alignment is called the Full-Interstate Alignment Alternative or Interstate MAX. The reasons cited for this modified alignment include lower cost, fewer displacements, fewer environmental impacts and greater public support.

2.3 Definition of Alternatives

This section describes the light rail capital improvements, operating characteristics and bus operations associated with the new Full-Interstate Alignment Alternative.

2.3.1 Capital Improvements

The South/North DEIS describes the Tri-Met and C-TRAN transit systems and the No-Build Alternative. These descriptions remain the same with the addition of the Full-Interstate Alignment Alternative. Tri-Met's *North Corridor Conceptual Plans for Light Rail Interstate MAX Alignment* (Tri-Met: April, 1999) provides a detailed description of the Full-Interstate Alignment Alternative.

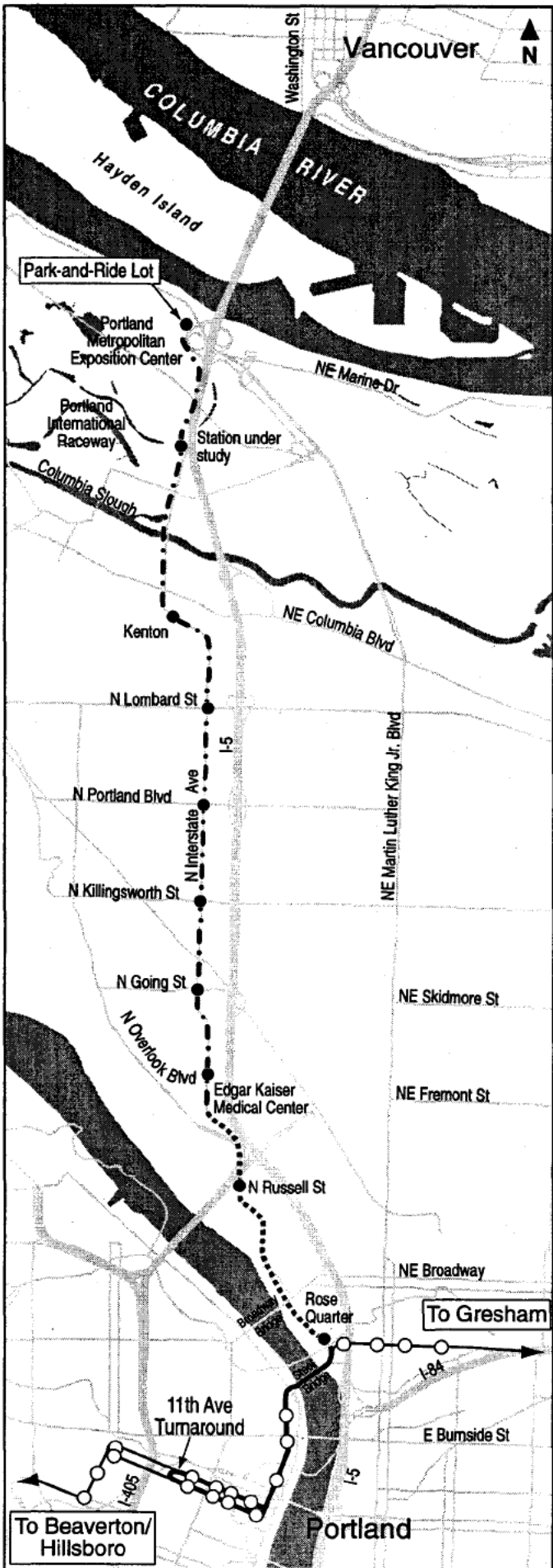
The Full-Interstate Alignment Alternative would result in a new alignment alternative in the North Corridor Study Area (Figure 2.3-1). The new alignment is illustrated for the Eliot Segment in Figure 2.3-2 and for the North Portland Segment in Figure 2.3-3. This new alternative would utilize the existing east-west light rail alignment between the downtown turnaround located at SW 11th Avenue (between SW Yamhill and SW Morrison Streets) and the Rose Quarter. The new light rail alignment would split from the east-west alignment on the eastside of the Steel Bridge in the vicinity of the Rose Quarter Transit Center, where the alignment would turn north into the center of N Interstate Avenue. A new station would be located at the corner of N Multnomah and N Interstate adjacent to the Rose Garden and about 200 yards west of the Rose Quarter Transit Center. Refer to Appendix A-1 for a diagram of the transit center and park-and-ride lot.

Rose Quarter to Kaiser. North from the Rose Quarter, the tracks would be aligned in the middle of N Interstate Avenue and pass underneath the Broadway Bridge. Two vehicular travel lanes would be provided for northbound traffic and one lane would be provided for southbound traffic on N Interstate Avenue between N Multnomah and N Larrabee. North of the Broadway Bridge, the alignment, one general traffic lane and a bike lane in each direction would generally fit within the existing N Interstate Avenue right-of-way (the right-of-way width varies in this segment between 80 and 100-feet). North of the Rose Quarter station, the trackway would be tie-and-ballast. A center platform station would be located between N Russell and N Knott Streets on N Interstate Avenue.

Truck access into the Lower Albina Industrial District would be provided at N Tillamook Street at the location of the City of Portland's proposed Lower Albina Overpass. Turning lanes would be provided at N Tillamook Street, N Russell Street, N Knott Street and N Greeley Avenue. From the intersection of N Greeley Avenue, the alignment would proceed on a five to six percent grade up to Overlook Park and the Edgar Kaiser Medical Center. A traffic signal would be modified and turn lanes provided to allow access into Kaiser medical buildings on the east and west sides of N Interstate Avenue. The Russell Station would have a center platform located in the center of N Interstate Avenue at N Overlook Boulevard.

Kaiser to Kenton. North of N Overlook Boulevard, the new Full-Interstate Alignment Alternative would be similar to the Interstate Avenue Alignment Alternative that is described and evaluated in the DEIS.

Figure 2.3-1
Full-Interstate Alignment Alternative



- DEIS Interstate Alignment
- New Full-Interstate Alignment
- Existing MAX Cross-Mall Alignment
- Remainder of Existing MAX Line
- Proposed Full-Interstate Light Rail Stations
- Existing Light Rail Stations

Figure 2.3-2
**Full-Interstate
Eliot Segment**



- LRT Alignment
- Station
- - - Existing Railroad

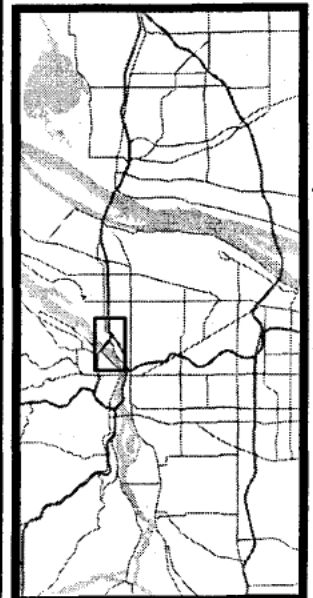
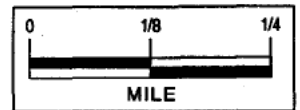
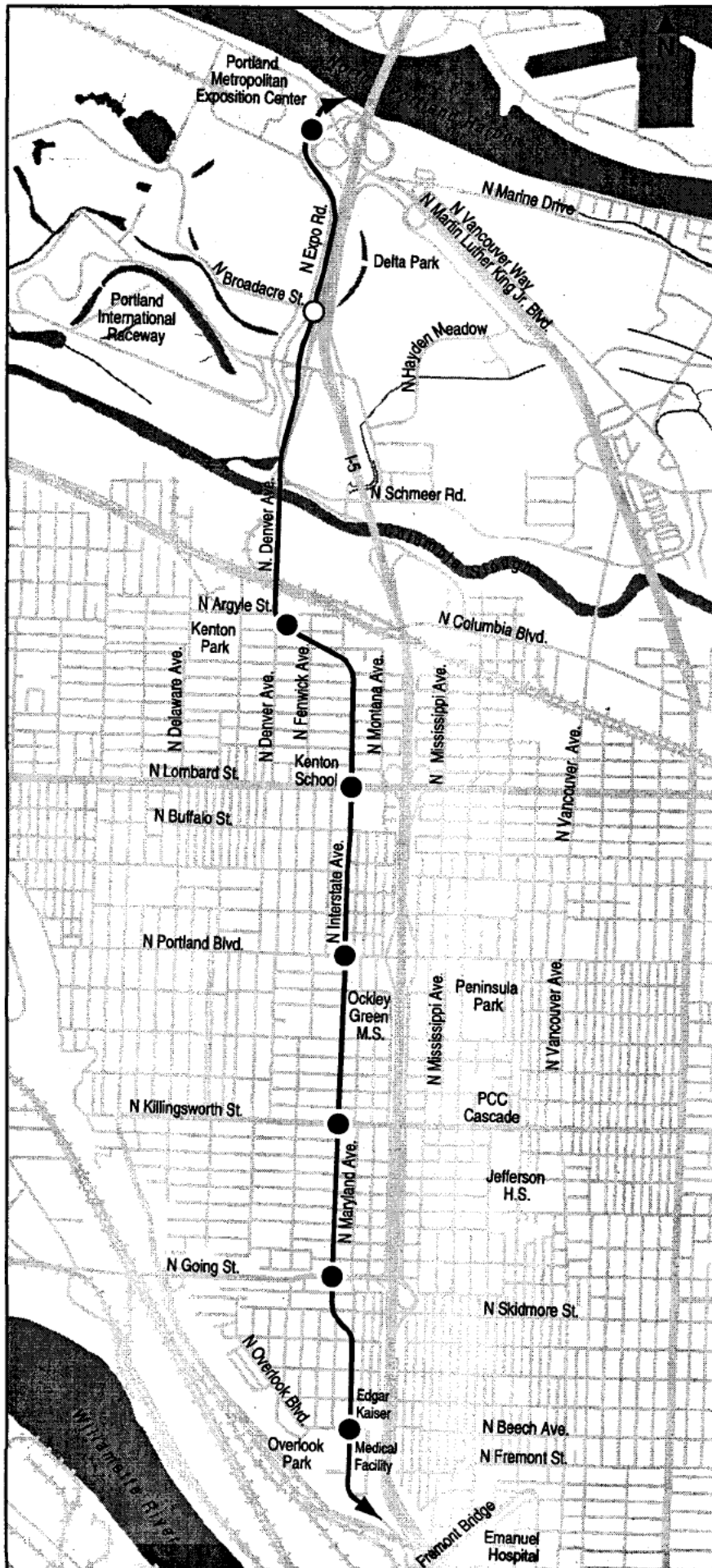
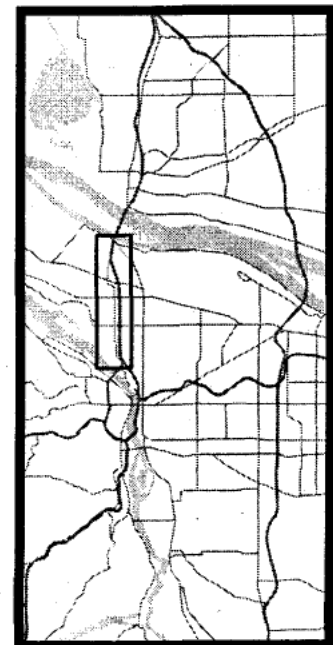
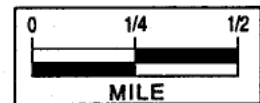


Figure 23-3
Full-Interstate
North Portland Segment



- LRT Alignment
- Station
- Station under study
- Existing Railroad



The new Full-Interstate Alignment Alternative would be constructed almost entirely within the existing 100-foot N Interstate Avenue right-of-way. The pedestrian crossings for the new alternative would be provided through pedestrian-activated signals as opposed to the "Z" type pedestrian crossings that were defined for the Interstate Avenue Alternative in the DEIS. The Full-Interstate Alignment Alternative on N Interstate Avenue would have fewer displacements, traffic lanes and fewer on-street parking spaces at the intersections of N Interstate and N Going Street, N Killingsworth Street, N Portland Boulevard, N Lombard Street and N Denver Avenue than the DEIS Interstate Avenue Alternative.

Within the 100-foot right-of-way, the new Full-Interstate Alignment Alternative would provide for sidewalks, bicycle lanes, one auto lane in each direction and two sets of light rail tracks. On-street parking would be maintained in most areas except at intersections with either traffic or pedestrian-activated signals. The light rail trackway would be tie-and-ballast between Steel Bridge and the Expo Center.

Stations would be located at N Going Street, N Killingsworth Street, N Portland Boulevard, and N Lombard Street, identical to the locations studied for the Interstate Avenue Alignment as described in the DEIS. In comparison, the alignment has been modified in the Kenton area to avoid impacting a historical structure and other potential displacements. As a result, the Kenton Station would be shifted one block to the southeast and the alignment would be shifted from the eastside into the middle of the N Argyle at N Denver Avenue intersection.

Kenton to Expo Center. North of the Kenton Station, the Denver Avenue Viaduct over N Columbia Boulevard and an existing bridge over the Columbia Slough would be replaced with two combined light rail and traffic bridges. The DEIS Interstate Avenue Alternative includes proposed new light rail only bridges on the eastside of the Denver Viaduct. The new bridge would cross over Columbia Slough with a vertical clearance of at least 34 feet Columbia River Datum (CRD) and a horizontal clearance of at least 66 feet.

The alignment would cross on an elevated structure over the southbound N Denver Avenue traffic lane to a potential "event only" station located on the eastside of the intersection of N Expo Road and N Broadacre Street adjacent to the entrance of the Portland International Raceway (PIR). This station is still under study by Tri-Met and was not included in the calculation of transit ridership or capital and operating costs. The station location and cost will be detailed in Preliminary Engineering and the FEIS.

From N Broadacre Street, the alignment would proceed north between the I-5 Freeway and N Expo Road to a terminus station located in the existing Expo Center parking lot. Approximately 500 existing parking spaces would be used as a shared use park-and-ride lot. A new traffic signal at N Marine Drive and the Expo Center would provide access into the shared use park-and-ride lot.

2.3.2 Transit Operations

This section describes the operations of light rail and bus transit that would occur with the Full-Interstate Alignment Alternative.

2.3.2.1 LRT Operations

The methodology used to calculate light rail running speeds and travel times for the Full-Interstate Alignment Alternative is unchanged from the methodology used for the light rail alternatives described in the DEIS. The hours of light rail operations and light rail vehicle type assumed in this analysis is also unchanged from the DEIS. The number of buses, light rail vehicles, transit vehicle miles traveled, place miles and revenue hours are shown in Table 2.3-1.

**Table 2.3-1
Year 2015 Transit Vehicle and Service Characteristics**

		No-Build Alternative	Full-Length Alternative	Full-Interstate Alternative
Number of Transit Vehicles – South/North Corridor				
BUSES				
Tri-Met	In Service	346	318	340
	In Service with Spares	433	398	425
C-TRAN	In Service	91	82	92
	In Service with Spares	114	103	115
LRV	In Service	0	50	20
	In Service with Spares	0	59	24 ²
Number of Transit Vehicles – Systemwide				
BUSES				
Tri-Met	In Service	636	610	630
	In Service with Spares	795	763	788
C-TRAN	In Service	120	110	120
	In Service with Spares	150	138	150
LRV	In Service	68	118	88
	In Service with Spares	80	139	104
Transit VMT (Weekday)				
South/North Corridor	Bus	50,300	49,100	48,900
	LRV	0	4,910	1,290
Non-Corridor	Bus	52,800	53,000	53,000
	LRV	7,500	7,500	7,500
Systemwide	Bus	103,100	102,100	101,900
	LRV	7,500	12,410	8,790
Place Miles¹ (Weekday) (266 per train; 66 per bus)				
South/North Corridor	Bus	3,319,800	3,240,600	3,227,400
	LRV	0	1,630,120	428,280
Non-Corridor	Bus	3,484,800	3,498,000	3,498,000
	LRV	2,490,000	2,490,000	2,490,000
Systemwide	Bus	6,840,600	6,738,600	6,725,400
	LRV	2,490,000	4,120,120	2,918,280
Revenue Hours (Weekday)				
South/North Corridor	Bus	3,290	3,100	3,210
	LRV	0	298	106
Non-Corridor	Bus	3,300	3,300	3,300
	LRV	354	354	354
Systemwide	Bus	6,590	6,400	6,510
	LRV	354	652	460

Source: Metro: Tri-Met, 1999.

Note: LRV = Light rail vehicles; and VMT = Revenue Vehicle Miles Traveled.

¹ Place Miles = Transit Vehicle Capacity (seated and standing) multiplied by VMT.

