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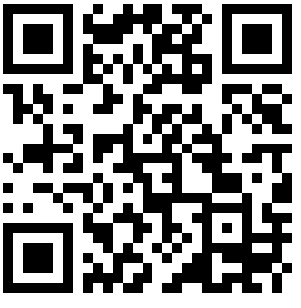

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Final Environmental Impact Statement

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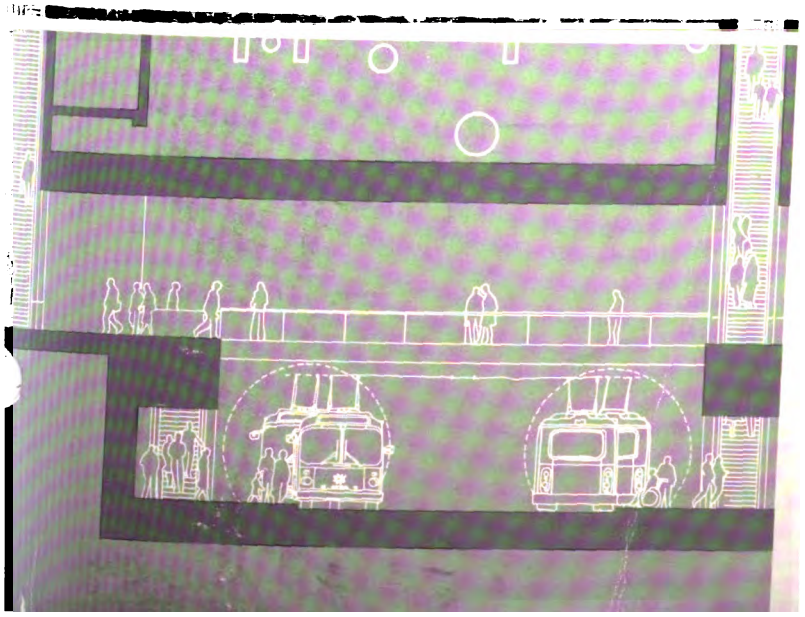

Downtown Seattle Transit Project

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FINAL ENVIRONMENTAL IMPACT STATEMENT/4(f) STATEMENT

FOR THE

DOWNTOWN SEATTLE TRANSIT PROJECT

IN

SEATTLE, KING COUNTY, WASHINGTON

PREPARED BY

U.S. DEPARTMENT OF TRANSPORTATION
URBAN MASS TRANSPORTATION ADMINISTRATION

JOINTLY WITH

MUNICIPALITY OF METROPOLITAN SEATTLE

and the

CITY OF SEATTLE

PURSUANT TO THE NATIONAL ENVIRONMENTAL POLICY ACT OF 1969
SECTION 102(2)(C)

and in compliance with the
Washington State Environmental Policy Act
Chapter 43.21C, Revised Code of Washington

Date: 6/5/85

For the United States Department of Transportation Urban Mass Transportation Administration

Aubrey Davis
Regional Administrator

Date: 4/25/85

For the Municipality of Metropolitan Seattle

Alan J. Gibbs
Executive Director

Date: 5/2/85

For the City of Seattle

Eugene V. Avery
Director of Engineering
Seattle Engineering Department

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COVER SHEET

U.S. DEPARTMENT OF TRANSPORTATION
URBAN MASS TRANSPORTATION ADMINISTRATION
FINAL ENVIRONMENTAL IMPACT STATEMENT

The document has been prepared pursuant to Section 102(2)(C) of the National Environmental Policy Act of 1969, Section 14 of the Urban Mass Transportation Act of 1964 and Section 4(f) of the Department of Transportation Act of 1966.

RESPONSIBLE AGENCIES:

Lead Agencies:	Urban Mass Transportation Administration Municipality of Metropolitan Seattle City of Seattle
Cooperating Agency:	Washington State Department of Transportation
TITLE OF PROPOSED ACTION:	Downtown Seattle Transit Project

ABSTRACT:

The environmental impact statement evaluates proposed alternatives to improve the transit system in and through the Seattle Central Business District. In addition to discussing existing conditions and 1990 No-Action conditions, four basic action alternatives (some of which have several options) are addressed: Transportation System Management, a TSM Non-intercept Mall, a Mall with Transit Centers and a Tunnel. The document describes these alternatives and evaluates the probable social, economic and physical environmental impacts associated with the project. Preliminary engineering has been conducted for Metro Council's preferred alternative consisting of an electric-only transit tunnel with a circulation system and surface improvements. This work has refined the description of the locally preferred alternative and enabled additional environmental impact analysis.

The final EIS was made available on JUN 14 1985 . Comments are invited for 30 days after this date.

For further information, contact:

Ken Mowll
Urban Mass Transportation Administration
400 7th Street S.W.
Washington, DC 20590
(202) 426-0096

Terry L. Ebersole
Urban Mass Transportation Administration, Region 10
3142 Federal Building
915 Second Avenue
Seattle, Washington 98174
(206) 442-4210

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Ron Borowski
Seattle Land Use and
Transportation Project
200 Municipal Building
Seattle, Washington 98104
(206) 625-4591

Ruth Hertz
Municipality of Metropolitan Seattle
821 Second Avenue
Seattle, Washington 98104
(206) 447-6613

Robert Chandler
Seattle Engineering Department
800 Municipal Building
Seattle, Washington 98104
(206) 625-2354

Cover: The cover illustrates the range of alternatives evaluated in this EIS--from No Action to a transit tunnel.

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FOREWORD

This environmental impact statement is written about the environmental impacts of proposals to improve the transit system through downtown Seattle.

This final EIS focuses on providing: more detailed information on the preferred alternative, as requested by many comments; responses to other comments on the draft EIS; a concise comparison of all of the main alternatives.

This EIS is written to help government officials decide which, if any, Downtown Seattle Transit Project alternative to build. None of the agencies has yet made a decision to proceed with a particular alternative.

The federal Urban Mass Transportation Administration can make its decision 30 days after this final EIS is filed. Metro and the City of Seattle can act seven days after this final EIS is adopted by either agency under the State Environmental Policy Act.

The EIS is written on the significant environmental impacts of the alternatives and is not the only basis for making decisions. Agencies may use other relevant information, documents or concerns in making their decisions, including technical, social, financial or other factors.

* * *

Some brief background is in order. Three government agencies--UMTA, Metro and the City of Seattle--have spent the better part of the past decade studying the problems leading to the proposals in this environmental impact statement. These agencies have worked with many interested citizens and groups and with other agencies on these studies and on many recommendations.

Metro, the region's transit agency, adopted the 1990 Plan in 1981, after six years of studies. Many of these studies were federally funded, and many specific alternatives for downtown Seattle were examined before adopting the 1990 Plan. The Seattle City Council also adopted resolutions urging major transit improvements in downtown Seattle.

The 1990 Plan, which calls for creating a network of community, regional and downtown transit centers throughout King County, identified the need to:

> . . . provide adequate transit facilities and corridors in downtown Seattle to achieve greater transit and pedestrian capacity, reduce environmental pollution, and improve internal circulation in recognition of downtown Seattle as the major metropolitan center in King County and the Central Puget Sound region. (Item 22)

The 1990 Plan did not define the precise improvements that should be made but discussed several options, including transit lanes, a mall, a mall with transit centers and a tunnel in downtown Seattle.

* * *

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The draft EIS looked at five basic project alternatives in detail, including no action. It also studied numerous options for implementing these alternatives.

Metro identified a preferred alternative to help focus planning and discussion consistent with the federal impact statement rules. These rules require a preferred alternative to be identified in the final EIS.

The preferred alternative--an electric bus transit tunnel, along with surface improvements on Third Avenue and Pine Street and an electric circulation system around downtown--has been refined in response to comments, further planning and continued environmental review. It is described in Chapter 2.

The preliminary engineering and consultation with public agencies and interested citizens that have occurred over the past year have helped to better define the proposal, identify potential impacts and mitigating measures and integrate the environmental studies and project planning. The agencies have tried hard to preserve as many options as possible and have not committed themselves to any of the alternatives under consideration.

The preferred alternative has evolved from a combination of the various alternatives in the draft EIS, as is common in the planning and EIS process. For example, the draft EIS discussed a tunnel under Third or Fourth avenues and cut-and-cover and bored construction methods. The preferred alternative currently proposes a tunnel under Third Avenue constructed by the bored method. The Pine Street segment and station areas would be constructed by the cut-and-cover method. The transit/pedestrian mall concept has evolved into wider sidewalks and other improvements on Third Avenue and Pine Street, along with a better "circulator" system for moving people around downtown. Use of Third Avenue and Pine Street by general traffic would also be maintained.

Since the draft EIS was issued last March, the agencies have spent a lot of time studying and responding to comments on the alternatives and their impacts. As a result, additional details on the preferred alternative, which was the focus of most of the comments, comprise most of the final EIS. The final EIS compares all of the alternatives, but tries to avoid repeating information in the draft EIS.

A labelling change in the final EIS should also be noted to avoid confusion. The final EIS considers the Non-intercept Mall alternative as a Transportation Systems Management alternative because of cost, operational characteristics and desire to have a TSM alternative that could meet more of the project's objectives than the other TSM options in the draft (see chapters 2 and 7). The environmental impacts, however, remain as described in the draft EIS.

* * *

In an EIS, an agency is required to identify, but not commit to, mitigation measures. Thus, mitigation measures in this EIS include those under consideration as well as those the agencies are committed to implementing.

Mitigation measures under consideration are typically described as measures that "might" or "could" be taken. Mitigation measures to which one or more agencies are committed are typically phrased "will" or "would" be taken or are already included in the proposal.

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Decisions on mitigation commitments are made by the agencies as part of their decisions on the proposed alternatives. The commitments are then included in the appropriate decision documents of the agencies (for example, the federal "record of decision" or Metro project authorization resolution).

As noted below, the agencies will continue to work with those affected by or interested in the project during final design and construction to make sure that mitigation measures are incorporated into design and implementation.

* * *

This is not an EIS on a rapid rail transit system for the Puget Sound or King County region. The proposal before UMTA, the City of Seattle and Metro is to improve the transit system in downtown Seattle for the near and mid term.

Several agencies in the region, including the agencies involved in the Downtown Seattle Transit Project, are studying a rail system for the long term. A North Corridor Alternatives Analysis, funded by UMTA, has been conducted by the Puget Sound Council of Governments and Metro. This analysis identified Interstate 5 north of Seattle's downtown as the most promising alignment for major transportation improvements and buses or light-rail transit in a CBD tunnel as the leading technology. This led to the long-term Multi Corridor Project which is refining the north corridor work and is analyzing "east" and "south" mass transit corridors and their relationship to the north corridor. The purpose of the Multi Corridor Project is to determine if and when a regional rail system would be needed, the implementation schedule for system components and the system's financial feasibility. The lead time to plan, design, fund and construct a regional rail system would take considerably longer than the Downtown Seattle Transit project.

For these and other reasons, transit project planning has been divided into the "near/mid term" (the 1990s) and the "longer-term" (after the 1990s). Effort has been put into developing Downtown Seattle Transit Project alternatives that could be converted to fixed guideway or light rail. This approach enables the Downtown Seattle Transit Project to address problems now and in the near future. The approach allows regional, systemwide planning to be done for longer-term needs. The timing of the Downtown Seattle Transit Project has been coordinated with longer-term project planning so that the alternative selected for downtown Seattle would be compatible with the longer-term options identified.