² 2015 operating plan would require 24 LRVs. Opening year service would require 17 LRVs.

Full-Interstate Alignment Alternative. In 2015, with the Full-Interstate Alignment Alternative, light rail trains would operate from the existing train turnaround at SW 11th Avenue to the Expo Center terminus at a 7.5-minute headway during the peak travel periods and at a 10-minute headway during the off-peak. Trains would operate on the existing East-West LRT line (which would include the Airport LRT line) between the 11th Avenue turnaround and the Steel Bridge. The one way travel time between the 11th Avenue turnaround and the Expo Center would be 27 minutes.

The Full-Interstate Alignment Alternative would result in the construction 5.63 miles of new light rail track miles and nine new light rail stations. The alignment would operate on 1.49 miles of existing track between the downtown turnaround and the Rose Quarter for total of 7.09 miles. The year 2015 operations of this alignment would result in 127 weekday platform hours and 1,290 weekday train miles.

Instead of constructing a new operations and maintenance facility as assumed in the DEIS, the existing Ruby Junction operation and maintenance facility would be upgraded to accommodate the additional light rail vehicles necessary to serve the new Full-Interstate Alignment Alternative.

2.3.2.2 Bus Operations

The proposed configuration of bus service provided in north Portland with the Full-Interstate Alignment Alternative would be similar to that associated with the Minimum Operable Segment (MOS) 5 and the Interstate Avenue Alignment Alternative described in the DEIS. With the Full-Interstate Alignment Alternative, the Line 5-Interstate Avenue bus would operate on N Denver Avenue between Kenton and N Killingsworth Street. The Full-Interstate Alignment Alternative would also include a bus between the Expo Center and the downtown Vancouver Transit Center. In the south portion of the corridor and in the remainder of the region the transit service would be identical to the service included in the DEIS No-Build Alternative. C-TRAN service between Clark County and Portland would be identical to the service included with the No-Build Alternative. The final configuration of the transit network in north Portland will be determined following extensive public comment.

2.4 Capital Costs

This section describes the capital cost estimates in 1994 dollars for the new Full-Interstate Alignment Alternative. Chapter 6 presents capital cost estimates in year of expenditure dollars based on these estimates, an assumed construction schedule and assumed inflation rates. The methodology used for this analysis is the same as that used for the DEIS. A full description of the capital cost estimating methods can be found in the *South/North Capital Cost Methods Report* (Metro: April 1996).

The capital cost estimates are based upon engineering plan and profile sheets prepared by Tri-Met. Each plan and profile sheet is composed of many different elements that would contribute to project costs. Eighteen different cost categories (listed in Table 2.4-1) have been used to consolidate these cost estimates. The definitions of these categories have not changed from the DEIS.

The Full-Interstate Alignment Alternative would cost \$223.4 million to construct in 1994 dollars. This cost would be significantly less than a comparable length alignment based on the DEIS design due to numerous factors including one less station, no displacements, no new maintenance facility, less expensive tie-and-ballast track finish and a narrower Interstate Avenue cross section that would require less construction. Table 2.4-1 describes the capital cost of the Full-Interstate Alignment Alternative in 1994 dollars.

**Table 2.4-1
Capital Cost for the Full-Interstate Alignment
Alternative by Cost Category (1994\$)**

Cost Category ¹	Full-Interstate Alignment Alternative
Utilities	\$6.0
Street Reconstruction	\$29.2
Track Grade Construction	\$13.7
Structures	\$25.0
Trackwork	\$10.9
Crossings	\$8.8
Stations	\$3.5
Fare Collection	\$1.5
Park-and-Ride	\$0.0
Traction Electrification	\$9.0
Signal System	\$4.7
Communications	\$3.1
Special Conditions	\$0.0
LRT O&M Facility ²	\$8.8
Light Rail Vehicles ²	\$44.8
Engineering & Administration	\$50.7
Right-of-Way	\$3.6
Total	\$223.4

Source: Tri-Met, Andrew Janssen, Parsons Brinckerhoff Quade & Douglas 1999.

Note: all cost are in 1994 dollars.

¹ Cost categories individually include contingencies.

² Transit vehicles and O&M facility are sized for opening year network

2.5 Operations and Maintenance (O&M) Costs

This section summarizes the annual corridor-level transit operating and maintenance costs that would be incurred by the Full-Interstate Alignment Alternative. The methods used to calculate the costs found in Table 2.5-1 are the same as those used in the DEIS. The *South/North Operating and Maintenance Costs Methods Report* (Tri-Met: May 1996) provides further detail on the methods used to calculate these costs.

**Table 2.5-1
Year 2015 Annual Corridor Operation and Maintenance Costs¹
for Tri-Met and C-TRAN**

Cost Category/Agency	No-Build Alternative	Full-Length Alternative	Full-Interstate Alternative
Bus Transportation			
Tri-Met	\$36,475,000	\$33,979,000	\$35,474,000
C-TRAN	\$6,565,000	\$6,233,000	\$6,612,000
Bus Maintenance			
Tri-Met	\$16,957,000	\$16,012,000	\$16,545,000
C-TRAN	\$4,334,000	\$4,308,000	\$4,341,000
Rail Administration			
Tri-Met	\$0	\$3,400,000	\$1,182,000
Rail Transportation			
Tri-Met	\$0	\$6,676,000	\$2,366,000
Rail Maintenance			
Tri-Met	\$0	\$10,457,000	\$3,314,000
General and Administrative			
Tri-Met	\$14,917,000	\$18,877,000	\$16,207,000
C-TRAN	\$2,255,000	\$2,191,000	\$2,255,000
Total	\$81,503,000	\$102,133,000	\$88,296,000

Source: Metro and Tri-Met: April 1999.

¹ At 2015 service costs levels in 1994 dollars. Totals may not sum due to rounding.

3. Transportation Impacts

This section describes the existing transportation environment and the changes to transit and traffic impacts that would result with the Full-Interstate Alignment Alternative compared to the alternatives studied in the South/North DEIS. The transit impacts include a summary of the total corridor and system transit ridership and light rail ridership. The traffic impacts described in this section include impacts to intersection level of service (LOS), the impacts of capacity restrictions on N Interstate Avenue compared to the No-Build Alternative, the impact of pedestrian-activated signals on traffic operations and impacts to truck access and routing.

The *Travel Demand Forecasting Methods Report* (Metro: April 1996); and the methods section of the *Local and Systemwide Traffic Impacts Results Report* (Metro: February 1998) provide more detailed information on transportation analysis methods used in this analysis.

3.1 Transit Impacts

3.1.1 Existing Environment

Tri-Met provides bus service to, from and within north Portland on north-south streets including N Greeley Avenue, N Interstate Avenue, N Albina Avenue, N Vancouver/Williams Avenues and NE Martin Luther King Jr. Boulevard and on east-west streets such as N Killingsworth Street and N Lombard Street. C-TRAN provides bus service connecting Clark County with downtown Portland and other employment centers in the central city with express service operating on I-5 and on I-205. A detailed description of existing transit service is available in section 3.2.2 of the DEIS.

3.1.2 Transit Service

The amount of transit service provided in north Portland with the Full-Interstate Alignment Alternative would be similar to the service concept described in the DEIS for MOS 5 (Clackamas Town Center Transit Center to N Lombard Street) and for the Interstate Avenue Alternative. The major difference between the MOS 5 transit network and the transit network analyzed for the Full-Interstate Alignment Alternative is that the Full-Interstate Alignment Alternative includes a local bus connection between the downtown Vancouver Transit Center and the Expo Center station. In the south portion of the corridor and in the remainder of the region the transit service included in the analysis is identical to the service included in the No-Build Alternative.

C-TRAN service between Clark County and Portland is similar to the service included in the No-Build Alternative, with some headway improvement to replace the Vancouver to Portland midday service currently provided by Tri-Met's Line 5 - Interstate Avenue bus which would be truncated at Kenton with the Full-Interstate Alignment Alternative. The transit service impacts of the Full-Interstate Alignment would differ only slightly from the alternatives addressed in the DEIS and are consistent with impacts previously identified.

3.1.3 Travel Time

Table 3.1-1 shows the light rail in-vehicle travel time between the Rose Quarter Transit Center and the Expo Center station with the Full-Interstate Alignment Alternative. The in-vehicle time would be approximately 14 minutes and 30 seconds. This time would be approximately two minutes faster than the comparable travel time with the Interstate Avenue Alternative (DEIS) and similar to the travel time analyzed with the I-5 Alternative (14:51). Travel times between major activity centers would be similar to those included in the DEIS for the I-5 Alternative.

**Table 3.1-1
Year 2015 In-Vehicle Light Rail Travel Times
(in minutes) Rose Quarter to Expo Center ¹**

	In-Vehicle Travel Time	Change from the DEIS
DEIS Interstate Avenue Alternative	16:57	NA
Full-Interstate Avenue Alignment Alternative	14:31	-2:26

Source: Tri-Met, 1997/1999.

¹ Travel time shown is for Rose Quarter to Expo Center. The travel time between the Rose Quarter and the 11th Avenue turnaround would be 12 minutes 39 seconds.

Table 3.1-2 indicates that the transit in-vehicle travel times for the Full-Interstate Alignment Alternative are 30% and 46% faster to north Portland locations than the No-Build Alternative.

**Table 3.1-2
2015 P.M. Peak Hour, In-Vehicle Travel Time Comparison
to Selected Corridor Locations**

From downtown Portland to:	No-Build (Minutes)	Full-Interstate	
		Minutes	% Change
Transit Travel Time			
N Lombard Street (914)	27	19	-30%
Expo Center (960)	43	23	-46%
Automobile Travel Time			
N Lombard Street (914)	14	14	0
Expo Center (960)	18	18	0

Source: Metro, 1999

Note: () indicates Metro Transportation Analysis Zone

3.1.4 Reliability and Operations

The Full-Interstate Alignment Alternative includes the same level of traffic signal priority included in the DEIS alternatives. Light rail trains would preempt traffic at all traffic signals between the

Rose Quarter Transit Center and the Expo Center.

The Full-Interstate Alignment Alternative would operate on the existing cross-mall alignment through downtown Portland. The bus operations on the downtown Portland Transit Mall would be similar to the No-Build Alternative, with a reduction of six buses in the peak hour to/from north Portland.

Reliability and operations impacts do not differ significantly from those identified in the DEIS.

3.1.5 Transit Ridership

The Full-Interstate Alignment Alternative differs from the build alternatives included in the DEIS in that it includes new light rail operations only between downtown Portland (SW 11th Avenue turnaround) and the Expo Center in north Portland. Because this is a north Portland alternative, the ridership data reflect only transit improvements in the north portion of the corridor.

Table 3.1-3 shows the total 2015 average weekday transit ridership for all bus and light rail trips produced in or attracted to the corridor. Trips totally contained within downtown Portland's free-fare zone are not included in these numbers. The data shows that the Full-Interstate Alignment Alternative would generate total corridor transit ridership of 130,400 per average weekday, a 4% increase over the No-Build Alternative, for a total of 4,500 new riders.

**Table 3.1-3
Year 2015 Average Weekday Total Systemwide and Corridor Transit Trips¹**

	Existing	No-Build	Full-Length	Full-Interstate
Total Corridor Transit Trips (originating rides)	78,400	125,900	163,700	130,400
% Change from Existing	N/A	+61%	+109%	+66%
% Change from No-Build	N/A	N/A	+30%	+4%
Total Systemwide Transit Trips	178,000	306,100	345,500	310,500

Source: Metro, 1997/1999.

¹ Transit Trips are one-way, linked trips. A person traveling from home to work and back counts as two trips.

Total Transit Trips include all LRT and Bus intra-corridor, CBD, and Eastside and Westside trips produced in or attracted to the South/North Corridor. Intra CBD trips are not included.

The increase in transit ridership with the Full-Interstate Alignment Alternative compared with the No-Build Alternative stems from two main sources; the Clark County/Hayden Island trips attracted to the Expo Center Park-and-Ride Lot and additional north Portland trips that are attracted due to the improved headways and improved travel time that would be available with the Full-Interstate Alignment Alternative.

Table 3.1-4 shows the projected 2015 light rail ridership for the Eastside/Westside MAX line and for the Full-Interstate Alignment Alternative. The table also includes the peak load point for the Full-Interstate Alignment Alternative.

**Table 3.1-4
Year 2015 LRT Ridership**

	No-Build	Full- Interstate
Average Weekday LRT Ridership		
North Corridor Light Rail	N/A	14,100
Eastside/Westside MAX	73,100	73,700
P.M. Peak-Hour, Peak Direction, Peak-Load Point ¹		
North Corridor Light Rail	N/A	1,130

Source: Metro, 1997/1999.

¹ Located north of the Rose Quarter Transit Center.

3.2 Traffic Impacts

3.2.1 Existing Conditions

I-5 is the major regional highway serving this portion of the corridor. P.M. peak hour, northbound auto volumes in the north Portland portion of I-5 are as high as 5,500 vehicles, with the a.m. peak hour southbound volumes as high as 6,500. The average peak hour speeds on this portion of I-5 are as low as 24 miles per hour.

The key north to south local streets in this portion of the corridor are N Denver Avenue, N Greeley Avenue, N Interstate Avenue, N Albina Avenue, the N Vancouver/Williams Avenue couplet and NE Martin Luther King Jr. Boulevard. The key east to west streets are N Skidmore Street, N Going Street, N Killingsworth Street, N Portland Boulevard, N Lombard Street, N Columbia Boulevard and N Marine Drive.

The existing intersection level of service is described in Table 3.2-1. A detailed description of existing highway and local street system is available in Section 3.2.3 of the DEIS.

3.2.2 Systemwide Impacts

The Full-Interstate Alignment Alternative would not have significant negative impacts to the regional highway system.

3.2.3 Local Impacts

This section describes the impacts of the Full-Interstate Alignment Alternative on the local street system. The focus of the analysis for this SDEIS is on the area between the SW 11th Avenue Turnaround in downtown Portland and the Expo Center adjacent to N Marine Drive. This analysis includes a discussion of traffic issues related to increased headways on the Eastside/Westside MAX alignment in downtown Portland (in the area not covered in the DEIS), level-of-service analysis at nine intersections, a description of traffic diversion related to a narrower cross section for N Interstate Avenue and a discussion of the traffic impacts of the pedestrian activated signals at several crossing locations.

With reduced capacity and the associated traffic diversion, N Interstate Avenue would no longer accommodate a significant amount of through automobile traffic. The impact of a reduced traffic carrying function of N Interstate Avenue is described in part in the Interstate Avenue Traffic Diversion section. Additional impacts associated with a reduced traffic carrying function of N Interstate Avenue will be addressed in the FEIS.

Downtown Portland

The DEIS analyzed the traffic impacts of operating light rail along the 1st Avenue and Yamhill/Morrison alignment in downtown Portland with up to 21 trains per hour in each direction as part of the Half Mall Alternative. The DEIS presented analysis of the Half Mall Alternative which included operating South/North light rail on SW Morrison Street from SW 1st Avenue to SW 5th Avenue and on SW Yamhill Street from SW 6th Avenue to SW 1st Avenue. The portion of SW Morrison Street between SW 5th Avenue and the SW 11th Avenue Turnaround and on SW Yamhill Street between SW 6th Avenue and the SW 11th Avenue Turnaround was not included in the DEIS analysis.

The major traffic issues in the area west of SW 5th/6th Avenues are left turns across the light rail tracks at major cross streets such as SW Broadway at SW Morrison Street, SW 11th at SW Morrison Street and SW 10th at SW Yamhill Street. The left turn situation at these locations is similar to the intersection of SW 4th Avenue at SW Yamhill Street that was analyzed in the DEIS. However, the p.m. peak hour auto volumes at this intersection are generally higher than at the locations west of SW 5th/6th Avenues.

The DEIS identified increased risk of queue spillback on both SW 4th Avenue and SW Yamhill Street with an increase from 11 to 21 trains per hour. The DEIS identified a package of three potential mitigation strategies that would reduce the queue spillback problem.

Queuing concerns due to left turns on SW Morrison/SW Yamhill west of SW 5th/6th Avenues with the Full-Interstate Alignment Alternative are likely to be less significant than the SW 4th Avenue at SW Yamhill Street queuing discussed in the DEIS. This is due to the following:

- The Full-Interstate Alignment would have two fewer trains per hour than the DEIS Half Mall Alternative (19 compared to 21). The cumulative impact of the Full-Interstate Alternative and Airport LRT would result in a net increase of two trains per peak hour compared to the Half Mall Alternative,
- The pedestrian volumes are likely to be lower at the new intersections than at SW 4th at Yamhill, and
- The South/North trains with the Half Mall Alternative would turn from SW 6th Avenue onto SW Yamhill Street. This turning move would contribute to the queuing problems at SW 4th Avenue and SW Yamhill Street.

The FEIS will examine the sensitivity of traffic operations in downtown Portland to varying levels of

light rail headways. If left turn or queuing problems are identified at intersections during the FEIS analysis, mitigation strategies similar to those identified in the DEIS for the SW 4th Avenue at SW Yamhill Street intersection could be implemented.

In addition to the increase in light rail trains described in the DEIS and this SDEIS, Tri-Met is also planning to operate service between the Gateway Transit Center and Portland International Airport. Tri-Met is currently considering two possible operating scenarios for the airport line; a shuttle operation between Gateway and the airport, or service routed through downtown Portland.

If the through-routed concept is implemented, it would add four additional one-car trains along the common alignment between the Rose Quarter Transit Center and the SW 11th Avenue Turnaround. Those four trains, coupled with the Full-Interstate Alignment Alternative, would result in 23 trains per hour operating on the cross mall alignment. This would be two more trains than the 21 trains per hour analyzed with the DEIS Half Mall Alternative. The FEIS will include an analysis of the cumulative impacts on traffic and transit operations of operating 23 trains per hour along the cross-mall alignment.

Intersection Level-of-Service Analysis

Table 3.2-1 summarizes the 2015 level-of-service analysis of nine key intersections in north Portland. The nine intersections include five not analyzed in the DEIS and four that have been re-analyzed due to changes to the intersection geometry.

**Table 3.2-1
2015 P.M. Peak Hour Intersection Level of Service**

Intersection	Status ¹	Existing	No-Build Alternative	Full-Interstate Alternative
N Interstate Ave. at N Multnomah St.	Reconfigured	D	E	D
N Interstate Ave. at N Larrabee St.	New	C	C	B
N Interstate Ave. at N Tillamook/Overcrossing	New	A	C	C
N Interstate Ave. at N Russell St.	New	B	D	D
N Interstate Ave. at N Greeley Ave.	New	B	A	B
N Interstate Ave. at N Going St.	Reconfigured	F	F	F
N Interstate Ave. at N Lombard St.	Reconfigured	F	F	F
N Interstate Ave. at N Argyle/Denver	Reconfigured	C	F	F
N Marine Dr. at Expo Center P&R access	New	NA	NA	C
N Marine Dr. at I-5 Ramps	New	C	F	F

Source: *South/North Local and Systemwide Traffic Impacts Results Report* (Metro: February 1998); and Parametrix/HNTB (1999).

¹ Reconfigured refers to intersections that were analyzed in the DEIS and that have changes in geometry with the Full-Interstate Alignment. New refers to intersections not analyzed in the DEIS.

This level of service analysis is based on a traffic reassignment that reflects the impact of traffic diversions off of N Interstate Avenue. The level of the diversion with the Full-Interstate Alignment Alternative is generally greater than the diversion included in the analysis of the DEIS Interstate Avenue Alternative. The traffic assignments also include the reduction in through travel lanes along

N Interstate Avenue between the Rose Quarter and N Overlook Boulevard. This reduction in capacity and through trips reinforces the "main street" character of N Interstate Avenue as envisioned by the city of Portland, as opposed to its current function as a major traffic street.

The intersection of N Interstate Avenue at N Multnomah Street would be reconfigured compared to the design studied in the DEIS. As a result of the reconfiguration and the reduced traffic volumes, the level of service at this intersection would improve to a LOS D compared to a LOS E with either the No-Build Alternative or the DEIS Interstate Avenue Alternative.

The reduced through volumes on N Interstate Avenue would also result in an improved level of service at N Interstate Avenue at N Larrabee compared with the No-Build Alternative. The intersections of N Interstate Avenue at N Tillamook Street/Albina Overcrossing, N Interstate Avenue at N Russell Street and N Interstate Avenue at N Greeley Avenue would perform at an acceptable level of service.

The intersection of N Interstate Avenue at N Going Street would operate at a LOS F with a v/c ratio of 1.40 with the No-Build Alternative. Due to the reduced volumes on N Interstate Avenue, the Full-Interstate Alignment Alternative would operate at LOS F with a v/c ratio of 1.19. While the overall intersection performance would improve, the eastbound and westbound through movements on N Going Street would operate at a worse v/c ratio than with the No-Build Alternative.

The intersection of N Interstate Avenue at N Lombard Street would operate at a LOS F with a v/c ratio of 1.24 with the No-Build Alternative. Due to the reduced volumes on N Interstate Avenue, the Full-Interstate Alignment Alternative would operate at LOS F with a v/c ratio of 1.14. While the overall intersection performance would improve, the eastbound through movements on N Lombard Street would operate at a worse v/c ratio than with the No-Build Alternative.

At the intersection of N Interstate Avenue at N Denver Avenue/N Argyle Street the Full-Interstate Alignment Alternative would allow the northbound N Interstate Avenue to N Denver Avenue movement to continue during the passage of a train (this was not the case with the DEIS Interstate Avenue Alternative). This helps the Full-Interstate Alignment Alternative to achieve an improved v/c ratio (.89) compared to the No-Build v/c ratio (1.69); however, the intersection remains at LOS F with either alternative. The northbound N Denver Avenue approach volumes are approximately 100 vehicles per hour higher with the Full-Interstate Alignment Alternative than with the No-Build Alternative due to traffic diverted off of N Interstate Avenue. The FEIS will examine the potential for traffic diverting off of northbound N Denver Avenue and onto neighborhood streets in order to avoid delays at the intersection.

Approximately 190 cars per hour would exit the park-and-ride lot at the Expo Center in the p.m. peak hour, primarily destined for I-5 northbound. The intersection that provides access off of N Marine Drive in and out of the Expo Center Park-and-Ride lot would operate at LOS C. The intersection of N Marine Drive at the northbound I-5 on-ramp would operate at a LOS F with the No-Build Alternative due to vehicles queuing back from the freeway ramp meter. The vehicles exiting the park-and-ride would exacerbate this problem. Additional analysis of impacts to this intersection will be prepared for the FEIS, and mitigation strategies will be coordinated with the

assessment of the corridor facility needs included as part of the I-5 Trade Corridor Study managed by ODOT.

From the Rose Quarter through to N Overlook Boulevard, with some trips diverted off of N Interstate Avenue, adequate intersection capacity would be provided. The intersection levels of service in this segment generally improve with the Full-Interstate Alignment Alternative compared with the No-Build Alternative. This level of service analysis assumed full traffic signal preemption for light rail operations on N Interstate Avenue.

Light rail trains preempting signal operations would tend to increase green time for northbound and southbound through traffic on N Interstate Avenue. The signal preemption would have two impacts, one would be to lessen the green time available for east/west travel and the second would be that, coupled with the pedestrian activated signals, the signal preemption would disrupt the north/south progression on N Interstate Avenue. The FEIS will consider appropriate traffic mitigation measures, including traffic management strategies, intersection improvements and evaluation of N Interstate Avenue's function and classification.

Interstate Avenue Traffic Diversion

The diversion of traffic off of N Interstate Avenue as a result of reduced capacity was assessed as part of the DEIS Interstate Avenue Alternative analysis and was described in Section 5.10 of the *Local and Systemwide Traffic Impacts Results Report* (Metro: February 1998). This SDEIS includes a reassessment of the issue due to three changed conditions:

- With the DEIS Interstate Avenue Alternative the capacity reduction from two through lanes in each direction to one through traffic lane in each direction included only the area between N Overlook Boulevard and Kenton. This analysis also includes the capacity reduction in the segment between the Rose Quarter and N Overlook Boulevard.
- The northbound and southbound approaches of N Interstate Avenue at N Going Street and at N Lombard Street have been reduced from two through lanes in each direction to one through lane in each direction.
- Pedestrian activated crossing signals have been included instead of the unsignalized "Z" crossings included in the DEIS design.

These changes were incorporated into this analysis of the Full-Interstate Alignment and as a result the findings as shown in Table 3.2-2 are somewhat different from in the DEIS analysis.

As a result of the decreased capacity on N Interstate Avenue, the parallel street system would experience increases in peak hour volumes. On N Denver Avenue, west of N Interstate Avenue, p.m. peak hour traffic volumes are forecast to increase by 58% to 490 vehicles per hour. On N Albina Avenue, east of N Interstate Avenue, p.m. peak hour traffic volumes are forecast to increase by 33% to 570 vehicles per hour.

**Table 3.2-2
Comparison of Selected North/South Screenline Volumes at N Portland Boulevard ¹
2015 P.M. Peak Hour**

Street or Highway	No-Build Alternative 2-Way Volume (vph)	DEIS Interstate Avenue Alignment 2-Way Volume (vph)	Full-Interstate Avenue Alignment 2-Way Volume (vph)	Change from the No-Build to the Full-Interstate
Greeley Avenue	400	400	500	+100
Denver Avenue	310	380	490	+180
Interstate Avenue	2,300	1,400	1,150	-1,150
I-5	9,900	10,100	10,000	+100
Albina Avenue	430	470	570	+140
Vancouver Avenue	640	630	700	+60
MLK Jr Boulevard	1,780	1,810	1,810	+30
Total Across Screenline	15,760	15,190	15,220	

Source: Metro & City of Portland EMME/2 assignments, 1996/1999.

¹ Approximately 540 P.M. peak hour trips would be diverted to facilities outside of the immediate corridor area.

Approximately 500 trips are diverted out of the corridor and onto a variety of different facilities, such as NE 33rd Avenue, NE Sandy Boulevard and on I-84 and I-205. Many of these are trips from central Portland or points south destined to the NE Columbia Boulevard/NE Lombard corridor.

Signalized Pedestrian Crossings

The Full-Interstate Alignment Alternative includes seven pedestrian activated signal crossings of N Interstate Avenue, between the N Tillamook Street and N Lombard Street. The DEIS provided for pedestrian crossings with unsignalized "Z" crossings. This analysis provides an assessment of the function and safety of the signalized crossings for pedestrians and the impact of the pedestrian activated signals on traffic progression.

A series of signalized pedestrian crossings such as those defined in the Full-Interstate Alignment plan sheets, would need to be interconnected with the traffic signal system. Even if they were interconnected with both the traffic signals and the light rail signals, these pedestrian crossings could act as a series of closely spaced traffic signals and impact vehicular progression.

Low pedestrian volumes at some of the crossing locations could lead to safety concerns based on motorists' lack of attention due to infrequent signal utilization. Another safety concern would be that an interconnected system could lead to long pedestrian waits, resulting in a high level of signal violations.

It is not anticipated that the proposed pedestrian crossing locations would meet *Manual of Uniform Traffic Control Devices* (MUTCD) warrant #3 (minimum pedestrian volumes) for installation of a pedestrian signal crossing.

Parking

The DEIS identified an existing parking supply on N Interstate Avenue (between N Overlook Boulevard and N Denver Avenue) and on adjacent block faces of approximately 775 spaces, with

approximately 360 of those spaces located directly on N Interstate Avenue. The DEIS Interstate Avenue design would displace approximately 93 spaces or 12% of the available on-street parking on, or within one block of N Interstate Avenue, while the Full-Interstate Alignment would displace approximately 110 spaces, or 14% of the available on-street parking.

3.3 Freight Access

There are four locations where the Full-Interstate Alignment Alternative could impact freight movements; in the Lower Albina Industrial Area, the Swan Island Industrial area at the intersection of N Interstate Avenue and N Going Street, at the N Columbia Boulevard industrial area in the vicinity of the intersection of N Interstate Avenue at N Argyle and N Denver Avenue, and at the park-and-ride access location on N Marine Drive.

With the implementation of the City of Portland's Albina Overcrossing Project, truck access into the Lower Albina Industrial Area west of N Interstate Avenue would change. At-grade rail crossings at N Albina Avenue, N Lewis Avenue, N Clark Avenue and N Harding Avenue would be closed and direct access to industrial uses west of the freight rail line would be provided exclusively via the new overcrossing. If the Albina Overcrossing Project were to be constructed, the northbound to westbound and southbound to westbound access into this area would be similar with a No-Build Alternative or with the Full-Interstate Alignment Alternative.

Access into Union Pacific's Albina Yard would be provided with a northbound left turn to N Knott Street and with southbound right turns at both N Knott Street and N Russell Street. The northbound to eastbound truck access into the Albina Industrial District east of N Interstate Avenue would be the same as existing. Southbound left turn access would be restricted at some existing locations, with left turn pockets provided at N Russell Street and N Tillamook Street.

The intersection of N Interstate Avenue at N Going Street is forecast to perform at a slightly improved overall level of service with the Full-Interstate Alignment Alternative compared with the No-Build Alternative. However, the eastbound and westbound movements would see some degradation in volume to capacity (v/c) ratios due to light rail train preemption. The FEIS will consider the implications of this intersection to truck routing and access for Swan Island.

The overall function of the intersection at N Interstate Avenue at N Argyle and N Denver Avenue would perform with an improved volume to capacity ratio with the Full-Interstate Alignment Alternative compared with the No-Build Alternative, although both would be at LOS F. Freight access to and from N Columbia Boulevard via N Argyle would be similar to the No-Build Alternative.

Truck access off of the N Denver Avenue viaduct to businesses located between N Columbia Boulevard and the Columbia Slough would be modified. Currently, trucks can access sites both east and west of N Denver Avenue with unsignalized left turns. This access would be signalized and truck access to these sites could continue as it currently exists. This signal would provide a red light to all approaches when a train was present.

N Marine Drive is a major truck route between the Rivergate Industrial Area and I-5. The addition of trips exiting the Expo Center Park-and-Ride lot in the p.m. peak hour would exacerbate the congestion problems at the intersection of N Marine Drive at the I-5 northbound ramps. Mitigation options will be explored in the FEIS.

3.4 Navigable Waterways

The United States Coast Guard (USCG) has jurisdiction over navigable waterways and the construction of a bridge across these waterways would require the USCG approval of a bridge permit under Section 9 of the Rivers and Harbors Act of 1899 and the General Bridge Act of 1946 as amended.

Columbia Slough is a narrow tributary to the Willamette River and located immediately north of the Columbia Boulevard industrial area in north Portland. Columbia Slough flows into the Willamette River at river mile 0.8. There is no official channel within Columbia Slough, nor has it been dredged in this area. Due to the shallow nature of the water, the primary use of the waterway has been recreational.

The segment of Columbia Slough that is within the South/North Corridor is spanned by the existing I-5 bridge at river mile 6.7 and the existing Denver Avenue Viaduct at river mile 7.0. The existing Denver Viaduct has a 66-foot horizontal clearance and a 34-foot Columbia River Datum (CRD) vertical clearance. Federal law would allow the construction of a bridge across Columbia Slough with a horizontal clearance of 80-feet and a vertical clearance of 30-feet CRD.

The proposed crossing of Columbia Slough would result in the replacement of the existing Denver Viaduct with a new combined light rail and automobile vehicle bridge. The determination of whether the existing piers can be reused or if new piers need to be constructed in Columbia Slough will be made in the next phase of Preliminary Engineering and documented in the FEIS. If the deck of the Denver Viaduct can be replaced without the construction of new piers, then the navigational clearances would remain at 66-foot horizontal and 30-foot vertical (CRD). If new piers are required in Columbia Slough, the project would provide an 80-foot horizontal clearance and at least 30-feet (CRD) of vertical clearance. The replacement of a bridge deck or bridge that would provide an 80-foot horizontal and 30-foot vertical clearance may not require the issuance of a bridge permit by the US Coast Guard. However, a narrower vertical or horizontal clearance would require the issuance of a bridge permit by the US Coast Guard.

4. Environmental Impacts

This chapter discusses the potential significant impacts of the new Full-Interstate Alignment Alternative on the built and natural environments.

4.1 Land Use and Economic Development

The DEIS contains analysis of several land use and economic related issues including:

- compatibility with the adopted comprehensive plans,
- existing and projected population and employment in proposed station areas,
- existing and planned land uses in proposed station areas,
- vacant and redevelopable land in proposed station areas,
- long-term and short-term effects on employment, and
- impacts on the local tax base due to public property acquisition.

At the regional level, the land use and economic impacts with the new Full-Interstate Alignment Alternative would be similar to or less than those identified in the DEIS. For example, a smaller and less expensive project would have less short-term (construction) employment than the Full-Length Alternative as defined in the DEIS.

The primary location where the land use and economic effects of the new Full-Interstate Alignment Alternative would be different from the impacts previously disclosed in the DEIS are in the segment between the Rose Quarter Transit Center and the Kaiser Medical Center. The impacts of the new alternative in this segment are discussed below.