* * *

Nor is this an EIS on overall plans, goals or growth management of Seattle, King County, other cities or towns. These agencies periodically review and revise their goals and plans. The City of Seattle has adopted the policy provisions of a new Downtown Land Use and Transportation Plan and accompanying interim zoning. King County has adopted its General Development Guide.

These city and county plans reflect a wide range of political, social, economic, environmental and other values. Because the transit system is related to local land-use plans, the consistency between the proposal and these plans is discussed in this EIS. However, it would be impossible, as well as inappropriate, for the region's planning goals, land use and growth management issues to be decided in the context of the Downtown Seattle Transit Project.

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Readers who believe that the city, county or regional agency should raise or lower the level of growth assumed in this EIS may wish to urge those bodies to adopt different comprehensive and land-use goals and plans to promote or control growth. The purpose of this project is to accommodate the planned population.

* * *

The process of exploring and developing alternatives took three years and involved public and agency discussion as well as technical analysis. Metro also periodically mailed special bulletins to over 4,000 people who expressed an interest in the project.

An open process has been maintained throughout the planning and environmental study process. Numerous designs of transit malls, transit centers, transit stations, ramps and other facilities were examined and revised as a result of citizen comments, advisory committee meetings and technical analysis. This effort was made so that high quality alternatives could be proposed in the EIS to meet transit and urban design objectives.

The planning process for a proposal as complex as this occurs in many phases. As noted, the 1990 Plan and EIS defined the general scope and need for the improvements in downtown Seattle. The decision before the agencies at this time is which project alternative, if any, to select and/or to fund for final design. The current decision also includes related steps, such as land acquisition. If an action alternative is selected, the agencies would proceed with additional engineering and final design. Approval of final design and authorization for construction are needed before actual construction and operation occur.

There are design considerations and mitigation measures associated with all of these phases. The environmental impact statement process ends with this final EIS unless later actions warrant additional environmental review, in which case a supplemental EIS or other environmental document (such as an addendum or environmental assessment) would be prepared by the appropriate agency.

The process of consulting with interested groups and agencies does not end with the final EIS. It is important that design considerations, mitigation measures and handling of unanticipated problems that may arise in later project phases be implemented within the framework described in the EIS and the upcoming decision. The EIS identifies procedures that would be used in later phases for consulting with historic preservation officers and boards, for example, and proposes to continue working with various community organizations during project design and construction.

* * *

The EIS consists of both the draft and final documents and is supported by technical appendices and reports. Given the unusual scope and complexity of the proposal, an effort has been made to keep the final EIS concise and usable for decisionmakers, in accord with the intent of the environmental impact statement regulations. Readers should refer to the draft EIS for detailed information on the environmental impacts of most of the alternatives, as they have not changed since the draft was issued (information on these impacts is also included in the comparative analysis in Chapter 2 and the response to comments in Chapter 8). The draft EIS and its foreword also provide additional information on the purpose of the proposal and EIS.

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Chapter 1 describes the need for and the objectives of the project. Chapter 2 defines the physical and operating characteristics of the alternatives and construction approaches. Chapter 2 also compares all the alternatives and impacts based on the analysis in the draft and final EIS documents. Chapter 3 summarizes the existing conditions and likely 1990 conditions if the action alternatives are not implemented. Chapters 4 and 5 provide detailed information on probable transportation and environmental impacts, focusing on the preferred alternative. Chapter 6 addresses existing conditions and impacts to parklands and historic properties. These elements of the environment are addressed separately to facilitate compliance with regulations protecting parklands and historic properties. Chapter 7 provides a comparative evaluation of the No Action, TSM/Non-intercept Mall, and Tunnel alternatives in more detail than Chapter 2, to satisfy UMTA's capital investment policy. Chapter 8 identifies issues raised in comments on the draft EIS and responses. References, a list of acronyms and a glossary are included with the appendices.

Additional detail on many of the issues is available in the technical reports on which this document is based. Because of the continuous technical and public review and discussion summarized earlier, not every alternative or analysis was put into a written report. Many earlier written reports have been superseded by later analysis. The completed background reports are available to the public at the Metro library, eighth floor, Exchange Building, 821 Second Avenue. Since some documents are long, please allow enough time to read them if you wish to refer to them.

Several related documents are also available for public review at Metro's library. Public and agency comments on the draft EIS are provided with agency responses in a Public Comment Document. Documents describing the eligibility of properties for historic register status and formal "determinations of effect" on historic properties have also been prepared.

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SUMMARY

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SUMMARY

1. Purpose of the Environmental Impact Statement

2. Need for the Project

3. Alternatives Considered

4. Significant Environmental Impacts

5. Issues to be Resolved

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SUMMARY

1. Purpose of the Environmental Impact Statement

This environmental impact statement informs government agencies and interested citizens about proposed transit project alternatives. The EIS assesses probable adverse environmental impacts and the measures to mitigate or eliminate them.

The EIS meets the state and national environmental policy acts' (SEPA and NEPA) requirements and recognizes that the purpose of an EIS is better served by concise documents which summarize or reference detailed technical data. The document is based on an extensive series of supporting technical reports which are available for review in Metro's library.

Interested citizens and government agencies were invited to review and comment on the draft EIS during the review period. A public hearing was also held to receive comments. This final EIS reflects the comments on the draft EIS by incorporating additional material or modifying the text or by directly responding to specific issues in Chapter 8.

Many comments on the draft EIS requested additional information on the Metro Council's preferred alternative. Since the draft EIS was issued, Metro has conducted preliminary engineering to refine the council's preferred alternative and to improve the analysis of environmental impacts. This final EIS focuses on the Metro Council's preferred alternative as it has evolved during preliminary engineering.

Because there have been no revisions to the Transportation System Management (TSM), Non-intercept Mall and Mall with Transit Centers alternatives, the descriptions of these alternatives are summarized in Chapter 2. Because their environmental impacts also remain the same as described in the draft EIS, the discussion is not repeated in this document. The impacts and costs of the Non-intercept Mall as a TSM alternative and the preferred alternative are compared in Chapter 7 to comply with Urban Mass Transportation Administration requirements. Text and series of tables in Section 2.2 compare all the alternatives and their environmental impacts. Readers needing additional detail on these alternatives should refer to the draft EIS.

Although the Metro Council and the Seattle City Council selected a preferred alternative for preliminary engineering (see Chapter 2), none of the alternatives in the document have been dropped from consideration. The Metro Council, City of Seattle and the UMTA will use the draft and final EISs to make decisions on the proposal.

2. Need for the Project

See Chapter 1 for additional discussion.

Seattle's topography limits expansion of its transportation network. The Seattle Central Business District, constrained by Elliott Bay on the west and Interstate 5 on the east, limits north-south CBD travel to a few streets. East-west travel in the CBD is hindered by steep streets with grades up to 18 percent.

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The 25 percent growth in CBD employment which occurred between 1970 and 1980 is expected to be repeated between 1980 and 1990. Transit absorbed the additional commuters in the 1970s and is expected to absorb most of the increase in peak-hour travel through 1990. This increase in transit demand is expected to increase the proportion of commuters using transit during the peak hour from the current 40 percent to 55 percent in 1990. This project is intended to increase the efficiency of transit service in and through downtown Seattle and contribute to the vitality of downtown and the region.

Although general traffic moves relatively well at most intersections in downtown Seattle, bus operation is severely hindered by bus queues and turning conflicts with pedestrian and general traffic. Downtown congestion also reduces schedule reliability. Schedule reliability is a key factor in attracting and maintaining ridership.

Downtown congestion also reduces transit travel speed. Average peak-hour bus speed in the CBD is expected to decrease from the current 5 mph to about 3.5 mph in 1990 if downtown congestion is not solved. The commuter's travel time would increase significantly. For example, a rider commuting to the Federal Way park-and-ride lot currently spends 26 percent of commute time traveling the 6 percent of the trip in the CBD. In 1990, the CBD portion of the trip would account for 36 percent of the travel time if downtown transit improvements are not in place. More bus service hours are spent downtown because of slower bus speeds. These higher operating costs affect regional service because a finite operating budget must be spent on inefficient downtown travel resulting in fewer service hours for neighborhood or suburban routes.

Downtown sidewalks offer minimal space for transit waiting areas and shelters that protect transit riders from the weather. The shelters and the persons waiting to board buses restrict pedestrian circulation. Providing adequate pedestrian space for transit facilities is a project objective.

Downtown transit circulation is provided by bus routes serving persons traveling to and from downtown. Circulation service within downtown is perceived to be infrequent, unreliable and not easily understood during off-peak periods, evenings and weekends. Between the downtown core and adjacent neighborhoods, transit service is limited to a few east-west routes because of the topography and the one-way street system.

Metro has steadily increased the number of buses to respond to growing demand resulting in lines of buses on CBD streets during the peak hours. Diesel-fueled buses also contribute to the air and noise pollution in the CBD. Reducing noise, exhaust and the wall of buses image are among the Downtown Seattle Transit Project objectives.

Numerous Transportation System Management measures--exclusive transit lanes and freeway ramps, bus only lanes, advanced traffic signal green lights for transit, a ride-free zone, skip-stop operation, a peak-hour fare surcharge and the use of articulated buses to minimize the number of buses downtown--have temporarily relieved increasing congestion. These remedies, however, cannot adequately accommodate transit needs and would not provide the capacity needed by 1990. Four action alternatives have been developed as possible solutions to downtown and regional transit problems.

3. Alternatives Considered

See Section 2.1 and the draft EIS for additional detail.

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Four action alternatives were examined, three of which include several options. An independent transit circulation system for the downtown which would supplement through-bus service has been developed for each of the action alternatives. The circulation system would use trolleybuses to provide local service for First Avenue and service from the CBD to First Hill. All transit center options would require a circulation system, but these requirements would be minimal outside peak commuting periods.

All action alternatives would include constructing a transit-only roadway through the Union Station Corridor to the proposed transit-only freeway ramps from I-5 and I-90. This roadway would begin near Fourth Avenue South and South Washington Street and extend south parallel to the existing Union Pacific Railroad tracks to connect with the transit-only I-5/I-90 freeway ramps at Airport Way South.

Preferred Alternative

Tunnel

The Tunnel alternative would provide a two-lane underground roadway for buses from Union Station to the Ninth and Pine area (see Figures 2-6 through 2-19). Five passenger stations, including one at each end, would be constructed along the alignment. The tunnel would be designed to permit potential conversion to fixed guideway or light-rail transit (LRT) use.

Two alignments were considered in the draft EIS--under Third Avenue and Pine Street and under Fourth Avenue and Pine Street. Both cut-and-cover and boring tunnel construction techniques were considered. A surface transit mall was included as part of the Third and Pine Tunnel.