4.1.1 Changes to the Affected Environment

Changes to the affected environment with the new Full-Interstate Alignment Alternative would be limited to the area between the Rose Quarter Transit Center and the Kaiser Medical Center. In this area, the new Full-Interstate Alignment Alternative would include one light rail station rather than two, as with the Eliot Segment Alternatives evaluated in the DEIS.

4.1.2 Impacts to Land Use and Economic Development

The City of Portland's adopted *Albina Community Plan* shows two light rail alignments. One of the two alignments in the plan follows N Interstate Avenue from the Rose Quarter Transit Center north, along Interstate Avenue, essentially on the same alignment as the new Full-Interstate Alignment Alternative. The proposed station locations are also similar to the station locations shown in the plan. The proposed new alternative and station locations would therefore be compatible with the adopted *Albina Community Plan*. If the LPS were to be amended to incorporate the proposed new alignment, the LUFO would also need to be amended to incorporate the new alignment between the Rose Quarter Transit Center and N Lombard Street.

The new Full-Interstate Alignment Alternative would have a single station in the Eliot Segment,

whereas both the previously studied DEIS alternatives and the LPS alignment proposed two stations between the Rose Quarter Transit Center and the Edgar Kaiser Medical Facility. The reduction in the number of stations means that there would be less land area served by light rail stations in the Eliot Segment than with the DEIS alternatives.

As a result of one less light rail station proposed in this segment with the new Full-Interstate Avenue Alignment Alternative than with either of the DEIS Eliot Segment Alternatives or the adopted Locally Preferred Strategy, there would be less population and employment (existing and projected) within one-quarter mile of the proposed stations. The land uses that would be served (existing and proposed) would also be different with the new Full-Interstate Alignment Alternative. The quarter mile station area associated with the Russell Street light rail station would serve primarily industrial uses, whereas the station areas associated with the DEIS alignments would serve a broader mix of existing and planned uses. Also, because there would be one less station with the new Full-Interstate Alignment Alternative, there would be less vacant and redevelopable land within one-quarter mile of the light rail stations with the new Full-Interstate Alignment Alternative.

Employment generated through construction of the light rail facilities was evaluated in the DEIS for the various length alternatives. In general, because short-term employment (from construction) is estimated using the Capital Cost Estimates, and because the new Full-Interstate Alignment Alternative would be a lower cost and smaller project than the Full-Length or other Minimum Operable Segments (MOSs) evaluated in the DEIS, there would be less short-term (construction) employment if the new Full-Interstate Alignment Alternative were constructed. Long-term employment (operations) from the light rail project would also be less with the new Full-Interstate Alignment Alternative than with the other DEIS alternatives because it would be a smaller project from the operational perspective as well.

With the new Full-Interstate Alternative, impacts to local tax bases from property acquisition would be reduced significantly, because the alignment would be within existing right-of-way and would not require public acquisition (by Tri-Met) of private land. Therefore, the new alternative would not remove significant existing properties from the tax base in the north corridor study area.

4.2 Displacements and Social and Neighborhood Impacts

This section summarizes differences in social and neighborhood impacts and displacements with the new Full-Interstate Alignment Alternative compared to the other alternatives previously studied in the DEIS. The Full-Interstate Alignment Alternative would serve the same neighborhoods that would be served by the DEIS Alternatives. The difference in the location of the new alignment occurs in the Lloyd District and Eliot neighborhoods, where the proposed alignment would travel on Interstate Avenue. The new alternative would result in differences in access to facilities, traffic impacts, and displacements.

The Full-Interstate Alignment Alternative would result in zero displacements anywhere along the alignment. Segments are discussed below along with the number of avoided displacements. In the Lloyd and Eliot Neighborhoods, the Full-Interstate Alignment Alternative would have no impacts compared to as many as 39 total displacements with the other alignment alternatives.

In the Lloyd Neighborhood, the new Full-Interstate Alignment Alternative would provide somewhat less access to regional facilities compared to the other light rail alternatives studied in the DEIS. This is a result of not locating a station at N Broadway/Weidler to the north of the Rose Garden Arena. There would also be significantly fewer traffic impacts as a result of avoiding an at-grade crossing of N Broadway/Weidler Streets.

In the Eliot Neighborhood, the Full-Interstate Alignment Alternative would more directly serve the Albina Industrial District along N Interstate Avenue than the residential portion of the neighborhood. A proposed station at N Russell Street would provide less direct access to the residential portion of the Eliot Neighborhood, Emanuel Hospital and Harriet Tubman Middle School than either of the other alignment alternatives studied in the DEIS. Some traffic impacts could occur in the Albina Industrial District, particularly for freight being delivered to the industrial businesses adjacent to N Interstate Avenue.

In the segment between the Edgar Kaiser Medical Center and Kenton, the new Full-Interstate Alignment Alternative would be very similar to the design of the DEIS Interstate Avenue Alternative. Social and neighborhood impacts would be very similar to those identified in the DEIS with the Interstate Avenue Alternative with the significant exception of no displacements. Up to 109 potential displacements would have occurred with the alignments previously studied in the DEIS. The Full-Interstate Alignment Alternative would create no displacements along the entire length and therefore would incur no displacements in the Overlook, Arbor Lodge or Kenton neighborhoods.

The Full-Interstate Alignment Alternative would significantly reduce impacts to north Portland neighborhood quality, when compared to the light rail alternatives studied in the DEIS. In addition to the reduction in displacements as a result of the new design, the new design would reduce the number of turn lanes at major intersections. This would result in some traffic impacts, as more fully described in Chapter 3. A few additional noise and vibration impacts would occur with the new design at buildings that were identified as potential displacements with the DEIS Interstate Avenue Alignment Alternative. The new Full-Interstate Alignment Alternative would include signalized pedestrian crossings. Pedestrian crossings were defined as "Z" crossings in the DEIS Interstate Avenue design. The pedestrian crossings would improve the local access across North Interstate Avenue at locations other than major intersections. The track treatment with the new Full-Interstate Alignment Alternative is proposed to be tie and ballast, which could affect the visual quality in Overlook, Arbor Lodge and Kenton neighborhoods.

The new Full-Interstate Alignment Alternative would avoid potential business displacements in the north end of the Kenton Neighborhood because it would be located on a rebuilt Denver viaduct rather than along the east side of the Denver viaduct as studied in the DEIS.

4.3 Visual Impacts

For the area between the Rose Quarter Transit Center and the Edgar Kaiser Medical Facility, the new Full-Interstate Alignment Alternative would have low visual changes because of the industrial nature of the adjacent land uses, the absence of displacements and the location of the trackway within the N Interstate Avenue right-of-way.

In the segment between the Kaiser Medical Facility and Kenton, the change from paved track to tie-and-ballast is the most significant visual change. Many of the impacts identified in the DEIS for the Interstate Avenue Alternative would also occur with the Full-Interstate Alignment Alternative. However the new design would remove fewer large street trees, no buildings (because there would be no displacements). This alternative would also reduce the visual separation created by the LRT trackway, because the improvements would be contained within the existing right-of-way. The visual simulation shown in Appendix B illustrates the design of the new Full-Interstate Alignment Alternative along Interstate Avenue at the N Dekum Street intersection.

4.4 Air Quality Impacts

This section describes the regional and local air quality impacts of the Full-Interstate Alignment Alternative. Regional impacts to air quality are measured through forecast changes to the following emissions: nitrogen oxides, nonmethane hydrocarbons, and carbon monoxide (CO). The DEIS found that all of the light rail length alternatives would result in a slight improvement over the No-Build Alternative in regional air quality measures due primarily to reduced automobile usage.

As noted in Section 3.1 (Table 3.1-1) of this SDEIS, total regional transit ridership would increase with the Full-Interstate Alignment Alternative compared with the No-Build Alternative which would result in fewer automobile vehicle miles of travel (VMT). With less automobile VMT, the regional air quality impacts of this alternative would be less than that of the No-Build Alternative.

The local air quality impacts are measured by the concentration of CO near intersections that would experience improvements or degradation in traffic congestion as a result of the light rail alternatives. The DEIS measured changes to CO concentrations at 22 intersections throughout the corridor and found that the light rail alternatives would have generally the same CO concentrations as the No-Build Alternative at most intersections.

Three of the intersections measured for CO are within the Full-Interstate Alignment Alternative, N Interstate Avenue at N Going Street, N Interstate Avenue at N Alberta Street and N Interstate Avenue at N Lombard Street. The DEIS found no substantial change in the CO concentrations at these locations.

The Full-Interstate Alignment Alternative includes geometric changes at two of the north Portland intersections, N Interstate Avenue at N Going Street and N Interstate Avenue at N Lombard Street. Based on the traffic analysis and potential mitigation measures identified in this SDEIS it is possible that the geometry of these two intersections will change again prior to an FEIS. A CO analysis will be prepared based on a fully mitigated design at these two intersections in the FEIS.

4.5 Noise and Vibration Impacts

This section describes the potential noise and vibration impacts from light rail and bus operations and from traffic that result from modification of roadways with the Full-Interstate Alignment Alternative. This analysis uses the same methodology and ambient noise measurements as described in the *South/North Noise and Vibration Result Report* (Metro: February 1998) and in the DEIS.

4.5.1 Existing Noise Conditions

This section describes the existing ambient noise levels as measured in the Spring of 1997. Measurements were taken at 78 locations along the South/North Corridor and 19 of these locations are in north Portland. The locations and ambient measurements are shown in Section 3.6.3 of the DEIS. The ambient measurements indicate that the areas adjacent to N Interstate Avenue and I-5 have high ambient noise related to traffic. The ambient noise measurements range from 62 A-weighted decibels (dBA) to 71 dBA with the average being approximately 65-66 dBA.

The State of Oregon adopted a traffic noise impact standard 65 dBA that is two decibels less than the Federal Highway Administration's traffic noise impact standard (67 dBA). Based on the ODOT standards and the ambient measurements, many of the residential properties that are on N Interstate Avenue currently are at, or exceed ODOT's impact criteria.

Interstate Avenue currently has two lanes of traffic in each direction and has p.m. peak hour traffic volumes of 1,400. The traffic along N Interstate Avenue also includes a high percentage of truck traffic that access the industrial areas in Swan Island and the Columbia Corridor.

4.5.2 Project Impacts

The Full-Interstate Alignment Alternative would result in nine additional traffic noise impacts, one additional light rail wheel squeal impact and two more vibration impacts than the DEIS Interstate Avenue Alternative for the area between the Rose Quarter Transit Center and the Expo Center. Differences between the two alignments are shown in Table 4.5-1 and discussed in more detail below.

**Table 4.5-1
Summary of Noise Impacts in North Portland**

	Traffic Noise	Light Rail Noise	Light Rail Wheel Squeal	Light Rail Vibration
DEIS Interstate Avenue Alternative	118	2	0	26
Full-Interstate Avenue Alternative	127	2	1	28

Metro: April 1999

4.5.2.1 Traffic Noise Impacts.

This section describes the traffic related noise impacts from the Full-Interstate Alignment Alternative. The Full-Interstate Alignment Alternative would result in a reconfigured N Interstate Avenue to a single lane of through traffic in each direction. Traffic projections for the year 2015 indicate that about 1,150 vehicles would use N Interstate Avenue during the p.m. peak hour with the Full-Interstate Alignment Alternative, compared to 2,300 vehicles with the No-Build Alternative. This slight decrease is the result of less through traffic capacity on N Interstate Avenue compared to

base year volumes.

The Full-Interstate Alignment Alternative would modify the alignment of N Interstate Avenue by generally moving traffic lanes approximately 10-feet closer to residential units compared to the existing conditions. This reduction in distance between the automobile lane and homes would result in a slight increase in traffic noise on N Interstate Avenue. This increase of one to two decibels would be barely perceptible to a person with average hearing. Since most of these homes are considered to have a traffic noise impact under the existing and no-build scenarios, and since the project would result in moving the road slightly closer to impacted receptors, the Full-Interstate Alignment Alternative would result in traffic noise impacts similar to the Interstate Avenue Alternative in the DEIS.

The Full-Interstate Alignment Alternative alignment would have very similar traffic noise impacts compared to the impacts associated with the Interstate Avenue Alignment. In comparison to the Interstate Avenue Alignment described in the DEIS, the Full-Interstate alignment would result in eight additional multi-family buildings and one park being impacted by traffic noise. The change in traffic noise impacts is the result of residential buildings that were considered displaced with earlier designs that would be retained and subject to road noise under the new design. Some areas would have fewer impacts due to the retention of buildings on N Interstate Avenue that would provide noise shielding.

The difference in traffic noise impacts between the Full-Interstate Alignment Alternative and the DEIS Interstate Avenue Alignment are described below.

Between the **Rose Quarter and Kaiser** no traffic noise impacts are anticipated due to the lack of residential units. This area is primarily an industrial district with high existing noise levels, but no sensitive noise receptors.

Between **Kaiser and N Going Street**, Overlook Park has an existing ambient noise level of 68 dBA, and would be considered impacted because the traffic lane would be located closer to the park. No active or passive uses occur in the area of the park and increased noise levels of one to two dBA would not deter any use of the park. Four fewer single-family homes would be impacted due to buildings that would be retained with the Full-Interstate Alignment Alternative. All the buildings retained in this area are commercial and would not be impacted by traffic noise.

North of **N Going Street and South of Killingsworth**, two additional multi-family units that are retained with the Full-Interstate Alignment Alternative would have a projected noise level of approximately 70 dBA and would be experience traffic noise impacts. Four single-family units would be protected from traffic noise impacts by commercial buildings that are retained with the new design.

Between **N Killingsworth Street and N Portland Boulevard**, a newly constructed multi-family building would have a projected noise level of 69 dBA and would be considered impacted by traffic noise. Two newly constructed single-family units just south of N Portland Boulevard, would have projected noise levels of 70 dBA and would also be impacted. The retention of commercial

structures at the corner of N Interstate Avenue and N Killingsworth Street would result in two fewer single-family traffic noise impacts.

Design modifications that retain buildings would add two single-family and four multi-family traffic noise impacts between **N Portland Boulevard and N Lombard Street**.

North of N Lombard Street, five multi-family and two single-family units that would have been displaced with previous designs, but are retained with the Full-Interstate Alignment Alternative would have projected traffic noise levels in the range of 65 to 69 dBA and would be considered impacted by traffic noise.

Mitigation for traffic noise impacts typically includes noise barriers and street realignment. Neither of these methods is considered practical for N Interstate Avenue. Noise barriers are ineffective with gaps in the wall that would be required to access properties off of N Interstate. Furthermore, noise walls would not fit with the urban character of the area.

ODOT's standards are based on the noise generated by the peak traffic hour. Nighttime noise levels would be considerably lower, between 50 and 55 dBA (exterior) after 10:00 p.m. The interior noise levels in homes would comply with the Federal Housing and Urban Development criterion of 45 dBA for residential sleeping quarters.

The projected noise increase along N Interstate Avenue would be less than three decibels in all but a few locations. Human hearing typically cannot perceive a change of less than three dBA in broadband noise such as traffic noise. No mitigation for traffic noise impacts is proposed at this time because:

- These traffic noise impacts occur under existing conditions. At 106 of the 127 impacted receivers, current noise levels exceed the ODOT traffic noise impact criteria,
- Future projected levels are barely over State of Oregon Guidelines,
- No practical and reasonable noise mitigation (i.e. noise walls) could be implemented where the impacts would occur, and
- The Full-Interstate Alignment Alternative would result in lower impacts than the No-Build Alternative.

The FEIS will investigate traffic noise impacts in greater detail and continue to explore effective mitigation measures.

4.5.2.2 Light Rail Noise

The Full-Interstate Alignment Alternative would result in two new light rail noise impacts. These impacts would be associated with special trackwork (i.e. track turnouts or switches) necessary for efficient train operations. These impacts would be the same as those identified for the DEIS Interstate Avenue Alignment. These impacts could be mitigated by using special track work that reduces the noise when a train wheel crosses over a track switch or by moving the locations of the

switches to an area with fewer sensitive receptors.

4.5.2.3 Light Rail Wheel Squeal

Wheel squeal noise is generated by the interaction of the train wheels and track as a train traverses a curve. The occurrence and volume of wheel squeal depends on many factors, including the material composition of the rail and wheel, lubrication between wheel and rail contact, the sharpness of the curve and the wheel profile. Based on review of the Eastside/Westside light rail alignment, curves with a radius less than 400-feet have a high potential for wheel squeals.

The Full-Interstate Alignment Alternative would result in two curves with less than a 400-foot radius located between N Mason and N Skidmore Streets. These curves would include a 300-foot radius and could potentially result in one light rail wheel squeal impact to a residential unit. The potential mitigation of wheel squeal impact includes lubrication of the wheel flange and track with water or other materials, de-tune or modify the wheel or rail by introducing different materials in the track and wheel so that they emit a less pure tone, or by grinding either the wheel or rail to modify the profile between the wheel rail interface.

4.5.2.4 Light Rail Vibration

The Full-Interstate Alignment would result in 28 total light rail vibration impacts, two more than the DEIS Interstate Avenue Alternative. These impacts could be mitigated with spring loaded frogs to reduce vibration produced by switches or by moving these switches and using ballast mats to dampen vibration. The location of switches and use of ballast mats will be further investigated in Preliminary Engineering and reported in the FEIS.

4.6 Ecosystems Impacts

4.6.1 Affected Environment

The area between the Rose Garden and Kenton is highly urbanized and includes commercial, residential and industrial land uses with very little vegetation or natural habitat. Columbia Slough and a few isolated wetland areas are located north of Kenton.

4.6.2 Environmental Impacts

The ecosystem impacts associated with the Full-Interstate Alignment Alternative would be almost identical to those of the Interstate Avenue Alignment Alternative ecosystem impacts as disclosed in the DEIS. Both alignment alternatives would result in 0.93 acres of fill in wooded wetland "K" located just south of the Expo Center and east of N Expo Road. For specific information, refer to the *Ecosystems Impacts Results Report*, (Metro: February 1998) and the *Wetland Determination and Delineation Report*, (Metro: October 1997).

The Full-Interstate Alignment Alternative would result in the replacement of the existing automobile vehicle bridge at the Denver Avenue Viaduct with a new combined automobile and light rail bridge.

A determination of whether the existing bridge deck can be replaced without additional or replacement piers in Columbia Slough has not been made. The location and size of new piers, if any, will be made during the next phase of Preliminary Engineering and documented in the FEIS.

Since Columbia Slough contains habitats suitable for various evolutionary significant units of threatened and endangered steelhead and chinook salmon, the South/North Project will consult with the National Marine Fisheries Service (NMFS) during the Preliminary Engineering and FEIS phase to assess potential impacts of additional piers in Columbia Slough and to determine the appropriate protective measures.

4.6.3 Mitigation

The impacts to Wetland "K", a high-value wooded wetland, could be avoided by realigning N Expo Road and the LRT Alignment to the west, but this would impact approximately 0.3 - 0.9 acres of a lower-ranking wetland. During the Preliminary Engineering Phase and before the publication of the FEIS, alternative alignments in the vicinity of the Expo Center will be further investigated to avoid and minimize impacts to wetlands. The development of these alignment modifications and potential mitigation for impacts will be coordinated with local, state and federal resource agencies.

Potential construction related impacts would be minimized and avoided by the implementation of best management practices (BMP's) and by adherence to the in-stream construction windows for Columbia Slough as determined by the Oregon Department of Fish and Wildlife (ODFW) and the National Marine Fisheries Service (NMFS).

4.7 Water Quality and Hydrology Impacts

The Full-Interstate Alignment Alternative would not result in any significant hydrological, flooding or water quality impacts in north Portland. The potential for piers in Columbia Slough could result in short term construction related impacts that would be minimized through the use of best management practices including adherence to prescribed construction windows. The location and design of these replacement piers will be further investigated during the Preliminary Engineering phase and documented in the FEIS. The Expo Center park-and-ride lot would not result in any additional impervious surface.

4.8 Energy Impacts

The Full-Interstate Alignment Alternative would result in very similar energy impacts as projected to occur with the Interstate Avenue or I-5 Alignment Alternatives disclosed in the Draft Environmental Impact Statement and in the *South/North Energy Impacts Results Report* (Metro: February 1998).

4.9 Geology and Soils

Because the new Full-Interstate Alignment Alternative would be located within existing street right-of-way and at the existing street grade, no new significant geology or soils impacts are expected.

4.10 Hazardous Materials

The DEIS evaluated a range of types of Hazardous Materials sites within 500 feet of the study alternatives. Identification of the types of Hazardous Materials on various parcels was identified through extensive records research. Where property acquisition of a contaminated site would be required, cleanup alternatives were suggested and recommendations for further analysis were made.

Because the new Full-Interstate Alignment Alternative crosses land that has historically been primarily industrial in nature, the potential of hazardous materials sites being located in close proximity to the proposed alignment is high. The new alignment is planned to be almost completely within the existing right-of-way of N Interstate Avenue. Since very little right-of-way acquisition is planned the risk of acquiring contaminated sites is low. If hazardous materials are encountered within the existing N Interstate Avenue right-of-way, impacts would be minimized by following the mitigation measures summarized in Section 5.11.9 of the DEIS.

4.11 Construction Impacts

Construction of the Full-Interstate Alignment Alternative would occur between January 2001 and Fall of 2004.

Impacts to existing traffic resulting from construction of the new Full-Interstate Alignment Alternative would be experienced along N Interstate Avenue and at its major cross streets. Partial lane closures would be required along Interstate Avenue and at cross streets to permit construction of the light rail trackway and reconstruction of the street, as well as modifications to existing intersections. Some temporary traffic diversions into adjacent residential and industrial neighborhoods may occur. The availability of detour routes is limited, particularly south of N Going Street. Traffic intrusion into residential areas may occur near N Lombard Street and in the Kenton business district due to existing, high traffic volumes and anticipated congestion in these locations.

Reconstruction of N Interstate Avenue through the Albina industrial area would cause short-term disruption of truck circulation and access. Local industrial access could be disrupted with reconstruction of the N Denver Avenue viaducts with light rail in the median over N Columbia Boulevard and Columbia Slough. Short-term, off-peak full closures of N Columbia Boulevard would be required to set falsework and/or girders for the structure over this location. In order to maintain local access to industrial properties adjacent to N Denver Avenue during construction, one of the two existing viaducts could be closed to traffic, reconstructed and reopened to traffic before closing the other structure to traffic for reconstruction. Detour routes are available for traffic at most construction locations and on-street parking loss would be minimal. Some impact to the existing Expo Center parking lot may occur and event traffic may require detours.

4.11.1 Construction Impacts to Transit Service

Transit impacts during construction of the new Full-Interstate Alignment Alternative could include service delays, rerouting of service and relocation of bus stops for bus routes using N Interstate and N Denver Avenues. There would also be impacts to East/West MAX operations due to construction

of track connections just east of the Steel Bridge.

4.11.2 Traffic and Transit Mitigation of Construction Impacts

Potential measures to mitigate short-term traffic (and transit) impacts could include but are not limited to the following:

- Develop and maintain a program of coordination and outreach with affected business and community interests to oversee development and implementation of traffic detour and access management plans. The plans would help minimize disruption of pedestrian access and local traffic access and circulation. Where appropriate, plans would also support the maneuvering requirements of large trucks.
- Avoid construction during peak travel periods in the peak direction or in the vicinity of the Rose Quarter and Expo Center during evening events when traffic volumes are significantly higher.
- Where appropriate, develop temporary parking to mitigate loss due to construction staging or work activities.
- As appropriate, implement alternative construction techniques to minimize traffic impacts.

4.11.3 Construction Impacts to Freight Railroads

The reconstruction of the N Denver Avenue viaduct over N Columbia Boulevard and the Union Pacific (UP) Railroad tracks would include temporary structures as required to maintain freight rail service to affected businesses. Construction activities that could potentially disrupt freight rail service would be coordinated with UP and would be timed to avoid critical freight train movements.

4.11.4 Construction Impacts to Navigable Waterways

The short-term impacts to the navigation in the Columbia Slough from the new bridge would include construction activities such as the installation of falsework, overhead gantries, temporary cofferdams and pile driving. These activities could limit vertical and horizontal clearances in the waterways for short periods.

4.11.5 Construction Impacts to Land Use and Economic Development

Potential short-term impacts to land use and economic development would be similar to those discussed in the South/North DEIS for the Interstate Avenue Alignment Alternative.

Regional Impacts Regional employment and income impacts from construction of the new Full-Interstate Alignment would be less than discussed in the South/North DEIS for the Interstate Avenue Alignment Alternative, because it would be a smaller project with less capital cost.

Site Specific Impacts There would be short-term disruption of local access from N Interstate

Avenue to Rose Quarter parking, loading dock and hotel facilities during reconstruction of N Interstate Avenue through the Rose Quarter district. Reconstruction of N Interstate Avenue through the Albina industrial area would cause short-term disruption of truck circulation and access. There would also be temporary disruption of access to North Portland and Kenton neighborhood businesses along N Interstate and N Denver Avenues.

Plans to mitigate short-term impacts to land use and economic development would be developed during preliminary engineering and preparation of the FEIS. The measures could include maintaining access to existing uses wherever possible, implementing access management measures to accommodate movement of large trucks at certain locations, as well as providing visual screening, controlling dust, and advance notification of access or utility service disruption.

4.11.6 Construction Impacts to Neighborhoods

Short-term impacts to neighborhood areas along, and in the vicinity of construction along N Interstate and N Denver Avenues could result from temporary street closures, traffic reroutes and detours which could increase local traffic congestion and impede access to residences and community facilities. Neighborhoods could also be affected by construction-generated noise, vibration and dust, as well as the potential hazards to pedestrians of proximity to construction sites.

Tri-Met would work with representatives of neighborhoods directly affected by construction to identify issues of concern and potential mitigation measures. Measures could include limiting work hours, traffic management, dust and noise control, temporary facilities to maintain pedestrian access and fencing to maintain pedestrian safety.

4.11.7 Noise and Vibration Impacts During Construction

Potential short-term noise and vibration impacts and mitigation for the new Full-Interstate Alignment Alternative would be the same as presented in the DEIS for the Interstate Avenue Alternative, except for the industrial area between the Rose Quarter and Kaiser Medical Facility. In this area construction noise and vibration would generally not be disruptive to the industrial uses in the vicinity of the alignment.

4.11.8 Construction Impacts to Geology and Soils

Potential short-term construction impacts and mitigation related to geology and soils for the new Full-Interstate Alignment Alternative would be the similar to those presented in the South/North DEIS for the Interstate Avenue Alignment Alternative except in the Rose Quarter to Kenton area. No additional geology or soils impacts are anticipated in this area.

4.11.9 Construction Impacts to Water Quality and Hydrology

The potential for construction-related water quality and hydrology impacts for the new Full-Interstate Alignment Alternative would be highest at the site of the proposed reconstruction of the viaduct across Columbia Slough. Soil would be exposed in this location and would require best

management practices (BMPs); e.g., erosion and sediment control. A Biological Assessment (BA) for sensitive fish species in the Willamette and Columbia Rivers concluded that application of BMPs identified in the BA would minimize potential residual water quality impacts. Application of BMPs would also minimize the potential for adverse water quality impact on wetlands near the Expo Center. Elsewhere, the project alignment within existing street right-of-way minimizes the potential for adverse water quality and hydrology impacts.

Potential BMPs include covering temporarily exposed soils, use of barrier berms, silt fences and temporary sediment basins, as well as special wet-weather rules regarding excavation, dump truck covering and tire cleaning. Protecting existing vegetation along channel banks, or if disturbance cannot be avoided, disturbing banks only during the dry season and revegetating as soon as possible, would reduce potential water quality impacts. A plan to manage vehicle fueling and lubricating and a hazardous materials spill plan would also be prepared.

4.11.10 Construction Impacts to Ecosystems

Potential short-term ecosystem impacts and mitigation for the new Full-Interstate Alignment Alternative would be the same as presented in the DEIS for the Interstate Avenue Alignment Alternative, with the following exception. In-water construction to replace existing footings in Columbia Slough for a reconstructed N Denver Avenue viaduct would affect the habitat of threatened, endangered or listed fish species. The Biological Assessment for sensitive fish species in the Willamette and Columbia Rivers concluded, and the USFWS and NMFS concurred, that with identified BMPs, residual water quality impacts would be minimal and adverse impacts to sensitive fish species would be avoided. This document would have to be updated during the FEIS and Preliminary Engineering phase to acknowledge the revised designs.

No new or additional parkland resources are affected by the new Full-Interstate Avenue Alignment Alternative. Overlook Park would experience increased noise levels due to N Interstate Avenue realignment. The noise levels would exceed the ODOT's traffic noise impact criteria. The increased noise levels would not be considered a "constructive use" of the park, because of the lack of active or passive uses in the area of the park affected by increased noise. The existing noise levels at the park are at or exceed ODOT traffic noise standards, so the one to two dBA noise increase would be barely perceptible.

4.11.11 Construction Energy Impacts

Potential short-term energy impacts for the Full-Interstate Alignment Alternative would be similar to those presented in the DEIS.

4.11.12 Construction Impacts to Hazardous Materials

If hazardous materials are encountered during construction of the Full-Interstate Alignment Alternative, mitigation measures would be the same as the DEIS. Confining the new Full-Interstate Alignment Alternative to existing right-of-way along N Interstate and N Denver Avenues would minimize the potential for encountering hazardous materials.

4.11.13 Construction Impacts to Public Services and Utilities

Potential short-term impacts on public services and utilities during construction of the new Full-Interstate Alignment Alternative, and mitigation measures for these impacts, would be similar to those as presented in the DEIS for the Interstate Avenue Alignment Alternative except in the area between the Rose Quarter and the Kaiser Medical Facility. In this area, the impacts to public services and utilities would be primarily within the right-of way of N Interstate Avenue.

4.11.14 Construction Impacts to Air Quality

Short-term air quality impacts and potential mitigation measures for the Full-Interstate Alignment Alternative would be similar to the impacts as presented in the DEIS.

4.11.15 Construction Impacts to Historic, Archaeological and Cultural Resources

Potential short-term impacts on historic, archaeological and cultural resources for construction of the new Full-Interstate Alignment Alternative, and mitigation measures for these impacts, would be similar to those identified in the DEIS for the Interstate Avenue Alternative. Confining the new Full-Interstate Alignment Alternative to existing right-of-way along N Interstate and N Denver Avenues would minimize the potential for impact to historic, archaeological and cultural resources.

4.11.16 Construction Impacts to Parklands

Potential short-term impacts on parklands for construction of the new Full-Interstate Alignment Alternative, and mitigation measures for these impacts, would be similar to those presented in the DEIS for the Interstate Avenue Alignment Alternative.

5. Historic, Archaeological and Parkland Resources

5.1 Identification of New Resources

Identification of historic and cultural resources for the DEIS Interstate Avenue Alternative was previously completed and documented in the DEIS. The historic and cultural resources in the area associated with the new Full-Interstate Alignment Alternative north of the Edgar Kaiser Medical Center would be similar to the resources associated with the DEIS Interstate Avenue Alternative. Identification of new potential historic and cultural resources within the area of potential effect of the Full-Interstate Alignment Alternative between the Rose Quarter Transit Center and the Edgar Kaiser Medical Center along N Interstate Avenue was done through a field review of the new alignment corridor by the project staff and a review of the following three documents:

- *Cornerstones of Community: Buildings of Portland's African American History* (1997),
- *Historic Resources Inventory* published by the City of Portland Bureau of Planning (1988); and
- *The Regional LRT System Plan/Bi-State Corridor Preliminary Impact Assessment* (1985).

In the area between the Rose Quarter and Kaiser along N Interstate Avenue, three new resources have been identified as potentially eligible for listing in, or currently on the *National Register of Historic Places*. These historic resources are listed in the City of Portland's Historic Resources Inventory. The resources that have been identified include:

- warehouse located at 2289 N. Interstate Avenue (inventory no. 4-443-02289) - potentially eligible
- warehouse located at 2262 N. Albina Avenue (inventory no. 4-010-02262) - potentially eligible
- Smithson and McKay Brothers Building located at 955 N Albina - on the National Register list

The two potentially eligible resources may be eligible for the National Register of Historic Places under "criteria C," which means they are properties "that embody the distinctive characteristics of a type, period, or method of construction, or that represents the work a master, or that possesses high artistic values, or that represents a significant distinguishable entity whose components may lack individual distinction."

5.2 Impacts to New Resources

Impacts to historic resources with the Full-Interstate Alignment Alternative would be similar to the impacts identified in the DEIS for the Interstate Avenue Alignment Alternative except in the area between the Rose Quarter Transit Center and the Edgar Kaiser Medical Facility. In the area between the Rose Quarter and Kaiser, where three new resources have been identified, a preliminary evaluation of effect has determined that there would be "no effect" from the Full-Interstate Alignment Alternative, because the light rail improvements would be completely within the existing right-of-way of N Interstate Avenue.