On Nov. 3, 1983, the Metro Council unanimously approved Resolution No. 4243 which identified an electric-only transit tunnel with a circulation system and surface improvements as its preferred alternative. Preliminary engineering has been conducted on the Metro Council's preferred alternative since the draft EIS was issued. Engineering, environmental, transit operations and cost considerations have been included in ongoing design for the tunnel. As further described in Chapter 2, a number of options noted in the draft EIS have been refined. These include 1) specifying Third Avenue and Pine Street as the tunnel alignment; 2) specifying portal stations at Ninth and Pine and at Union Station and three intermediate locations at James Street, University Street, and Westlake Mall; 3) specifying the characteristics of surface improvements and the surface circulation system; and 4) specifying a bored-tunnel construction approach for most of the tunnel and cut-and-cover construction for intermediate stations and for most of Pine Street.

The exact location of access points for the stations has not been completely determined. Section 2.1 identifies locations where access is currently planned. The section also acknowledges, however, that other access points adjacent to stations may be selected during final design.

Metro Council's preferred alternative resolution (see Appendix K) also notes that identifying a preferred alternative neither limits the choice of reasonable alternatives available nor represents a decision to authorize or construct a particular alternative.

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Non-Preferred Alternatives

A. No Action

The No Action alternative assumes the 1990 Metro Comprehensive Plan for Public Transportation in King County would be implemented except for provision directing capital investment to ease downtown congestion.

Ordinary system management and planning efforts would include: adjusting schedules, adding service, reallocating service among CBD streets and ramps to take advantage of unused existing street and sidewalk capacity, relocating and splitting bus stops and other similar strategies.

Bypass routes which do not travel through CBD streets are included in the adopted transit plan and in the No Action alternative to reduce transit rider trips through the CBD. This alternative would be compatible with the proposed transit connection between the I-5/I-90 interchange and the Seattle CBD.

All existing transit-preference features in the CBD are assumed to remain, including the peak-period, with-flow bus lanes on Second and Fourth avenues and the contraflow bus lane on Fifth Avenue. The No Action and Transportation System Management alternatives also serve as baselines to compare the costs and benefits of higher service alternatives.

B. Transportation System Management (TSM)

Transportation System Management would improve the efficiency of existing roadways without major new capital investment. The TSM alternative attempts to meet project objectives through limited capital investments and intensive management of the transportation system to provide preferential treatment for transit.

The Third Avenue Transit Street (TSM Mall) would be a low-cost transit mall on Third Avenue (see Figure 2-1). Third Avenue between Stewart Street and Prefontaine Place would be restricted to buses from 6 a.m. to 6 p.m., Monday through Saturday. Additional contraflow bus lanes, I-5 ramp modifications, parking restrictions, traffic signal adjustments, a flextime promotion program and the continuation of existing TSM elements would be included in this option.

The second TSM option would be based on two transit-only contraflow lanes on Second and Fourth avenues between Jackson and Stewart streets (see Figure 2-2). Two contraflow lanes would operate 24 hours a day with bus-only traffic between 7 and 9 a.m. and between 3 and 6 p.m. Truck traffic could also use the lanes during other hours. This option would include an additional contraflow bus lane on Stewart Street, traffic signal adjustments, parking restrictions, a flextime promotion program and the continuation of existing TSM improvements.

As noted in Chapter 2, the TSM alternatives described above failed to meet several of the project objectives. Therefore, the Non-intercept Mall is used in this document as a lower-cost alternative for comparison with the Tunnel alternative.

The Non-intercept Mall (TSM) would be a modification of the TSM Mall. Only buses would operate on the Third and Pine mall most of the time, sidewalks would be widened,

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pedestrian amenities and other urban design improvements would be added, and bus stops would be rearranged for more efficient use (see Figure 2-3). High dual-power and electric bus volumes would use Third Avenue and Pine Street, minimizing the effects of diesel exhaust odor and noise.

The I-5 reversible ramp at Pine Street would be converted to a bus-only ramp. The I-5 reversible ramp at Cherry Street would revert to a general traffic ramp.

C. Mall with Transit Centers

The Mall with Transit Center alternative addresses project objectives with an all-electric transit mall on the same alignment as the Non-intercept Mall. Incoming passengers would arrive at a transit center on diesel buses and transfer to electric trolleybuses or walk to their destination. Conversely, passengers leaving the CBD would walk or ride a trolleybus to the transit center and transfer to suburb-bound diesel buses. The transit mall would connect the two transit centers. Sidewalks would be widened on Pine Street with all the transit center options. Third Avenue sidewalks would be widened only with the close-in terminal option.

The alternative has six options that differ in the size and location of their transit centers and the number of vehicles intercepted. Options with peripheral transit centers would involve locations near either Yesler Street or Union Station in the south and near Ninth and Pine Street in the north (see Figure 2-4). Transit centers would be constructed to intercept either 150 or 90 diesel buses in the peak hour. The smaller transit centers (stations) would require a considerably greater number of dual-power buses than the larger transit centers (terminals) (see Figure 2-5). More dual-power buses would be needed because they would switch to electric power and travel on the mall rather than turn around at the transit centers. Close-in transit centers would be located at Third Avenue and Pine Street in the north and at Fourth Avenue and Columbia Street in the south and connect with mini-stations at the downtown periphery via underground access tunnels. Close-in centers could be designed to intercept either 150 or 90 diesel buses in the peak hour.

4. Significant Environmental Impacts

(Environmental impacts which would occur during construction and operation are addressed in Chapters 4, 5 and 6.)

Although the construction period for the alternatives would vary in duration and extent, all action alternatives would generate additional noise and dust during construction. Traffic would be rerouted disrupting downtown circulation. Employee, customer and truck access to businesses, stores, offices and other downtown uses would be somewhat disrupted during construction. Surface construction in the downtown retail area would cease during the holiday shopping period. There may also be a storm-water pipe constructed to carry street runoff under James Street and Yesler Way to Elliott Bay.

The non-preferred alternatives would displace some businesses and parking to provide a connection to the I-5/I-90 transit ramps at Airport Way South. Displacement of additional businesses and residents would occur with some action alternatives (see Table S-1).

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Although all action alternatives would provide the transit capacity needed to serve ridership projections for 1990, the options differ in their attractiveness to potential riders. As discussed in Chapter 4, the number of transfers and the total travel time associated with each option would influence the number of riders attracted to the transit system. In 1990, for example, the relatively high number of transfers associated with the Mall with Transit Center alternative would reduce the number of riders attracted to the system compared with the other action alternatives.

Transit improvements would produce greater reliability and higher average bus speeds in the CBD which would shorten bus trip time and lower operating costs compared with No Action. In addition to the transportation benefits, higher average travel speeds would improve air quality, noise and energy consumption.

The overall general traffic circulation would not be significantly affected by any alternative. There would be a small energy and air quality benefit with any action alternative. All of the action alternatives would require detaining or diverting storm water from the combined sewer system. While diverting storm water would reduce the frequency of sewer overflows, storm water would then enter a receiving body directly.

Preferred Alternative

Tunnel

A transit tunnel in Seattle's central business district would increase the ridership capacity of the system to and from downtown. By increasing accessibility to the CBD, the tunnel would maintain Seattle's viability and accommodate planned downtown growth. The tunnel is consistent with Metro and Puget Sound Council of Governments plans and with Seattle and King County land-use plans.

In contrast to other alternatives evaluated in this EIS, the transit tunnel would provide additional street capacity in the CBD. The additional street capacity for buses would enable Metro to operate fewer buses on surface streets reducing surface congestion and improves general traffic flow.

A separate transit roadway would benefit the transit system by reducing conflicts with pedestrians and general traffic. Tunnel buses would offer better schedule reliability and improved travel time through the CBD. Compared with No Action, the average peak-hour transit rider would save seven minutes of CBD travel time with the Tunnel alternative. Tunnel bus riders would save nine minutes of CBD travel time compared to No Action.

This, in turn, would increase the attractiveness of the transit system. Metro expects 1990 peak hour ridership to increase from 25,000 with No Action to almost 30,000 with the Tunnel alternative. Peak-hour CBD ridership capacity would increase from the 25,000 capacity limit expected to be reached with No Action in 1985 to 43,000 with the Tunnel alternative, which would be reached in approximately 2003.

Faster CBD travel time would also reduce Metro's energy and operating costs. As noted in Chapter 2, the Tunnel alternative would save $4.4 million in 1990 operating cost compared with No Action. In the year 2000, the tunnel would be operating closer to its capacity and annual savings would be $8.7 million compared with No Action. Lower operating costs and better service to Seattle and the region would benefit the entire transit system.

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The urban environment would also benefit. Fewer diesel buses downtown would reduce diesel bus exhaust, emissions, odor and noise. A downtown circulation system would make it easier for people to travel within downtown without automobiles. Wider sidewalks and street amenities would ease sidewalk congestion and improve patron access to the transit system.

These benefits do not come without any associated costs. Although Metro's operating costs would decrease, the capital cost of the preferred alternative is estimated to be $416 million. The financial plan assumes that these costs would be paid for by Metro and the Federal Urban Mass Transportation Administration. Some of the costs may be deferred by contributions from the Washington Department of Transportation, the City of Seattle, private utilities and businesses in the downtown Seattle business district.

The portal stations for the project would require Metro to acquire many of the same properties as the peripheral transit centers option. As summarized in Table S-1 and discussed in Section 5.3, up to 36 businesses would be displaced at least during construction and 18 residents would be permanently displaced. In addition to providing relocation assistance, Metro would contribute to the City of Seattle housing funds approximating the replacement cost for the 16 low-income housing units lost at the Best Apartments.

The wider sidewalks proposed as part of the surface improvements would displace existing off-peak street parking on Third Avenue and Pine Street. Some curbside load zones would also be eliminated. The additional trolley routes proposed as part of the circulation system would require additional overhead wire on First Hill and lesser amounts at other locations. More detail on these elements is available in chapters 2 and 4.

The benefits during the operation of the tunnel would be achieved at the expense of significant disruption during construction. Although the bored segments of the tunnel would have minimal impacts, about 40 percent of the alignment would be constructed by cut-and-cover techniques. Two cut-and-cover construction strategies described in Chapter 2 allow decision-makers to choose between total street closure for approximately nine to 14 months and closing part of the street for up to 29 months in areas with cut-and-cover construction.

The tunnel is the only alternative with possible soils-related impacts. The tunnel would require deep excavations at some locations that could cause settlement and consequent damage to nearby pavement, utilities and buildings. To minimize this possibility, several engineering approaches would be used to protect foundations near tunnel and station excavations. These approaches include underpinning to support building foundations, grouting to consolidate soils and tie-back shoring to minimize ground settling.

The State Historic Preservation Officer has determined that the tunnel station and lid at Union Station would have an adverse effect on the Union Station building, which is on the National Register of Historic Places. However, a Memorandum of Agreement has been signed which specifies measures which would be taken to minimize adverse effects. A formal determination of the significance of these effects on the historic properties is discussed in Chapter 6.

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Non-Preferred Alternatives

A. No Action

No Action would steadily increase congestion and, therefore, peak-hour travel times and transit operating costs. Diesel exhaust, odor and noise would increase compared with today because there would be a 20 percent increase in the number of diesel buses in the CBD during the peak hour. Ridership capacity would be reached in 1985.

The No Action alternative would not require public funds for capital facility costs in downtown Seattle. Existing businesses and residents would not be displaced. Construction impacts would also be avoided or at least delayed.

B. Transportation System Management (TSM)

The TSM alternative would provide a cost-effective but short-lived response to CBD transit problems. This alternative would reach its rider-carrying capacity by 1991. With TSM options, on-street parking and delivery zones would be displaced, at least during peak hours. Although the peak-hour volume of diesel buses in the CBD would be about the same as No Action, the higher average bus speed would lessen diesel exhaust odor and noise. Diesel exhaust odor and noise, however, would still be higher than existing conditions.

TSM alternatives, however, would be relatively inexpensive and would only displace existing businesses for the I-5/I-90 connection. Construction impacts would be relatively minor and short-lived.

The Non-intercept Mall (TSM) would have impacts similar to other the TSM options--few businesses would be displaced but parking and delivery zones would be eliminated along the mall. High dual-power and electric bus volumes would use Third Avenue and Pine Street minimizing the effects of diesel exhaust, odor and noise. Ridership capacity would be reached in 1991.

The higher cost of this mall would substantially improve the urban design compared with the lower cost TSM Mall. Wider sidewalks to ease pedestrian congestion would be especially important. Third Avenue and Pine Street reconstruction would take two years or approximately 23 weeks per block.

C. Mall with Transit Centers

The Mall with Transit Centers alternative would displace businesses and residences at the transit center locations and the I-5/I-90 connection. As shown in Table S-1, close-in transit centers have greater displacement impacts than the peripheral transit center locations. Many residents of the Best Apartments at the Ninth and Pine site and the Pacific Hotel at the Fourth and Columbia site are low-income. For additional information on displacement, refer to Section 5.3.

The elimination of most diesel buses from Third Avenue and Pine Street would significantly reduce diesel exhaust odor and noise along the mall. A noticeable increase in noise would occur at the transit centers from buses waiting to gain access to either peripheral or close-in transit centers.

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TABLE S-1

SUMMARY OF PROBABLE DISPLACEMENT IMPACTS

Alternative	Number of Residents	Number of Businesses	Number of Buildings
No Action	0	0	0
Transportation System Management	0	5	2
Non-intercept Mall (TSM)	0	5	2
Mall with Peripheral Transit Centers	18	14	13
Mall with Close-in Transit Centers	123	49	20
Third Avenue Tunnel	18	35	18
Fourth Avenue Tunnel	18	36	12

The transfer to electric circulator or shuttle vehicles would add an extra transfer for most express bus riders. The inconvenience of the additional transfer would be partially offset by the comfortable transit center environment.

Access to the mall from the Yesler site peripheral transit center would require reconfiguration of City Hall Park. The construction of an access tunnel to the south close-in transit center would require dismantling and reconstructing the Yesler Street Bridge, which is on the National Register of Historic Places.

Impacts of the mall construction would be similar to the Non-intercept Mall because individual blocks would be under construction for 23 weeks at a time. Transit center construction would occur simultaneously and would have impacts similar to those encountered during the construction of a major downtown office building.

The access tunnels for the close-in transit centers would be constructed using the cut-and-cover method. After the old street surface is removed, the street would be decked over to provide at least two traffic lanes while construction proceeds below.

The Mall with Terminals options and the Mall with Stations options would reach ridership capacity in 1993 and 1991, respectively.

5. Areas of Controversy

The major controversial areas identified in the draft EIS were:

- The degree of impact on retail sales by displacing automobiles from city streets for a transit mall. Some downtown merchants feel that reducing window display exposure and automobile access would reduce sales.

- The degree of impact on neighborhoods adjacent to the CBD. One concern is that tunnel stations or transit centers would attract commuters who would park in downtown neighborhoods before traveling on buses to CBD destinations. Adjacent neighborhoods are also concerned about the potential for more intense development pressure near the Ninth and Pine and the Union Station transit facilities.

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Two additional areas of controversy were identified in comments on the draft EIS:

- Some reviewers questioned the operational feasibility of the dual-power bus and Metro's ability to have a sufficiently large fleet operating to effectively use tunnel capacity when it is completed.

- Several citizens' groups contend that a bus tunnel under downtown Seattle would be too expensive a solution. They contend that regional transit service would suffer because the project would consume a disproportionate share of the transit system's budget.

6. Issues to be Resolved

The primary decision is to select the best alternative analyzed in the EIS for implementation. If an action alternative mutually acceptable to Metro, the City of Seattle and UMTA is selected, the next major issue is the funding source for the project. Possible funding sources are identified in Section 7.2, but a specific funding plan has not been prepared. This would depend on the alternative selected and available funding and financing sources. Because President Reagan's proposed 1986 federal budget does not include funding for major new transit projects, federal funding of this project is uncertain. Third, several decisions need to be made regarding the extent and method of reducing or eliminating impacts identified in the EIS.

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CHAPTER ONE
PURPOSE AND NEED

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PURPOSE AND NEED

1.1 Transportation Facilities and Services in the Study Area

1.2 General Need for Improvements

1.3 Specific Transportation Problems in Downtown

1.4 Detrimental Impacts to Transit Performance

1.5 Negative Environmental Consequences

1.6 Conclusion

1.7 Transportation Goals and Analysis

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CHAPTER 1

PURPOSE AND NEED

Tremendous population and employment growth has occurred in the Puget Sound region during the past decade (see Figure 1-1) . Downtown Seattle's ability to continue as the preeminent activity center in the region is partly dependent on people's ability to reach and travel within the downtown. Public transit has played a critical role in serving a growing number of downtown commuters on a limited and topographically restricted downtown street system. During the past five to seven years, however, the high volume of vehicles, including buses, traveling through downtown during the peak hours has created heavy congestion in the area.

Downtown and regional transit service have become increasingly inefficient and unreliable. Buses now travel through downtown at an average speed of 5 mph during peak hours. This speed is expected to drop to 3.5 mph by 1990. Downtown congestion has reduced the reliability of schedules and added unnecessary time to commuter trips throughout the region.

Public transportation's ability to maintain its share of commuter trips and downtown's ability to accommodate and control anticipated growth during the next 10 years will depend on resolving downtown congestion and developing efficient transit service in downtown.

The Downtown Seattle Transit Project examines alternative means to remedy existing downtown transit congestion and provide adequate transit capacity for the ridership anticipated by 1990 and beyond.

A reduction in downtown Seattle transit congestion would benefit all of Metro's riders living within or outside the city limits. By 1990, 40 percent of bus riders in the CBD in the peak hour will live outside the Seattle city limits. The region needs better transit through downtown Seattle to reduce commuter travel time and improve schedule reliability. Higher transit speeds would reduce energy consumption, economic costs and air pollution and noise. Furthermore, the project is a component of Metro and regional plans to improve transit through the CBD and to make the CBD an integral link for regional activity centers.

1.1 Transportation Facilities and Services in the Study Area

1.1.1 Study Area

The study area of the Downtown Seattle Transit Project is bounded by Denny Way on the north, Interstate 5 on the east, Royal Brougham Way on the south and Elliott Bay on the west (see Figure 1-2). The project's direct and indirect impacts will be within this area. The First Hill area which is north and east of the study area may also be affected because of potential new circulation services to complement the improvements within the study area. Bus riders in King, Pierce and Snohomish counties would notice improved scheduling and faster trips on the downtown routes serving those areas.

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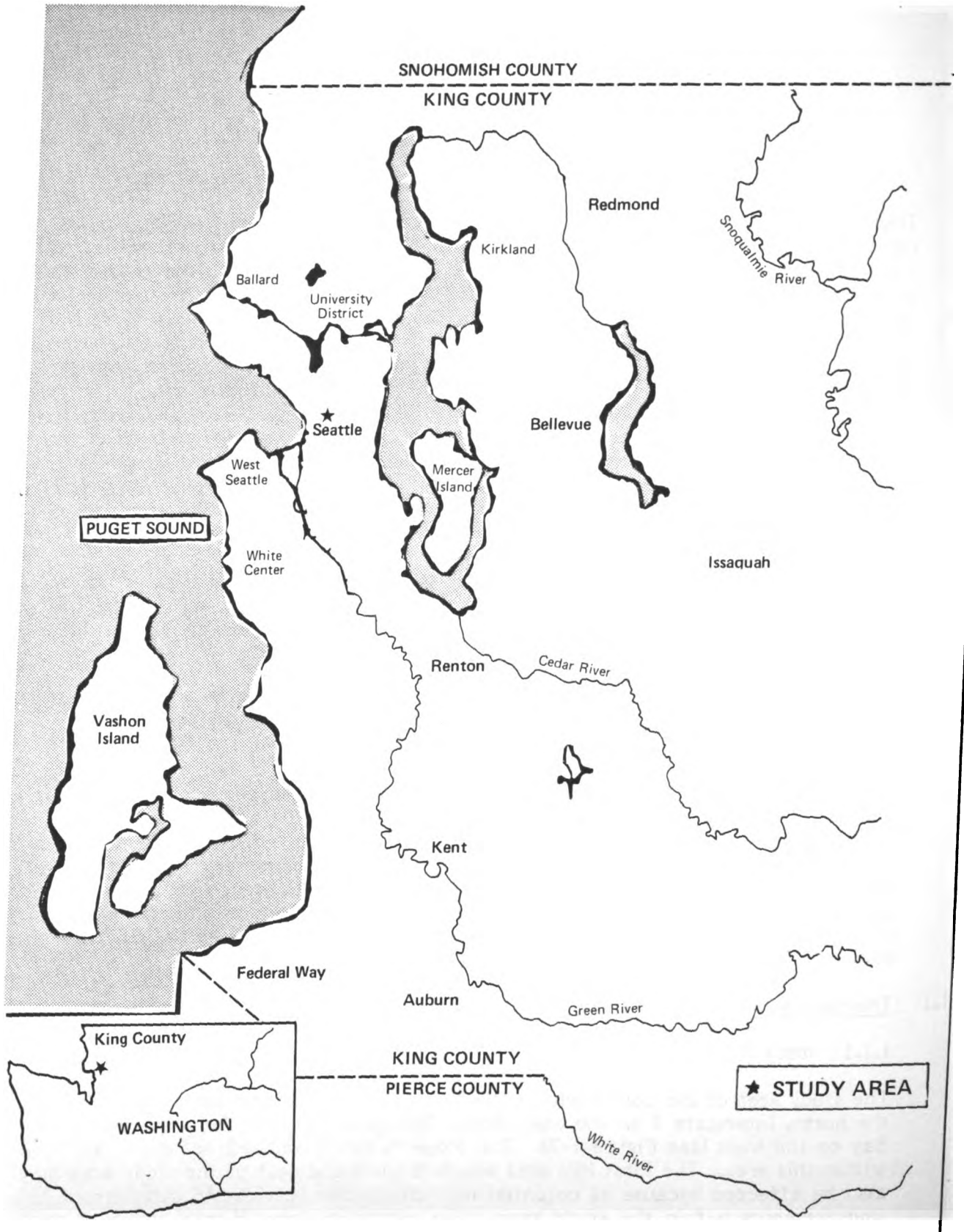