Impacts to other historic and cultural resources with the new Full-Interstate Alignment Alternative would be similar to the impacts as identified in the DEIS for the Interstate Avenue Alignment Alternative and are identified in Chapter 6 of the DEIS

Early coordination with the SHPO has been initiated with respect to identification of new resources and project effects associated with the new alternative. SHPO concurrence on eligibility on the newly identified resources and completion of a formal determination of effect will be completed during the preparation of the FEIS. During the preparation of the DEIS, the SHPO staff reviewed and approved the methodology and findings for the portion of the new Full-Interstate Alignment Alternative north of the Edgar Kaiser Medical facility.

5.3 Parklands

There are no new or additional parkland resources as a result of identification of the new Full-Interstate Alignment Alternative, other than those described and evaluated in the DEIS. Overlook Park would experience a slight increase in traffic noise from existing conditions. This increase of one to two dBA would be considered barely perceptible to a person with normal hearing. There are no active or passive park uses in the affected area. Although this park could be considered impacted because of the slight increase of noise, due to the lack of passive or active uses in the area, the noise increase does not cause a use or a constructive use of the park.

6. Financial Analysis and Evaluation of the Full-Interstate Alignment Alternative

This chapter presents the financial analysis and evaluation of the Full-Interstate Alignment Alternative. Section 6.1, Financial Analysis, provides information to judge the fiscal feasibility of building and operating the corridor alternatives. Section 6.2, Evaluation of Alternatives discusses this alignment alternative in relation to those already studied in the DEIS.

6.1 Financial Analysis

This section assesses the financial feasibility of the Full-Interstate Alignment Alternative. The analysis is divided into two elements: the Project Capital Financial Analysis and the System Fiscal Feasibility Analysis.

6.1.1 Project Capital Financial Analysis

The Project Capital Financial Analysis focuses on how to pay for the construction of the Full-Interstate Alignment Alternative. Between now and the year 2015, Tri-Met will have other capital costs that are not associated with the Full-Interstate Alignment Alternative. These other capital costs are accounted for in the System Fiscal Feasibility Analysis. The results of the Project Capital Financial Feasibility Analysis are based on the assumptions and methodology described in the South/North Corridor DEIS.

6.1.1.1 Project Capital Costs

Table 6.1-1 shows the project capital costs for the Full-Interstate Alignment Alternative. Costs are shown in 1994 dollars (1994\$) and year-of-expenditure dollars (YOES). Year-of-expenditure dollars were calculated by inflating the 1994 dollar costs by the appropriate inflation index for each cost category based on a detailed construction schedule. As shown, the Full-Interstate Alignment Alternative would cost approximately \$350.0 billion (YOES). This cost includes the cost of borrowing approximately \$59 million to make up for potential gaps between federal appropriations and construction expenditures.

**Table 6.1-1
Summary of Project Capital Costs for the Full-Interstate Alternative**

	Full-Interstate Alternative
Project Capital Cost in 1994 Dollars ¹	\$223.4
Inflation To and During Construction Period	\$117.6
Finance Costs	\$9.0
Total Project Capital Costs in Year of Expenditure Dollars (YOES)	\$350.0
Interim Borrowing Needs ²	\$58.7

Source: Tri-Met: April 1999.

¹ Costs are in millions of dollars.

² This estimates end-of-year borrowing needs assuming that annual appropriations are equal to 70 percent of annual construction costs up to \$50 million. The issuance and interest costs associated with the interim borrowing are included in the Finance Costs.

6.1.1.2 Project Capital Finance Plan

In November 1994, Tri-Met district voters approved a \$475 million general obligation (GO) bond to construct the South/North Light Rail Project, contingent upon the availability of Federal matching funds. Because the funding plan and project scope had changed from that presented to the voters in 1994, Tri-Met sought re-approval of the bond amount in November 1998. This time, the voters rejected the use of \$475 million of GO bonds for the project. Thus, GO Bond revenues are no longer available for any segment of the South/North Light Rail Project, including the Full-Interstate Alignment Alternative.

Table 6.1-2 shows the current finance plan to meet capital costs of the Full-Interstate Alignment Alternative. The paragraphs which follow describe each of the revenue sources.

**Table 6.1-2
Summary of Capital Financing Plan for the
Full-Interstate Alternative**

	Full-Interstate Alternative
Project Capital Cost ¹	\$350.0
Project Revenues ²	
New Starts Federal Funds – U	\$246.0
Regional STP Funds – A	\$24.0
Regional Compact Funds – U ³	\$80.0
Total Project Revenue	\$350.0
Interim Borrowing Needs	\$58.7

Source: Tri-Met: April 1999.

Note: STP = Surface Transportation Program.

¹ Costs and revenues are in millions and year-of-expenditure dollars.

² U = this revenue is currently unavailable, and A = this revenue is currently available.

³ The Regional Compact consists of contributions from Tri-Met and the City of Portland.

Section 5309 New Starts Funds. Section 5309 grants are discretionary Federal funds available for bus capital improvements, new fixed-guideway transit systems and extensions to existing fixed-guideway systems. A portion of these funds, commonly referred to as New Starts funds, are expressly authorized for the construction of major fixed guideway projects such as light rail. The maximum share, as a statutory matter, that New Start Funds can pay toward a light rail project, under TEA-21, is 80 percent of the total project cost (20 percent is the minimum allowed local matching fund contribution to a project).

The amount of federal authorization that may be available for a Full-Interstate Alignment project is a function of the project's merit and cost, the general availability of federal authorization at the time the Full Funding Grant Agreement (FFGA) is being approved and the cost, merits and authorization requirements of other projects which are competing for authorization. As a practical matter, the amount of federal authorization potentially available for a project is difficult to predict.

The capital finance plan assumes that \$246 million of New Start funds would be authorized for the project. To date, Congress has authorized \$25 million for a South/North LRT Project segment.

STP Funds. STP funds are flexible Federal funds allocated to the Oregon Department of Transportation (ODOT) on a formula basis. ODOT then allocates a portion of its STP funds to metropolitan regions within Oregon by formula. STP funds allocated to the Portland region are programmed for specific projects by the Joint Policy Advisory Committee on Transportation (JPACT) and the Metro Council, the regional Metropolitan Planning Organization. In January 1997, JPACT recommended and the Metro Council approved Resolution No. 96-2442, which committed STP funds to the South/North LRT Project. \$24 million of these funds are planned to be used for the Full-Interstate Alignment alternative.

Regional Compact Funds. The funding plan anticipates the creation of an \$80 million regional funding compact wherein Tri-Met and the City of Portland would provide local funds to match New Starts Funds and STP funds committed to the project. The plan assumes that \$50 million of that total would come from Tri-Met's general fund. It is anticipated that Tri-Met would issue revenue bonds to contribute its share. The remaining \$30 million would come from the City of Portland.

6.1.2 System Fiscal Analysis

This analysis focuses on whether there are adequate resources to operate and maintain the entire transit system, including operations of the Full-Interstate Alignment Alternative, between now and the year 2015. The System Fiscal Feasibility Analysis is based on the assumptions and methodology described in the South/North Corridor DEIS.

6.1.2.1 System Costs

Table 6.1-3 summarizes the corridor O&M costs for the No-Build Alternative and the Full-Interstate Alignment Alternative. As shown, the Full-Interstate Alignment by Tri-Met would not negatively impact the O&M costs for C-TRAN's bus system. Thus, the systems analysis discussed below focuses solely on Tri-Met's costs and revenues.

**Table 6.1-3
Summary of Full-Interstate Alternative O&M Costs ¹**

	No-Build Alternative	Full-Interstate Alternative	Difference from No-Build
Costs ^{1,2}			
LRT	\$0.0	\$6.9	+ \$6.9
Bus – Tri-Met ²	\$68.3	\$68.2	- \$0.1
Bus – C-TRAN	\$13.2	\$13.2	\$0.0
Total ³	\$81.8	\$88.3	+ \$6.8

Source: Tri-Met: April 1999.

¹ In millions, with year 2015 service levels and in 1994 dollars.

² Includes general systemwide administration costs.

6.1.2.2 System Revenues

System revenues are based on the assumptions similar to those described in the South/North Corridor DEIS. The key assumption is that payroll tax revenue growth will average 7.2 percent per year beginning in FY 03.

6.1.3 Conclusions

6.1.3.1 Cash Flow Analysis of the Tri-Met System

System costs and revenues were projected over a 16-year period based on the key elements of this analysis as described in Section 6.1. Table 6.1-5 summarizes the detailed system cash flow table for the Full-Interstate Alignment Alternative. The table illustrates how system revenues, costs and working capital are projected on a year-by-year basis.

In this study, an alternative is fiscally feasible (on a systemwide basis) if ongoing revenues would suffice to meet the estimated total system costs and maintain a sufficient beginning-year working capital to meet two months of operating costs. While two months of working capital is the minimum standard, Tri-Met has a goal of maintaining a working capital reserve of, at least, three months of operations. Table 6.1-4 summarizes year-by-year beginning working capital results for the Full-Interstate Alignment Alternative.

**Table 6.1-4
System Fiscal Feasibility Test Beginning Working Capital
FY 1999 through FY 2015 for the Full-Interstate Alternative**

Fiscal Year	Beginning Working Capital ¹	Months of Operating Expense
1999	\$74.5	4.6
2000	\$68.2	3.9
2001	\$63.6	3.5
2002	\$65.9	3.4
2003	\$71.3	3.5
2004	\$63.1	2.9
2005	\$60.0	2.6
2006	\$56.8	2.3
2007	\$52.8	2.1
2008	\$58.5	2.2
2009	\$67.5	2.4
2010	\$106.8	3.7
2011	\$140.7	4.6
2012	\$167.2	5.3
2013	\$179.0	5.4
2014	\$194.2	5.6
2015	\$214.6	5.9

Source: Tri-Met: April 1999.

Note: FY = fiscal year.

¹ In millions and year-of-expenditure dollars.

**Table 6.1-5
Summary of Detailed Cash Flow for the Full-Interstate Alternative**

I. Description	FY99	FY00	FY01	FY02	FY03	FY04	FY05	FY06	FY07	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15	Total	
System Costs/Revenues																			
System Costs																			
System Operating Costs	196.0	208.4	219.5	234.2	245.0	262.1	279.9	293.4	307.0	322.0	337.9	347.9	363.4	380.7	398.0	417.2	436.5	5,052.9	
System Capital Costs	63.9	31.0	37.7	39.4	48.5	47.3	48.8	54.8	53.2	55.7	35.0	51.0	78.1	98.5	109.2	115.8	161.3	1,065.2	
System Revenues																			
Payroll Tax/State In Lieu of Tax	137.7	147.7	160.0	171.5	183.7	196.6	210.5	222.4	241.4	258.8	276.8	296.4	317.4	339.9	364.0	389.8	417.5	4,197.1	
Passenger Fares	40.9	41.9	45.0	47.1	50.1	51.4	56.8	58.5	63.1	65.0	70.2	72.3	77.0	79.3	84.3	86.9	92.3	1,041.2	
Federal Operating	21.2	19.9	21.5	23.1	24.7	25.5	26.2	27.0	27.8	28.6	29.5	30.4	31.3	32.2	33.2	34.2	35.2	450.5	
Federal Capital ¹	34.7	5.2	12.4	16.1	4.7	10.7	9.8	10.7	10.9	11.1	11.3	6.5	12.6	7.7	7.9	8.0	8.2	153.7	
Other	19.2	20.0	20.7	21.2	22.1	22.1	22.3	22.5	22.7	23.4	24.4	27.2	29.7	31.8	33.0	34.4	36.1	413.6	
General Fund Result	(6.2)	(4.7)	2.3	5.4	(8.2)	(3.1)	(3.2)	(4.0)	5.7	8.9	39.3	33.9	26.5	11.8	15.2	20.4	(8.4)		
Working Capital Reserve																			
Beginning Working Capital	74.5	68.2	63.6	65.9	71.3	63.1	60.0	56.8	52.8	58.5	67.5	106.8	140.7	167.2	179.0	194.2	214.6		
Months of Operating Reserve	4.6	3.9	3.5	3.4	3.5	2.9	2.6	2.3	2.1	2.2	2.4	3.7	4.6	5.3	5.4	5.6	5.9		
II. Project Capital Reserve																			
Project Capital Costs																			
Construction		6.4	67.1	104.4	127.3	35.7													340.9
Finance		1.1	0.0	1.0	2.3	3.3	1.4												9.1
Total		7.5	67.1	105.4	129.6	39.0	1.4												350.0
Project Capital Revenues																			
Federal New Start			47.0	50.0	50.0	50.0	49.1												246.1
STP Funds		5.3	6.7	6.0	6.0														24.0
Regional Compact Funds		2.2	13.4	49.4	14.9														80.0
Interim Borrowing					58.7	(11.0)	(47.7)												0.0
Total		7.5	67.1	105.4	129.6	39.0	1.4												350.0

Source: Tri-Met: April 1999.

Note: All figures are in millions of year of expenditure dollars. FY = fiscal year; GO = general obligation; STP = surface transportation program.

¹ Projected amount of federal operating funds expended during fiscal year; does not show carry over.

As shown in Table 6.1-5, the Full-Interstate Alignment Alternative would maintain a two-month or better working capital reserve throughout the planning period. Therefore, the standard for financial feasibility is met with the Full-Interstate Alignment Alternative. Tri-Met would also maintain a three-month or better working capital reserve between FY99 - FY03 and FY10 - FY 15. During the intermediate period between FY04 and FY09, the Working Capital Reserves trends down as certain bus capital facilities are upgraded and then trends upwards as the projects are completed and payroll tax revenues continue to grow. The growth in Working Capital Reserves between FY10 - FY15 demonstrates the long-term stability of Tri-Met's ability to achieve its 3-month working capital goal.

While a system revenue shortfall is not projected by the year 2015, conditions could change. Given that reasonable levels of beginning working capital are projected to exist, it is very likely that any deficit would be of a magnitude that could be met by standard management techniques, such as adjusting fares or altering the rate of service increases.

6.1.3.2 Capital Plan Feasibility

Table 6.1-4 shows a detailed project capital cash-flow for the capital plan for the Full-Interstate Alignment Alternative, illustrates several critical points.

Based on an assumed maximum annual appropriation of \$50 million per year and the availability of the local funds discussed earlier, the Full-Interstate Alignment Alternative would require a total authorization of Federal New Starts funds of \$246 million. However, even if federal money is authorized, it still must be appropriated to make funds available for the project. Because, the appropriation would be subject to Congressional decision-making, it is likely during the years when a large appropriation is required that the amount of New Starts funds appropriated to a project would be less than what it needs.

Under these circumstances, the Regional Compact funds would be advanced to backfill any shortfalls in annual federal appropriations. As a result, it is predicted that by FY 2003 the Regional Compact would be fully depleted, requiring an interim borrowing program to sustain the optimum construction schedule. Funds that would be borrowed on an interim basis would be repaid with New Starts funds appropriated at a later date, but in the interim the project would incur some interest costs. The implementation of such an interim borrowing program would require the establishment of a credit guarantee program. In the case of the Full-Interstate Alignment, the interim borrowing program would have to be support about \$59 million dollars of debt.

Interim borrowing could be avoided by extending the construction schedule to have it match Federal New Starts appropriations. If the construction schedule were extended, the added costs of inflation would likely exceed the interim borrowing costs and would, therefore, increase the overall capital cost of the project. However, this approach could be necessary to avoid a borrowing need that would exceed the region's capacity to guarantee repayment if Federal funding authorizations were insufficient.

6.1.4 Finance Plan Implementation

Implementation of the financing plan depends on the region's ability to institute the Regional Compact. It further depends on Tri-Met's ability to successfully secure a sufficient level of authorization of New Starts funds to demonstrate an ability to construct the project. The region would adopt a detailed financing plan after completion of the negotiations with FTA regarding the amount of Federal authorization and other FFGA provisions.

6.2 Evaluation

6.2.1 Context

In the DEIS, the Evaluation Chapter presented the effectiveness, cost-effectiveness, equity and major tradeoffs of length, alignment and terminus alternatives under consideration for the South/North Corridor. By making distinctions at the alignment alternative level, it is possible to capture the differences between the Full-Interstate Alignment Alternative and the other alternatives evaluated in the DEIS.