FIGURE 1-1

Area/vicinity map

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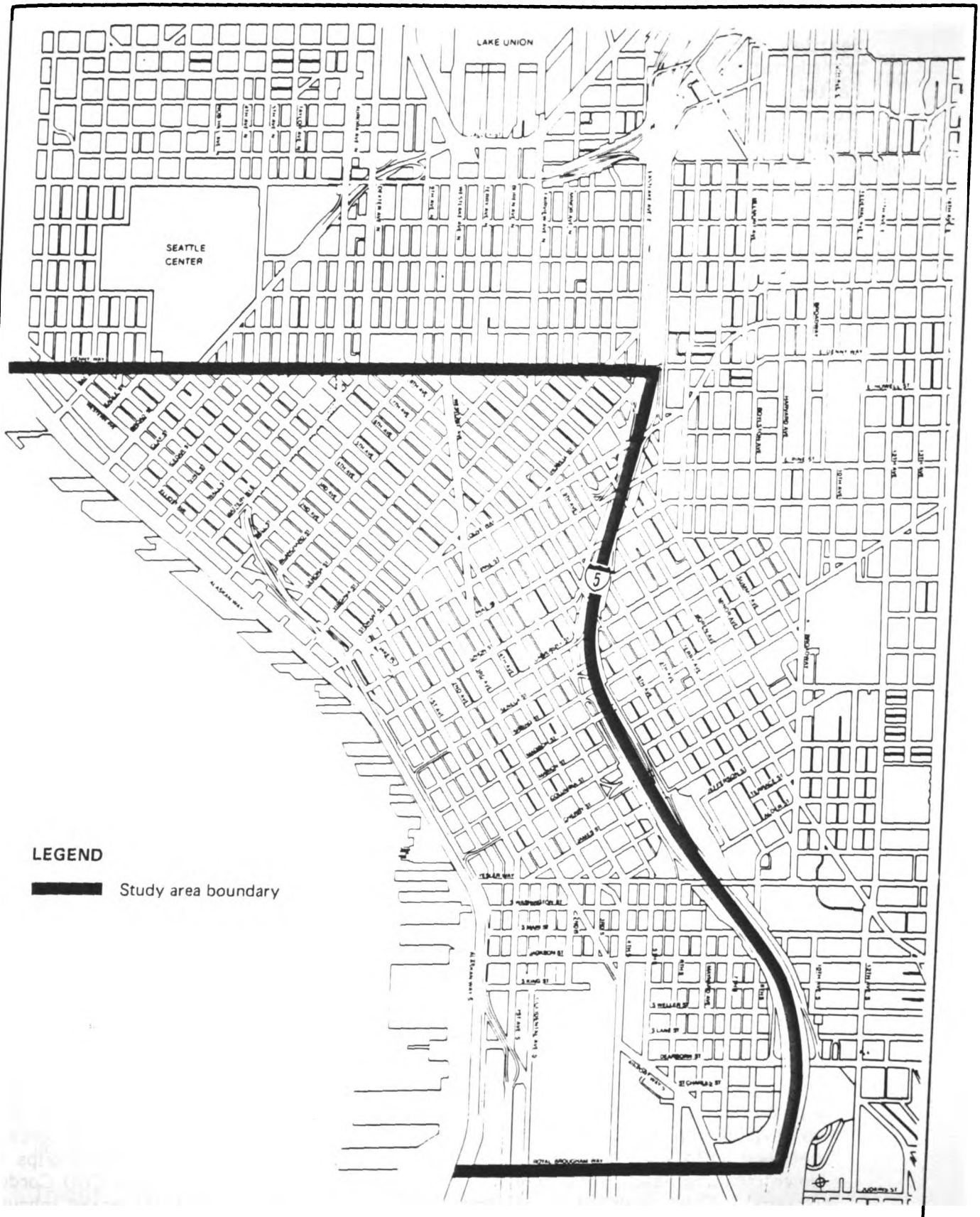

DOWNTOWN SEATTLE TRANSIT PROJECT

METRO City of Seattle

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FIGURE 1-2

Study Area

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Seattle's Central Business District is the focus of the Puget Sound regional transportation system because of its location and dominance as the region's largest center for business, governmental and cultural activities. Interstate 5 and State Route 99 accommodate north-south travel to the CBD. Interstate 90 and State Route 520 connect the CBD and Eastside communities. The Seattle to Bremerton and Seattle to Winslow ferries extend the regional highway system across Puget Sound. Existing arterial and freeway approaches are near capacity and, except for the I-90 improvements, will not be significantly expanded in the future. Washington Department of Transportation's highway and HOV improvements will improve transit access to Seattle from the east and south.

1.1.2 CBD Transportation Facilities

Downtown Seattle is a dense urban core encompassing approximately 1.4 square miles. Downtown Seattle has six major streets that run north-south, generally parallel to I-5. Numerous streets connect the downtown to the freeway and facilitate east-west movement. Many streets are constrained by steep grades. Pedestrian travel often is restricted by narrow sidewalks that are frequently inadequate to handle the volume of passersby and bus-stop waiting areas.

Bus congestion in the CBD is a critical problem because of the central role the CBD plays in the regional transit network. The transit network consists of express and local routes. Local routes serve downtown and most areas within the city limits as well as major suburban areas. The CBD also is a transfer point for regional travel. The express routes operate principally on the freeways and arterials with access to downtown. Downtown also has a monorail and waterfront streetcar, but neither plays a primary access role.

1.2 General Need for Improvements

1.2.1 Congestion Effect on Downtown Vitality

Maintaining and enhancing downtown Seattle's vitality is a goal of King County, the City of Seattle, and the Puget Sound Council of Governments and the focus of land-use and transportation policies. These local governments are working to concentrate additional employment and retail activity in the CBD and four other regional activity centers to reduce public infrastructure costs (streets, transit, water and sewer) and the environmental and economic costs of urban sprawl.

Downtown Seattle contributes a significant share to the City's total general tax revenue. The City's community development department's urban research office estimates that over 25 percent of Seattle's revenue comes from downtown. Downtown's continued vitality and growth would significantly influence the City of Seattle's ability to finance the services provided to all Seattle neighborhoods.

Increasingly congested downtown streets and inadequate internal circulation, however, are seriously threatening planned growth in the CBD. During the 1970s, employment in the study area grew by 25.3 percent, from 91,703 employees in 1970 to 114,296 employees in 1980 (PSCOG 1983). CBD office space increased 39 percent between 1975 and 1982. At the same time, inbound peak-hour vehicle trips to downtown decreased from 20,664 in 1977 to 17,575 in 1982 (SED Annual CBD Cordon Counts). This combination of increased CBD employment and decreased inbound

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peak-hour vehicle trips suggests that the proportion of transit and carpool riders has increased substantially. Metro statistics show that peak-hour travel increased 100 percent during the 1970s.

Between 1980 and 1990, downtown employment is expected to grow by another 25 percent to 146,000 jobs (PSCOG 1984). Once again, transit is expected to handle nearly all additional peak-hour trips generated by these new employees to and from downtown.

In 1980, approximately 40 percent of peak-hour travel and 28 percent of daily travel to the CBD was made by transit. By 1990, transit would accommodate 55 percent of peak-hour travel and 40 percent of daily trips as the number of employees grows and additional transit service is provided.

1.2.2 Congestion Effects on Transit Service

In 1980, over 490 diesel and electric trolleybuses were distributed over five CBD downtown streets during the peak hour (see Figure 1-3). Between 100 to 200 buses travel on Second, Third and Fourth avenues, the primary north-south avenues, during peak hours. Over 100 buses traveled on both Stewart Street and Olive Way, the primary east-west transit routes at the north end of the CBD. The greatest number of peak-hour buses (approximately 190) were on Third Avenue, which is a two-way street with a mix of transportation modes. Third Avenue was relatively congested during most of the day. The wall of buses that occurs at bus stops during peak hours was a major contributor to this congestion. Similar congestion existed on the one-way couplets of Second and Fourth avenues where approximately 135 and 95 buses traveled during the peak hour.

The transit service required by 1990 (adding 140 buses to already congested streets and bus stops during peak hours) would seriously aggravate transportation and environmental problems. The existing congestion, brought about partly by the tremendous growth in transit use in the 1970s, has affected the efficiency of transit service into and through the CBD over the past few years. While the general traffic level-of-service is at reasonable levels on most streets, conflicts between buses, autos and pedestrians at major intersections dramatically reduce bus speeds and schedule reliability and restrict the potential growth of the transit system.

1.2.3 TSM Measures Implemented to Date

During the 1970s and early 1980s, Metro, the City of Seattle and the Washington State Department of Transportation implemented numerous Transportation System Management (TSM) and other transit improvements to alleviate increasing transit congestion in downtown. These measures included: with-flow transit lanes on Second and Fourth avenues; a contraflow lane on Fifth Avenue; exclusive HOV freeway lanes and ramps on I-5; downtown free-fare zone; peak-hour fare surcharge; increased use of articulated buses to reduce the number of buses in downtown; split bus stops downtown (bus routes grouped into sets which stop at alternate bus stops); restructuring downtown routes to balance capacity; supporting carpool/vanpool program; and new downtown route maps at each bus stop.

Transit performance continues to suffer even with these ambitious efforts. The anticipated transit growth by 1990 further threatens transit service. More substantial remedial measures are needed.

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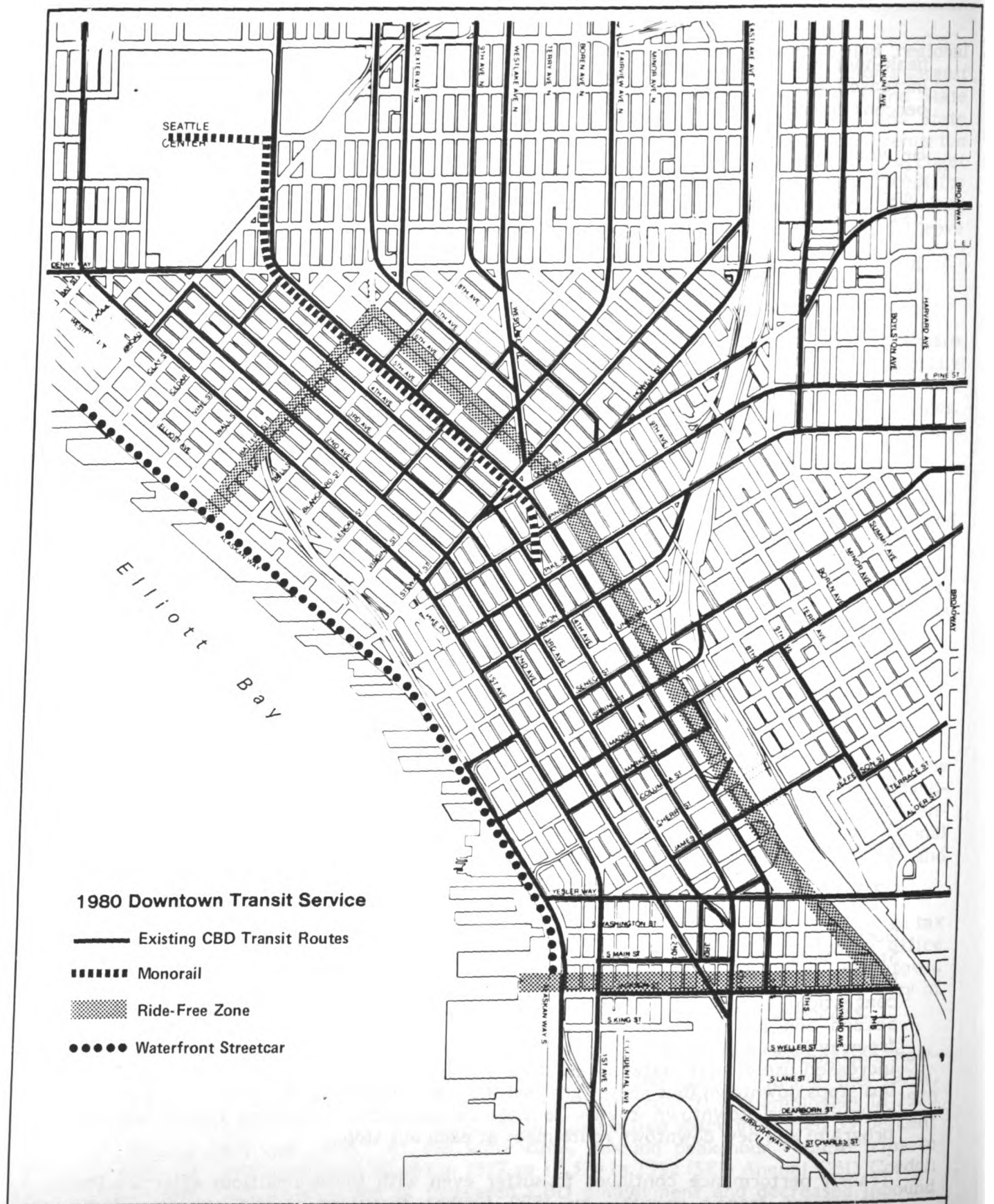