6.2.2 Trade-Offs Between the Full-Interstate Alternative and the DEIS Alternatives

The major tradeoffs between the Full-Interstate Alternative and the DEIS alternatives occur in the areas of capital cost, displacements, and number and location of stations. The capital cost of the Full-Interstate Alignment Alternative is \$46 million (\$1994) less expensive than the comparable segment of the alignment chosen as the LPS between the Rose Quarter and Expo Center. This difference would be \$81 million in year of expenditure dollars. The Full-Interstate Alignment Alternative would result in between 71 and 148 fewer residential and business displacements than the DEIS Alternatives. The Full-Interstate Alignment Alternative would have one less station than the DEIS Alternatives, and would not provide as direct access to Emanuel Hospital or the Eliot neighborhood as the DEIS Interstate Avenue Alignment. A new station at N Russell and N Interstate would provide better access to the Albina Industrial Area and the area to the west of Emanuel Hospital.

Appendix A

**Conceptual Designs
Rose Quarter Station
Expo Center Park-and-Ride Facility
Cross-Sections**

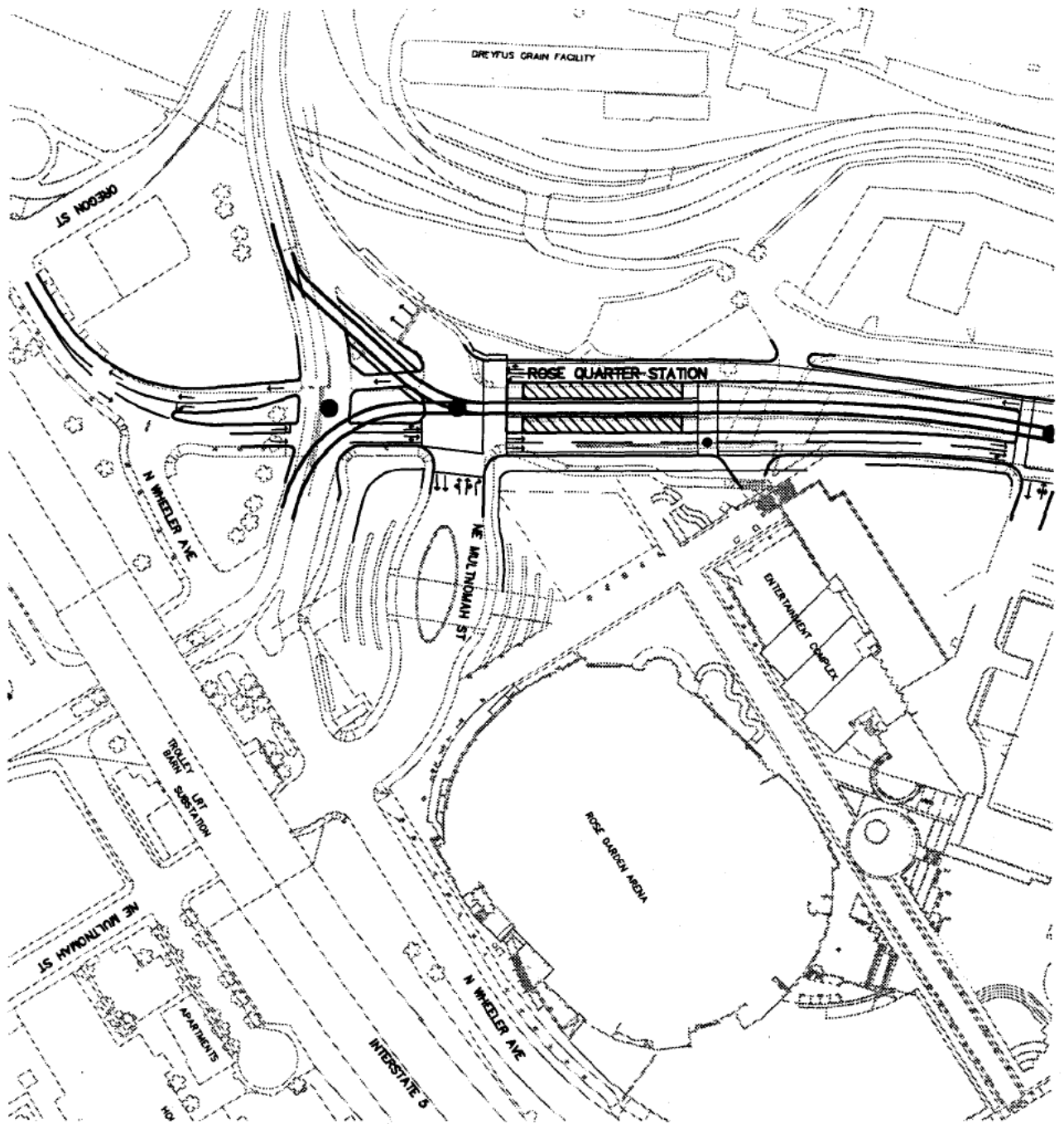


FIGURE A-1
ROSE QUARTER
CONNECTION TO EXISTING LIGHT RAIL

**South
North**
Transit Corridor Study

TRI-MET

This drawing represents a conceptual design portrayal. Alignments, stations and LRT facilities are currently under study and may change.

○ EXISTING SIGNAL

● NEW OR MODIFIED SIGNAL

▨ LRT STATION PLATFORM

▬ STEPS/RAMPS

— GATED CROSSING

▬ WALL

100' 50' 0 100' 200'

SCALE: 1" = 200'

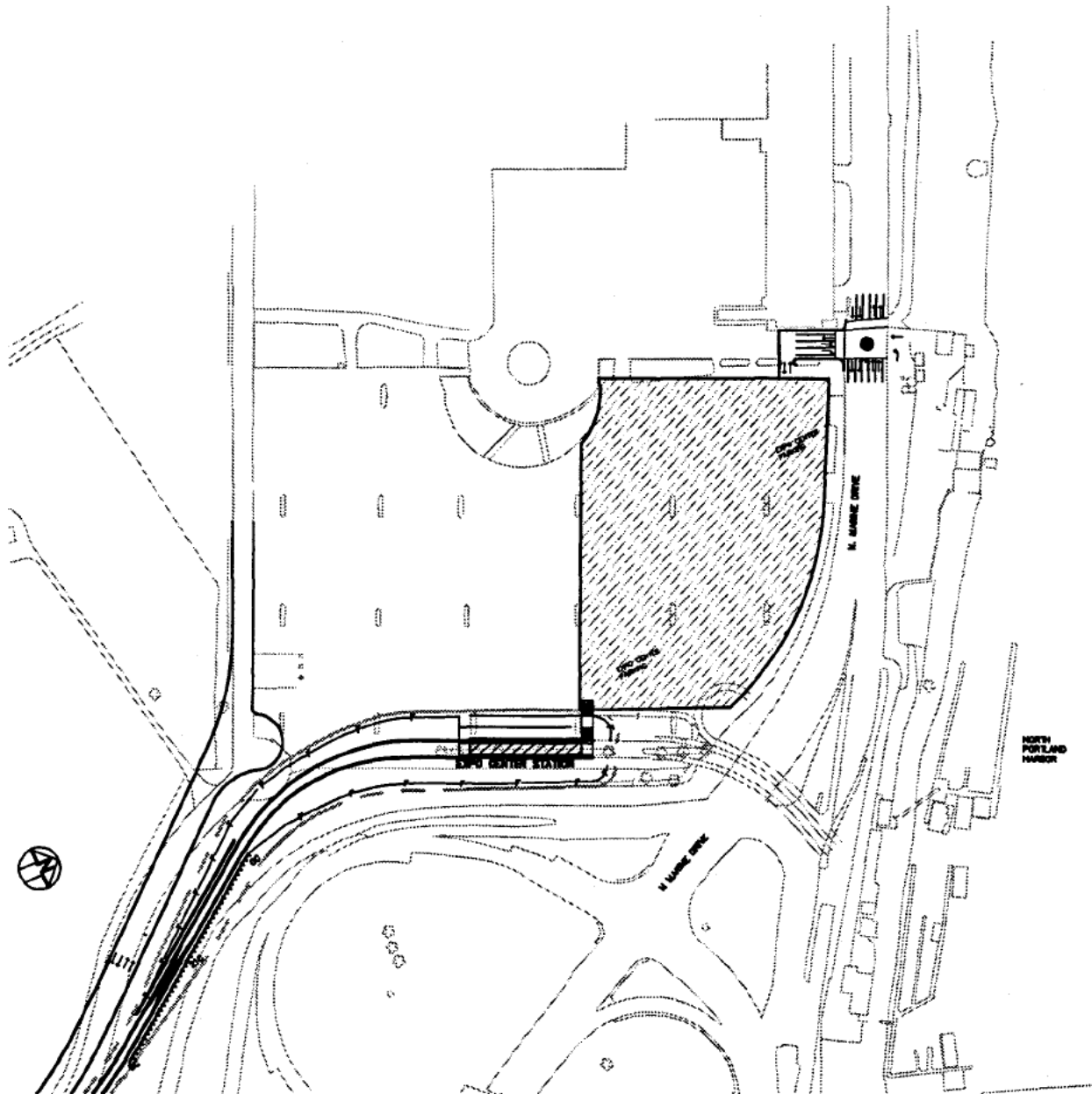
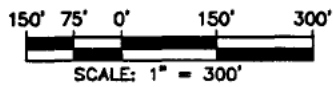


FIGURE A-2
EXPO CENTER
PARK-AND-RIDE FACILITY

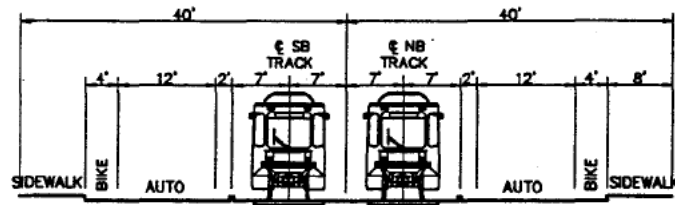
South North
Transit Corridor Study

TRI-MET

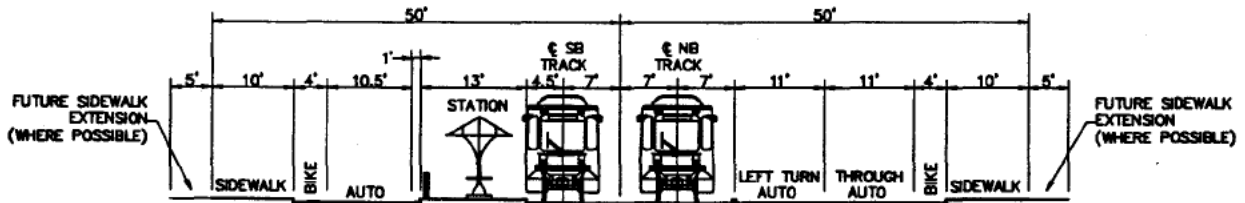
- EXISTING SIGNAL
- NEW OR MODIFIED SIGNAL
- ▨ LRT STATION PLATFORM
- ▬ GATED CROSSING
- ▬ STEPS/RAMPS
- ▬ WALL



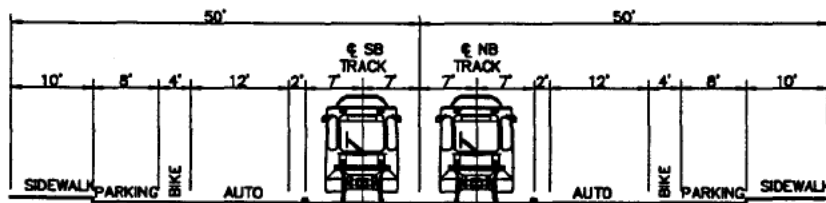
This drawing represents a conceptual design portrayal. Alignments, stations and LRT facilities are currently under study and may change.



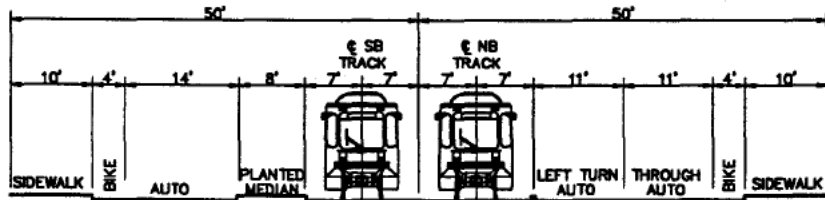
INTERSTATE AVE
NEAR MISSISSIPPI AVE D
AI-07A



KAISER TO KENTON - TYPICAL
SIGNALIZED INTERSECTION W/ STATION A
PP-AI-10



KAISER TO KENTON - TYPICAL
BETWEEN SIGNALIZED INTERSECTIONS B
PP-AI-10

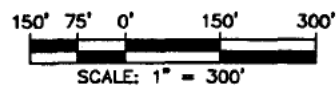


KAISER TO KENTON AVE - TYPICAL
SIGNALIZED INTERSECTION W/OUT STATION C
PP-AI-10



FIGURE A-3
INTERSTATE MAX
CROSS-SECTIONS

- EXISTING SIGNAL
- NEW OR MODIFIED SIGNAL
- LRT STATION PLATFORM
- GATED CROSSING
- STEPS/RAMPS
- WALL



This drawing represents a conceptual design portrayal. Alignments, stations and LRT facilities are currently under study and may change.

Appendix B

Visual Simulation
Interstate Avenue at N Dekum Street

Visual Simulations North Portland Segment

Note: This simulation was prepared to illustrate the new alignment alternative for the South/North Supplemental Draft Environmental Impact Statement (SDEIS). This appendix includes one simulation for the alignment alternative studied in the SDEIS that best illustrates the North Corridor study area alternative. This illustration is based on a preliminary level of design (approximately 5%) and is subject to change.

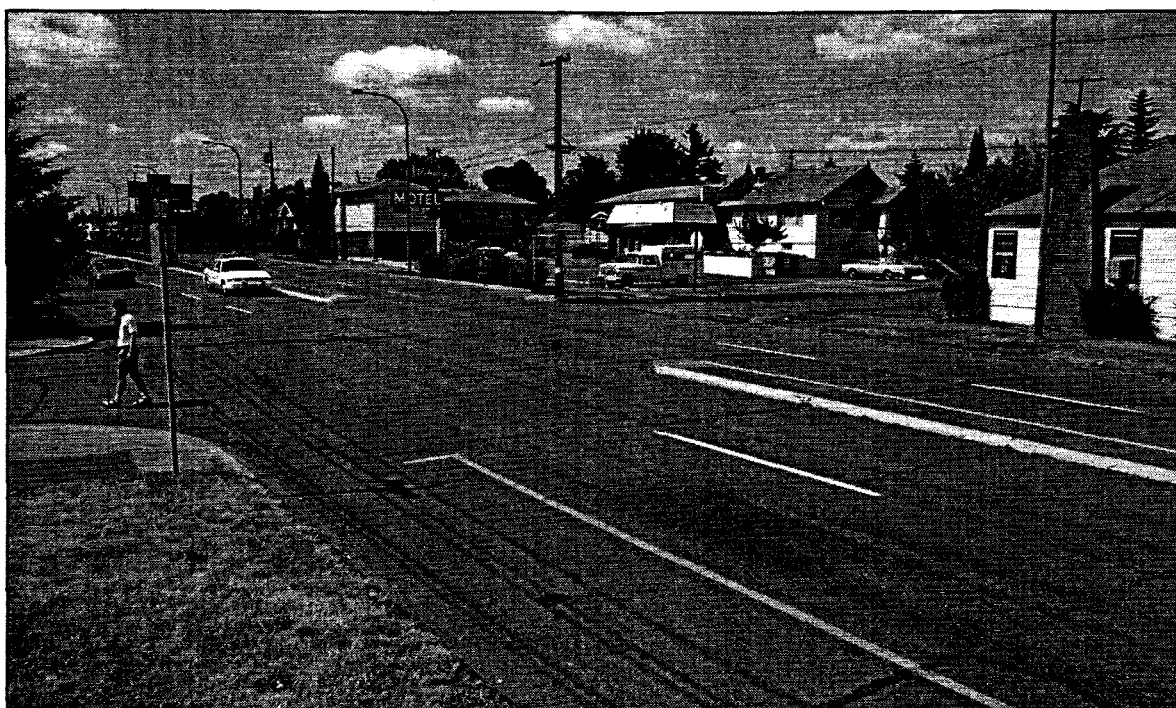


Figure B.1
Existing Condition
• View from N Interstate Avenue at N Dekum Street, looking south