FIGURE 1-3

Existing downtown transit service

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1.3 Specific Transportation Problems in Downtown

The following is a description of the magnitude of problems Metro faces in its efforts to provide efficient and reliable transit service in downtown Seattle:

1.3.1 Critical Operational Problems - Shared Right-of-Way and Competition for Curb Lanes

Metro's ability to provide efficient and reliable service has been hampered by the restricted environment in which buses must travel. In 1980, the 490 buses traveling on the five downtown streets had to compete for curb space to load and unload passengers. In the right-of-way, buses compete with autos and pedestrians, particularly at major intersections.

The buses going through downtown not only must travel in a limited number of lanes, but must negotiate in mixed traffic and encounter high auto and pedestrian volumes, signals at downtown intersections and curb loading of trucks and auto passengers. In addition, buses are forced to back up at overloaded bus-loading zones.

1.3.2 Critical Operational Problems - Sidewalk Deficiencies

Narrow downtown sidewalks accommodate pedestrians, window shoppers and people waiting for buses. In a few locations, bus shelters provide space and shield waiting transit riders from Seattle's inclement weather. At bus stops without shelters, riders huddle against adjacent buildings and block pedestrian travel, building entrances and windows. The existing bus shelters, combined with more and more waiting patrons created by growing transit demand, restrict travel on the already crowded sidewalks. The crowding and encounters between waiting bus riders and other pedestrians increase the time and difficulty of reaching the desired bus in the minimum period of time. This problem now exists during morning, lunchtime and afternoon peak periods, but will dramatically worsen as downtown's daytime population and transit ridership grow.

1.4 Detrimental Impacts to Transit Performance

The above-mentioned restrictions on bus operations have severely affected Metro's ability to provide efficient and reliable transit service to the downtown.

1.4.1 Reduction in Bus Speeds

Bus speeds which increased in 1978 as a result of implementing with-flow transit lanes on Second and Fourth avenues have been eroded during the past five years. Bus speeds are now averaging 4 to 5 mph downtown. With additional auto mobile and bus traffic by 1990, bus speeds would drop further. This would substantially increase the number of minutes spent in downtown on an average trip. With no transit improvement, the average transit trip to downtown in 1990 would take 20 percent longer than the present 21.1 minutes. Figure 1-4 illustrates how congestion would lengthen a trip from the Federal Way park-and-ride lot without downtown transit improvements.

Besides competing with autos and trucks for curb space, buses must compete with other buses at bus stops. Despite the use of a skip-stop operation and extended bus

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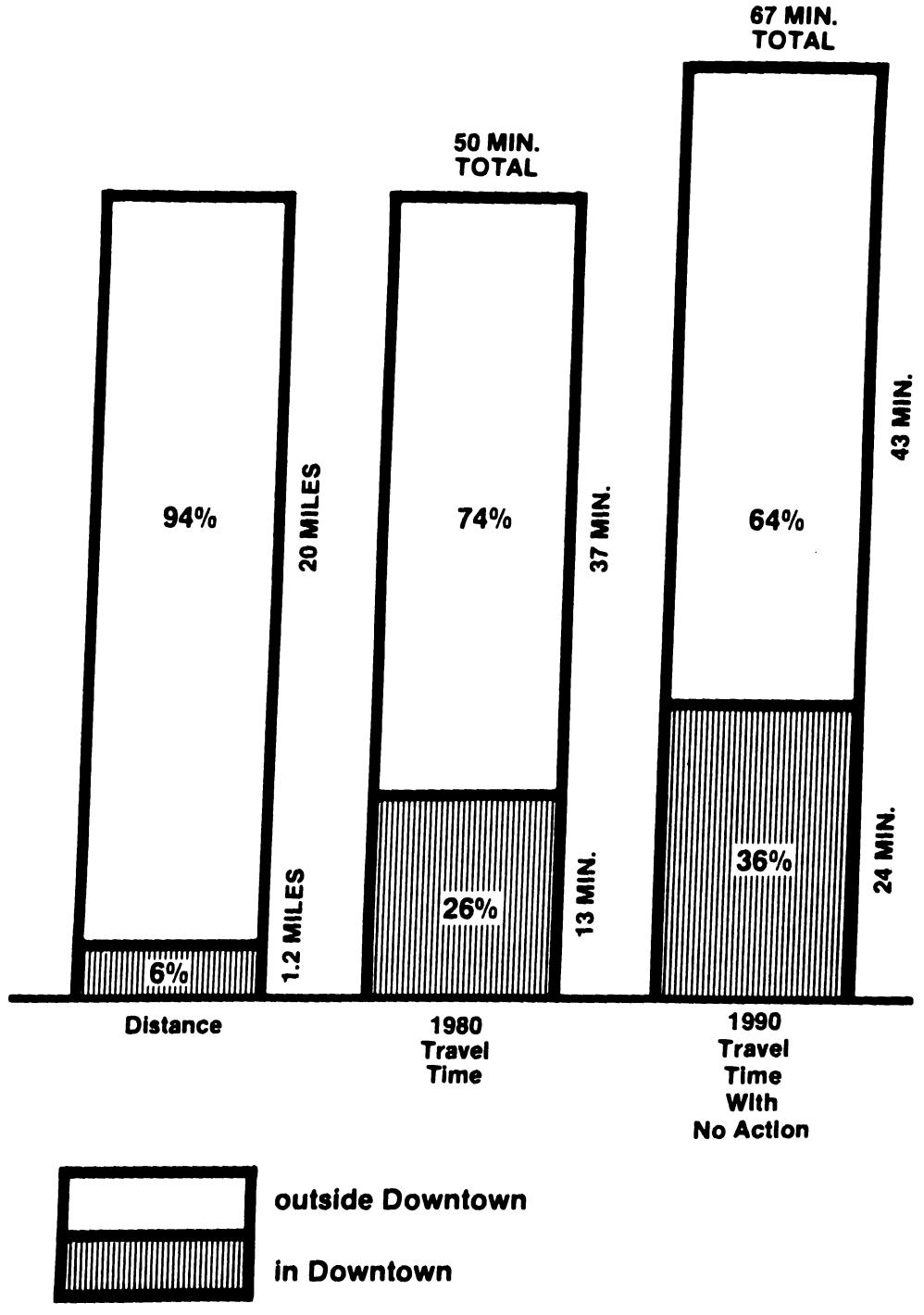

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FIGURE 1-4

Peak-hour travel time and distance from Federal Way park-and-ride

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zones during the peak hours which permit three buses to stop at one zone at a time, buses still have to wait for curb space to become available.

Time is also lost as pedestrians and people boarding buses conflict with each other in the limited amount of available sidewalk.

1.4.2 Degradation of On-time Performance and Schedule Reliability

Buses are severely hampered from meeting schedules through frequently prolonged loadings at bus stops, compounded by the queue of buses waiting to enter the bus-loading zones during peak periods. The time lost to boarding, combined with continued reduction in bus speeds and the inability to control peak-hour congestion, have significantly eroded transit service reliability. While boarding time is built into the schedule, sidewalk congestion and the inability to predict the position of specific buses at bus stops cause unpredictable delays.

On-time performance, identified as the primary passenger concern, suffers a 43 percent failure rate (see Figure 1-5). Metro studies have found that travel times of specific bus routes through downtown vary substantially on a day-to-day basis -- between several minutes early and late (see Figure 1-6).

On-time performance and schedule reliability become more difficult to achieve as the compounding effect of this transit congestion affects other aspects of the system. For example, evening peak-hour staging areas have had to move farther from the downtown core as expansion and traffic congestion make temporary parking of buses possible only at the downtown periphery. By requiring buses to travel even greater distance from their staging areas through downtown, their ability to adhere to schedules are further reduced. This reduces regional schedule reliability when riders outside the CBD can't depend on bus schedules.

1.4.3 Restrictions in Downtown Circulation

The topography, limited east-west transit routes, skip-stops on one-way streets and the restricted route patterns of trolleybuses limit easy travel in the CBD. Transit patrons must walk up and down steep inclines to reach many bus routes. Also, Metro's transit service is designed primarily to get people to and from downtown, with internal circulation a byproduct of this primary effort. Consequently, off-peak transit vehicles circulating on some downtown streets do not run on frequent and reliable schedules, particularly outside the downtown core and on Second and Fourth avenues between the retail core area and the government office area. The multitude of transit routes and destinations for internal downtown trips are not easily understood. As downtown expands and population grows, more thorough and understandable transit service would be needed to interconnect the various down-town segments.

1.5 Negative Environmental Consequences

Three primary environmental issues have been raised regarding the present provision and level of transit service in downtown. Presently, the air quality from combined auto and diesel exhaust emissions are raising health and aesthetics concerns. In particular, concentrated diesel bus odors on heavily-used diesel-bus routes have been noted. The noise created by diesel buses has also been cited. Aesthetic concerns

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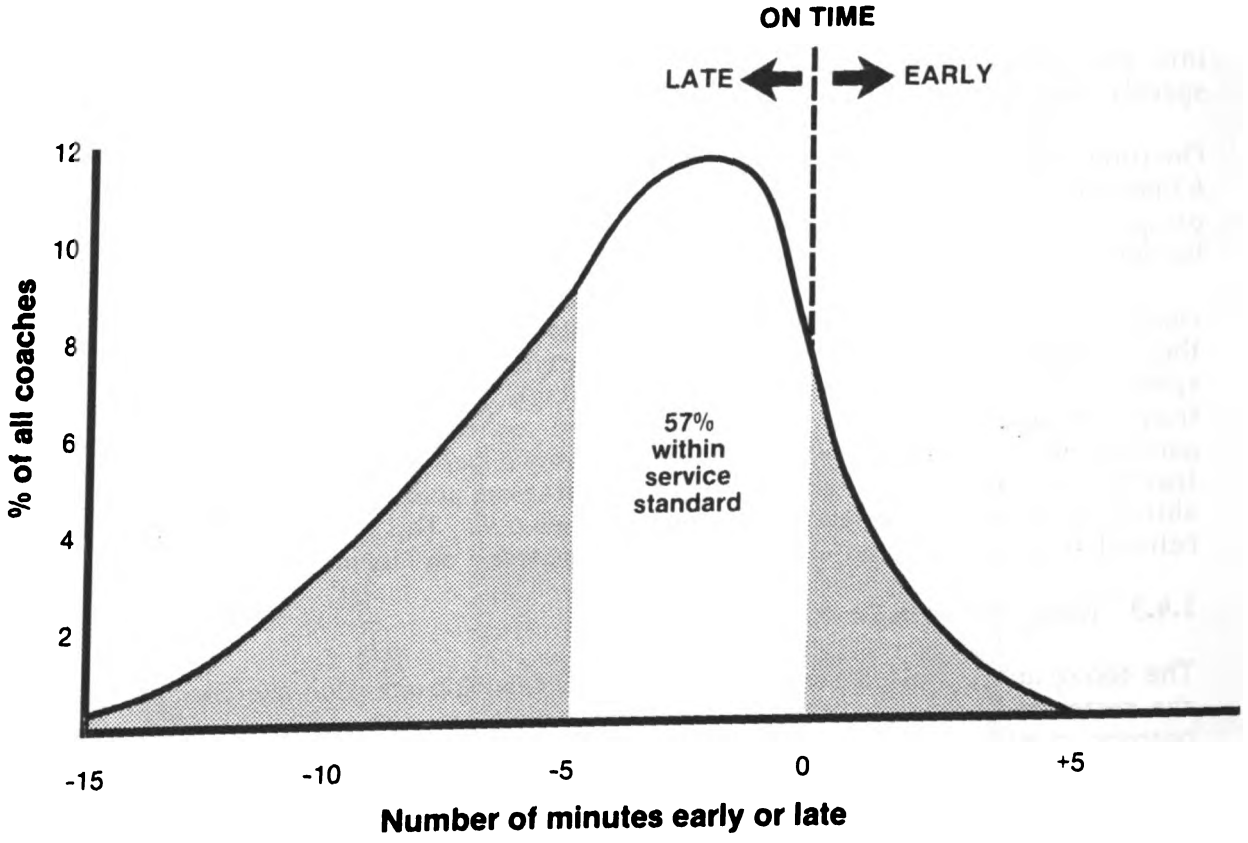

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FIGURE 1-5

Adherence to schedule (p.m. peak-hour coaches exiting downtown Seattle)

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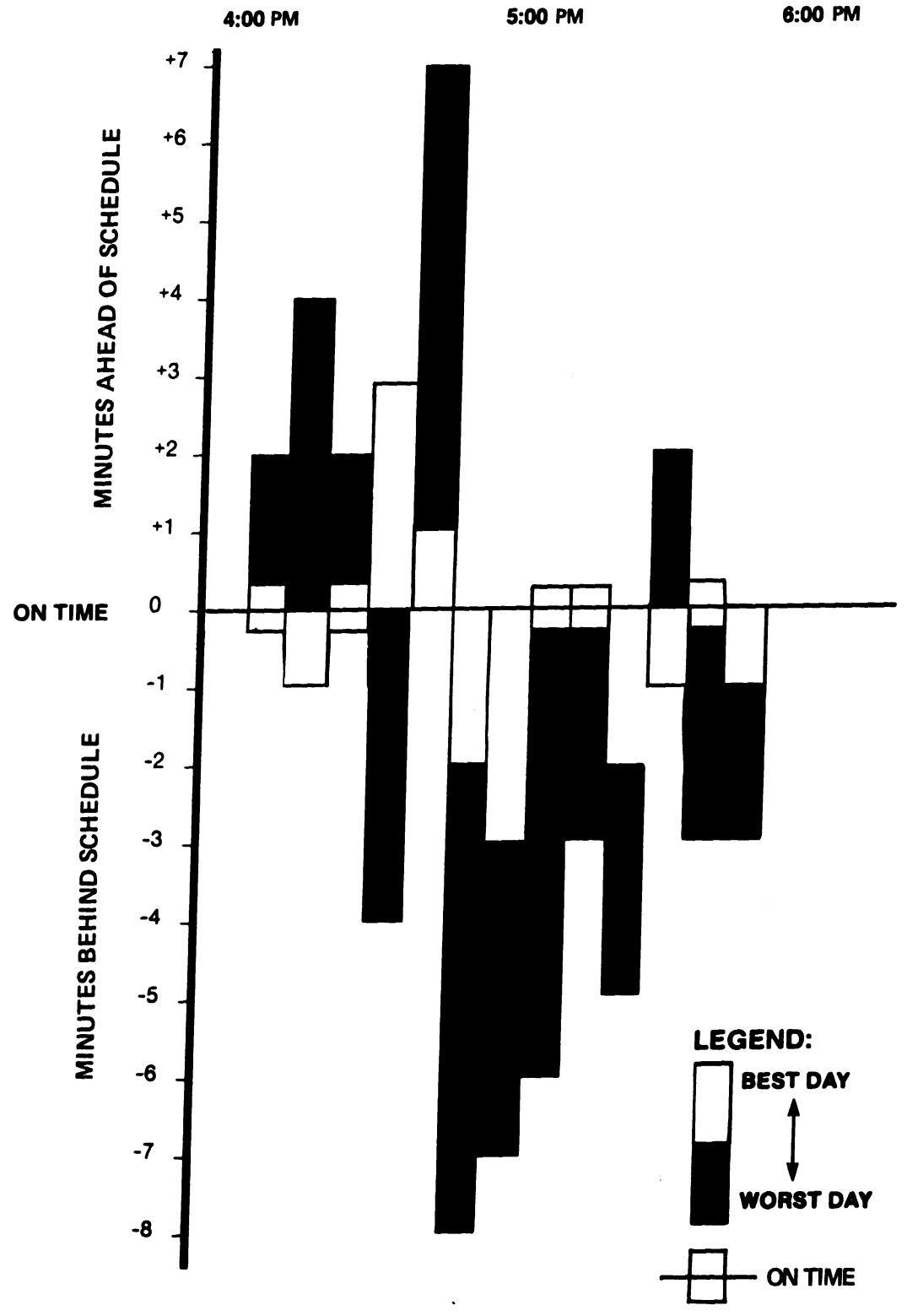

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FIGURE 1-6
Travel time vs. schedule time through downtown Seattle (Rtes. #3 & 4: 4:00-6:00 p.m.)

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revolve around the "wall of buses" on the streets during peak hours. The increasing number of buses is contributing to a less pleasant downtown.

1.6 Conclusion

Peak-hour bus service in downtown is still slow and unreliable even with the measures implemented to date to reduce congestion and refine the existing street system. If the present system is not substantially restructured, conditions will continue to deteriorate. Transit, which is expected to absorb almost all increase in downtown trips, may have difficulty maintaining its existing share of all trips to the downtown. In addition, auto users, along with transit riders, would suffer from the same problems caused by increased congestion.

Planned long term CBD growth would likely be constrained by inadequate transit capacity. At the same time, the entire region would pay directly for the continued congestion in the CBD through higher operating costs for the downtown portion of bus trips.

1.7 Transportation Goals and Objectives

Enhancing transit services has been a critical component of long-term policies and plans of the City of Seattle and the Puget Sound region. The City of Seattle and Metro have cooperated in numerous ventures to improve transit service in downtown. The City of Seattle recently adopted policies that rely heavily on transit to accommodate all growth in travel demand to the CBD. Seattle City Council resolutions and the proposed Downtown Land Use and Transportation Plan recognize the need to address the CBD's transit congestion and propose specific improvements to transit service and facilities.

The City of Seattle and Metro have established the following objectives for the Downtown Seattle Transit Project:

- Provide adequate transit capacity and service for expected rush-hour ridership based on employment and population estimates for 1990.
- Provide enough space for transit facilities so that pedestrians can use sidewalks and transit waiting areas comfortably.
- Mitigate adverse effects of noise, odor and emissions caused by the high volume of diesel buses on pedestrians and adjacent property.
- Provide adequate transit circulation within downtown at all times of the day, in conjunction with other downtown traffic.
- Preserve the opportunity to phase the expansion of the metropolitan transit system so that mid-term actions can be taken while longer-term solutions are being planned.
- Incorporate good urban design into the project.

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CHAPTER TWO
ALTERNATIVES CONSIDERED

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ALTERNATIVES CONSIDERED

2.1 Description of Alternatives

2.1.1 Elements Common to All Action Alternatives

2.1.2 Tunnel (Preferred Alternative)

2.1.3 No Action

2.1.4 Transportation System Management

2.1.5 Non-intercept Mall (TSM)

2.1.6 Mall with Transit Centers

2.2 Comparison of the Alternatives

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CHAPTER 2

ALTERNATIVES CONSIDERED

Five alternatives, including the No Action alternative, were examined in the draft EIS to address the severe transit congestion in downtown Seattle. The physical and operating characteristics, construction requirements and costs were described for the alternatives and for the major options that were studied for certain alternatives. The alternatives and options examined were:

1. No Action

2. Transportation System Management
   - o TSM Mall
   - o Dual Contraflow Lanes

3. Non-intercept Mall (TSM)

4. Mall with Transit Centers
   - o Peripheral Terminals
   - o Peripheral Stations
   - o Close-in Terminals
   - o Close-in Stations

5. Tunnel
   - o Third Avenue and Pine Street
   - o Fourth Avenue and Pine Street

The Metro Council identified a locally preferred alternative November 1983. Although the preferred alternative had not been determined when the draft EIS was issued, it most resembles the tunnel option under Third Avenue and Pine Street. The preferred alternative resolution specified that electric buses would operate in the tunnel, surface improvements would be made on Third Avenue and Pine Street and a downtown circulation system would be developed.

Since the draft EIS was issued, preliminary engineering has occurred which further defined the proposed tunnel, surface improvements and circulation system. This chapter describes the preferred alternative in detail. The other alternatives described in the draft EIS, except for the addition of dual-powered buses in the TSM Non-Intercept Mall, have not changed and are only briefly described in this chapter. Readers desiring additional detail should refer to the draft EIS, Chapter 2.

With the exception of the addition of dual-powered buses to the TSM non-intercept mall the No Action alternative is commonly used as a baseline against which action alternatives are compared. UMTA also compares high capital cost alternatives to a low-cost alternative--Transportation System Management. Two TSM options were identified for this project in the draft EIS: the TSM Mall and the Dual Contraflow Lanes.

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When selecting an appropriate TSM measure for UMTA's comparison (see Chapter 7), it is important that the TSM option be implementable and that it meets the project goals. It became apparent after evaluating the TSM options presented in the draft EIS that they do not satisfy these criteria. These options preempt scarce street capacity without offering substantive urban amenities. Neither option addresses sidewalk congestion problems related to transit patrons competing for sidewalk space with other users.