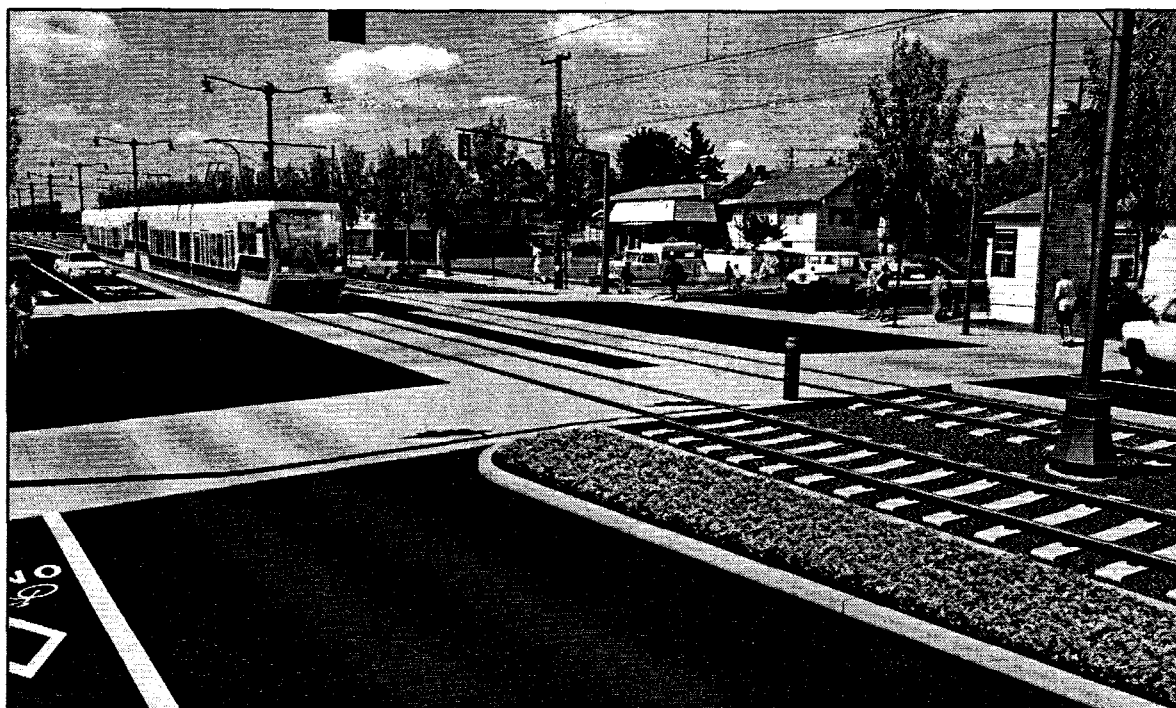


Figure B.2
Full Interstate Alignment Alternative (Visual Simulation)
• View from N Interstate Avenue at N Dekum Street, looking south

Appendix C

Environmental Justice Compliance

ENVIRONMENTAL JUSTICE COMPLIANCE

This appendix describes how the Full-Interstate Alignment Alternative compares with the alternatives previously studied in the DEIS with respect to environmental justice. The neighborhoods served or affected by the new alignment were all included and evaluated in the DEIS analysis. Therefore, this appendix focuses on the differences in impacts and benefits to low income and minority neighborhoods with the Full-Interstate Alignment Alternative compared to the DEIS alternatives in the same neighborhoods.

In the DEIS analysis the potential adverse human health effects from the project alternatives were related to noise and vibration impacts, displacements and neighborhood quality impacts (traffic, noise, vibration, displacement and visual effects). The new Full-Interstate Alignment Alternative would be located entirely in the existing right-of-way of Interstate Avenue, dramatically reducing the displacement impacts from as many as 133 residential and 40 commercial to zero. There would be seven more noise and/or vibration impacts to residences or businesses in low income and minority neighborhoods compared to the alignments previously studied. These additional impacts are to structures that would have been displaced with the DEIS alternatives. Traffic impacts could be somewhat greater in the portion of the alignment along North Interstate in the Lower Albina Industrial area (in the Eliot Neighborhood) as well as the area between the Edgar Kaiser facility and commercial district in Kenton.

The Full-Interstate Alignment Alternative would provide one less station in the Lloyd Neighborhood (north of the Rose Garden arena) and a different station location in the Eliot Neighborhood compared to station locations previously studied. The station in the Eliot Neighborhood at North Interstate Avenue and North Russell Street would provide somewhat less direct access to the residential area of the neighborhood, than the stations evaluated in the DEIS. If the Locally Preferred Strategy were amended to include the Full-Interstate Alignment Alternative and the alignment was to become the first portion of the South/North corridor proposed for construction, it would provide improved transit access for a higher concentration of low income and minority neighborhoods compared to other segments of the corridor as studied in the DEIS.

Overall, the new Full-Interstate Alignment Alternative has significantly fewer impacts to low income and minority neighborhoods compared to other alignments studied in the DEIS and would provide similar access to stations along most of the alignment. Therefore, there would not be disproportionate impacts to low income and minority neighborhoods with the new Full- Interstate Alignment Alternative.

Appendix D

Other
List of Recipients
List of Preparers
Glossary

D.1 LIST OF RECIPIENTS

Federal Agencies:

Advisory Council on Historic Preservation
Department of the Army, Portland District
Corps of Engineers
Federal Emergency Management
Administration
Federal Highway Administration
Federal Railroad Administration
National Marine Fisheries Service
US Army Corps of Engineers
US Coast Guard
US Department of Agriculture
US Department of Commerce
US Department of Energy
US Department of Interior
US Department of Transportation
US Environmental Protection Agency
US Fish and Wildlife Service

Native American Tribes:

Confederated Tribes of the Grand Ronde
Confederated Tribes of the Warm Springs
Confederated Tribes of Umatilla
Confederated Tribes of Siletz
Columbia Inter-Tribal Fish Commission
Nez Perce Tribe
Yakama Nation

Oregon State Agencies:

Office of the Governor, State of Oregon
Oregon Department of Agriculture
Oregon Department of Energy
Oregon Department of Environmental Quality
Oregon Department of Fish & Wildlife
Oregon Department of Geology and Mineral
Industries
Oregon Department of Land Conservation &
Development
Oregon Department of Transportation
Oregon Department of Water Resources
Oregon Division of State Lands
Oregon Economic Development Department

Oregon Geology & Mineral Industries
Department
Oregon Office of Energy
Oregon Public Utilities Commission
Oregon State Board of Geologist Examiners
Oregon State Historic Preservation Office
Oregon State Library
Oregon State Parks and Recreation
Department

Washington State Agencies:

Office of the Governor, State of Washington
Washington Department of Fish & Wildlife
Washington Department of Natural Resources
Washington Land Use Study Commission
Washington State Department of Ecology
Washington State Department of
Transportation
Washington State Historic Society
Washington State Office of Archaeology and
Historic Preservation
Washington State Parks & Recreation
Commission
Washington Utilities & Transportation
Commission

Regional and Local

Agencies/Governments:

C-TRAN
City of Gladstone, Oregon
City of Milwaukie, Oregon
City of Oregon City, Oregon
City of Portland, Oregon
City of Vancouver, Washington
Clackamas County, Oregon
Clark County, Washington
Multnomah County, Oregon
North Clackamas School District
Port of Portland
Portland School District

Libraries:

Clark County Regional Library
Ledding Library
Fort Vancouver Regional Library
Multnomah County Library
Portland State University Library
University of Oregon Library
Oregon State University Library

Neighborhood Associations:

Arbor Lodge Neighborhood Association
Boise Improvement Association
Bridgeton Neighborhood Association
Downtown (Portland) Community Association
Eliot Neighborhood Association
Hayden Island Neighborhood Network
Humboldt Neighborhood Association
Irvington Neighborhood Association
Kenton Neighborhood Association
King Neighborhood Association
Lloyd District Community Association
North Portland Neighborhood Office
Northeast Coalition of Neighborhoods
Old Town/Chinatown Neighborhood
Association
Overlook Neighborhood Association
Pearl District Neighborhood Association
Piedmont Neighborhood Association
Sabin Community Association

Miscellaneous:

1000 Friends of Oregon
Alliance of Portland Neighborhood
Association for Portland Progress
Audubon Society of Portland
Columbia Corridor Association
Downtown Retail Council
Historic Old Town
Interstate Avenue Association
Kenton Business Association
Lloyd District Transportation Management
Association
Lower Albina Council
North-Northeast Business Association
North Portland Business Association
Northeast Broadway Business Association
Oregon Historical Society
Oregon League of Conservation Voters
Oregon League of Women Voters
Oregon Water Resource Council
Portland Chamber of Commerce
Portland Community College
Portland Development Commission
Portland Metropolitan Chamber of Commerce
Portland Public Schools
Portland State University
Swan Island Business Association
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B.S., Urban Planning, University of Washington, 1970.

John Griffiths, Project Engineer (Maintenance Facility)
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B.S., Transportation Engineering and Planning, Worcester Polytechnic, 1976.

Claire Potter (Financial Analysis)
B.A., Political Science, Lewis and Clark College, 1978.

Kathy Blodgett, Secretary
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Robert A. Dethlefs, Junior Engineer
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Consultants:

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M.S., Civil Engineering, Stanford, 1986

B.S., Environmental Earth Sciences, 1985

Professional Engineer (Traffic), Oregon, California

Dan Mills, Traffic Engineer (Traffic)

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M.S., Transportation Engineering, Villanova University, 1984.

B.S., Civil Engineering, University of Virginia, 1980.

Professional Engineer - Oregon, Washington.

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B.S., Civil-Engineer, University of Houston, 1985.

Professional Engineer - Texas, Washington.

Newlands & Company, Inc. (Sub-Consultant for Visual Simulations)

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B.A., Fine Arts, Oberlin College, 1986.

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Geoff Larkin

M.A., Political Science, University of Michigan, 1977.

B.A., International Affairs, Lewis and Clark College, 1976.

Steven Siegel & Associates (Financial Analysis and Evaluation)

Steve Siegel

M.S., Industrial Engineering, State University of New York at Buffalo, 1971.

B.S., Industrial Engineering, Polytechnic Institute of New York, 1968.

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B.S., Civil Engineering, Stanford University, 1989.

M.S., Civil Engineering, Stanford University, 1991.

D.3 GLOSSARY

Alignment: Horizontal and vertical geometric elements that define the location of an LRT alignment or roadway.

Alignment Alternatives: Alignment alternatives specify the general location of light rail alignment choices within a given segment of the South/North Corridor.

Ambient Noise: Surrounding or existing noise level.

Best Management Practices: The process by which the most environmentally sound methods for construction are employed (such as design with least impact, controlling silt and runoff and construction during least sensitive times of the year, i.e., avoiding nesting or spawning seasons).

Capital Costs: Nonrecurring costs required to construct transit systems, including costs of right-of-way, facilities, rolling stock, power distribution and the associated administrative and design costs, and financing charges during construction.

Decibel: A quantitative measure of sound.

Displacements: Displacements refers to any buildings or parts of buildings that must be acquired for construction of light rail.

Headway: The time between transit vehicles at any particular point along the route.

High Capacity Transit (HCT): Any mode of transportation (typically referring to public transportation or transportation infrastructure) that enables large numbers of people to travel from one destination to another with faster speeds than single occupancy vehicle travel. Examples of high capacity transit include buses, light rail, High Occupancy Vehicle (HOV) lanes and carpools.

Land Use Final Order (LUFO): The Metro Council land use decision designating the entire required right-of-way for light rail construction in one regional action rather than a series of small, jurisdictional actions.

Level of Service (LOS): A qualitative measure that represents the collective factors of travel under a particular volume condition. A measure of traffic congestion.

Light Rail Transit (LRT): A mode of mass transportation comprised of light rail vehicles that travel on steel tracks and are powered by electricity from overhead wires. This mode is characterized by its ability to operate in both at-grade and/or grade separated environments, usually operating in combinations of 1 or 2 vehicles.

Locally Preferred Strategy (LPS): The alignment selected for further study in the Final Environmental Impact Statement (FEIS) after comparisons of several alignments are completed in the Draft Environmental Impact Statement (DEIS).

Mode: A particular form or method of travel, such as pedestrian, bicycle, automobile, bus or LRT.

National Register of Historic Places: The official list of the nation's cultural resources determined to be worthy of preservation.

Off-peak: Those periods of the day where demand for transit service is not at a maximum.

Operating Costs: Recurring costs incurred in operating transit systems, including wages and salaries, maintenance of facilities and equipment, fuel, supplies, employee benefits, insurance, taxes and other administrative costs. Amortization of facilities and equipment is not included.

Operating Revenue: The gross income from operation of the transit system including fares, charter income, concessions, advertising, etc. Does not include interest from securities, non-recurring income from sale of capital assets, etc..

Park-and-Ride (P&R) Lot: A lot near a transit station that provides all-day parking for cars. Park-and-ride lots are located near the fringe of a transit system where feeder bus service is sparse or nonexistent.

Peak Hour: The hour of the day in which the maximum demand for service is experienced, accommodating the largest number of automobile or transit patrons.

Peak Period: A specified time period for which the volume of traffic is greater than that during other similar periods.

Platform Hours: Elapsed time from when a transit bus or train pulls out of the garage into service to when it returns to the garage after completing its service.

Queue Spillback: Refers to the number of cars lined up at a stoplight.

Record of Decision: Regarding the South/North Light Rail Project, the Record of Decision is the decision on the light rail alignment and funding issued by the Federal Transit Administration upon completion of the Final Environmental Impact Statement.

Ridership: Refers to the number of transit riders projected for a specific alignment alternative or segment within a specific time period (such as per day, per AM peak-period, etc.).

Right-of-Way: The corridor (horizontal and vertical space) owned by the transit agency for the transportation way.

South/North Corridor or Corridor: A subset of the region, defined in Chapter 2 of the Draft EIS as the travel shed that would be potentially affected by the proposed South/North LRT project.

Terminus: A transit station located at the end of transit (including light rail) line.

Tie and Ballast: Track treatment consisting of a gravel bed with rails and ties.

Train Miles: The number of miles an individual train travels within a day of service.

Transit: A transportation system principally for moving people in an urban area and made available to the public usually through paying a fare.

Transit Center: A station with shelters where a large number of transit vehicles and passengers can be brought together with safety and convenience.

Travel Time (In Vehicle): The time required to travel between two points, not including terminal or waiting time.

"Z" Crossing: Type of unsignalized pedestrian crossing of light rail tracks in the shape of the letter "Z." Pedestrians are forced to cross first looking toward oncoming trains, then must turn to face oncoming train traffic on the second track.

Appendix E

Agency Coordination

U.S. Department
of Transportation

United States
Coast Guard



Commander
Thirteenth Coast Guard District

815 Second Avenue
Seattle, WA 98174-1067
Staff Symbol: oan
Phone: (206) 220-7270
FAX: (206) 220-7285

16593
April 13, 1999

Mr. Dave Unsworth
Principal Transportation Planner
METRO
600 Northeast Grand Avenue
Portland, OR 97232-2736

Dear Mr. Unsworth:

As you requested, we have reviewed the draft language for Coast Guard issues in the Supplemental Environmental Impact Statement for the South/North Project. We are providing our comments as cooperating agency in this project.

The draft language is largely acceptable for our purposes. We offer the following minor changes to the text. In the first paragraph under **Section 3.4 Navigable Waterways**, the "General Bridge Act" should be cited rather than the "General Bridges Act". Generally, the waterway discussed in this section is customarily referred to as "Columbia Slough" rather than "the Columbia Slough".

If you have any other questions, please call me at (206) 220-7272 or Austin Pratt at (206) 220-7282.

Sincerely,

A handwritten signature in black ink that reads "John E. Mikezell".

JOHN E. MIKESELL
Chief, Plans and Programs Section
By direction of the District Commander



Reply to
Attention of:

Operations Division

DEPARTMENT OF THE ARMY
PORTLAND DISTRICT, CORPS OF ENGINEERS
P.O. BOX 2946
PORTLAND, OREGON 97208-2946
April 22, 1999



METRO

Attn: Dave Unsworth
600 NE Grand Avenue
Portland, Oregon 97232

Dear Mr. Unsworth:

We have reviewed the draft text from the South/North Corridor Supplemental Draft Environmental Impact Statement (SDEIS). This text addresses impacts associated with the new light rail alternative between the Rose Quarter and Expo Center. Discussions regarding the need to investigate alternatives to avoid or minimize impacts to Wetland "K" and the Columbia Slough are consistent with comments we made on the draft EIS in a letter dated April 28, 1998. We, therefore, have no changes to recommend.

Thank you for your continued effort to keep us informed on this project. Questions can be directed to Ms. Judy Linton at the above address or telephone (503) 808-4382.

Sincerely,

A handwritten signature in cursive script that reads "W. B. Paynter".

W. B. Paynter
Chief, Regulatory Branch