Therefore, this EIS uses the Non-intercept Mall alternative as the TSM measure for UMTA to compare with the locally preferred alternative. This is the least expensive alternative which could be constructed entirely with local funds and still meet most of the project objectives.

Section 2.2 provide summary tables to enable readers to evaluate the costs and benefits of each alternative.

2.1 Description of Alternatives

2.1.1 Elements Common to All Action Alternatives

Several components are common or similar in all the action alternatives: a busway connection to I-5 and I-90 at the southern end of the project, an independent trolleybus circulation system in downtown, surface storm-water collection/disposal system, a and system of bus routes which bypass the CBD. All alternatives also include flextime promotion which would increase the capacity of the transit system.

I-5, I-90 Bus Connection

The Washington State Department of Transportation plans to construct a two-lane busway which can be converted to rail from the I-5/I-90 interchange to Airport Way South, south of the Seattle CBD. The state DOT also plans to construct a busway in the existing Union Pacific Railroad right-of-way to connect the Union Station busway with Spokane Street near I-5. The busway would be extended under any action alternative selected to connect with the transit project.

Circulation System

The circulation system would provide transit service within downtown. The system would consist of new trolleybus routes, overhead wires, power substations and electric trolley coaches. Local improvements such as wider sidewalks at heavily-used bus stops and improved rider information to enhance use of existing trolleys would also be included. As explained in this chapter, the circulation system for the tunnel alternative has been modified slightly from that outlined in the draft EIS.

Storm-water System

A separate storm-water system would have to be constructed for all action alternatives as required by the Seattle Drainage Ordinance (see Sections 3-10 and 5-10). Metro, in conjunction with the City of Seattle, would determine construction methods during final design. A storm drainage system may require open-cut construction within the street rights-of-way.

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CBD Bypass Routes

CBD Bypass routes are routes which do not serve downtown Seattle, but serve riders who might have to pass through downtown Seattle if these routes were not available. These routes enable riders to bypass downtown congestion. Currently there are over 25 CBD bypass routes in the Metro system. A bypass network of bus routes was included in the travel forecasts for all the alternatives because these routes are included in Metro's 1990 Comprehensive Transit Plan, the Mid-Range Program and supporting service plans. Metro is therefore implementing them as an integral part of the 1990 Plan independently from the Downtown Seattle Transit Project.

2.1.2 Tunnel (Preferred Alternative)

The Tunnel alternative would respond to project objectives by including a new transit-only roadway and passenger stations in a tunnel under the CBD. By removing buses from surface streets, the tunnel would reduce traffic congestion, and improve the speed and reliability of transit schedules. It would also reduce crowding on sidewalks as some transit riders would wait for their bus in underground stations along the tunnel. The tunnel would be designed to convert easily to light-rail or other fixed guideway operation which would be a useful element in a regional guideway transit system.

On Nov. 3, 1983, the Metro Council unanimously approved Resolution 4243 which identified an electric-only transit tunnel with a circulation system and surface improvements as its preferred alternative (see Appendix K). The resolution noted that identifying a preferred alternative neither limits the choice of reasonable alternatives available nor represents a decision to construct a particular alternative. Preliminary engineering was conducted to improve the analysis for the final EIS before the Metro Council decides which alternative to construct.

The preferred alternative incorporates the Seattle City Council's preference stated Oct. 31, 1983, in Resolution 27027. The resolution stated that the council accepted an electric vehicle tunnel and preferred a Third Avenue tunnel alignment, but supported additional engineering work to determine if there is a fatal flaw with this alignment with respect to its crossing the Burlington Northern railroad tunnel.

The resolution identified the extension of the Waterfront Streetcar as a possible element in a downtown circulation system. Metro and City staff have agreed, however, to develop the Waterfront Streetcar as a separate project and conduct a separate environmental analysis. This is a more appropriate approach because 1) no specific extension routes have been selected for study at this time; 2) an entirely different vehicle technology would be introduced into an already complex project; and 3) the streetcar extension is justified as an independent project even though it would supplement the circulation systems described for the alternatives considered in this document.

The draft EIS evaluated a 1.3 mile transit tunnel capable of carrying 9,000 passengers in each direction during the peak hour. Buses would form platoons at portal stations at the Ninth and Pine site and at Union Station, and stop at three underground stations between the portals. A surface circulation system was also included as part of the Tunnel alternative.

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The draft EIS tunnel alternative included a number of options. Alignment options included Pine Street and either Third or Fourth avenue. Vehicle options included either electric or diesel-powered buses. Construction options included cut-and-cover and bored or mining techniques. Surface treatment options which were evaluated included returning the streets to general traffic use or constructing an electric-vehicle transit mall above the tunnel.

Since the draft EIS was issued, preliminary engineering and additional planning has refined the Tunnel alternative described in the Metro Council's preferred alternative. Elements from all the tunnel options described in the draft EIS have been recombined in the preferred alternative.

No fatal flaws were discovered related to the crossing of the Burlington Northern railroad tunnel, so the City of Seattle's preference for a Third Avenue alignment was maintained. Continued investigation of dual-powered buses has also reaffirmed the feasibility of using electric buses in the tunnel, so this preference of the Metro and Seattle City Council has also been incorporated. Further evaluation of construction techniques firmly established the feasibility of boring the tunnel between Westlake Station and Union Station, so this less disruptive approach has also been included.

The draft EIS recommended that readers wishing to focus on the Metro Council's preferred alternative should study the tunnel on Third Avenue and Pine Street. The following description of the locally preferred alternative is similar to the Third and Pine tunnel evaluated in the draft EIS. The primary change is that surface improvements would be made to Third Avenue and Pine Street to facilitate on-street transit service and assure adequate pedestrian access to the tunnel. This change differs from the transit mall described in the draft EIS in that general traffic would not be excluded from the streets with the preferred alternative. The preferred alternative also differs in its construction method and has slightly different station configurations.

The following section describes the elements of the preferred alternative in detail. Physical characteristics such as alignment, stations, and vehicles are followed by a description of the operating characteristics of the tunnel and circulation system. Two alternative construction approaches are then described. The construction schedule and traffic and transit reroutes are discussed in Chapter 4.

All references to "the tunnel" in the remainder of this EIS refer to the preferred alternative as it has evolved during preliminary engineering. References to tunnel alternatives discussed in the draft EIS will be distinctly noted as such. Although other tunnel options could still be selected, preliminary engineering has identified the tunnel described in the following pages as the best alternative at this time.

Physical Characteristics

The Tunnel alternative is a 1.3-mile "L" shaped tunnel under Third Avenue and Pine Street in downtown Seattle (see Figure 2-1). Metro proposes to operate electric buses through the tunnel to improve service and relieve the traffic congestion on streets. Five transit stations - one at each end of the tunnel and three in between - would enable passengers to get on and off the buses. Planned tunnel construction would occur within Pine Street and Third Avenue rights-of-way between building

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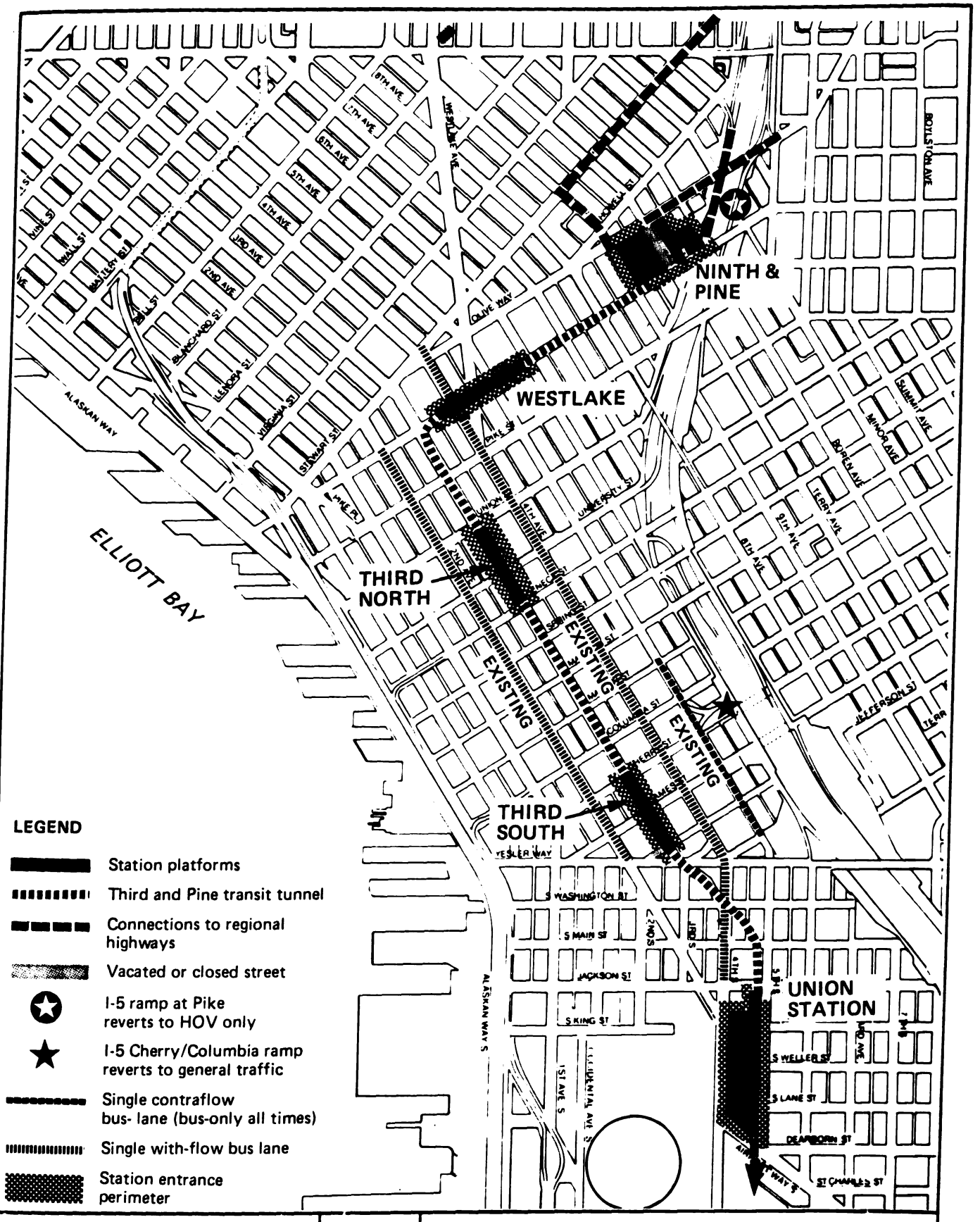

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FIGURE 2-1

Preferred alternative — Third Avenue and Pine Street transit tunnel alignment

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property lines except for the properties indicated in this EIS. Properties required are described more completely in the Displacement and Relocation section of Chapter 5.

Figure 2-1 shows proposed locations of the five tunnel stations. Station access points could be located at any of the adjacent property, as indicated by the shading, as final design is completed. The following section identifies locations where Metro currently expects station access but some changes may occur.

The station at the south end of the tunnel would be constructed directly east of the Union Station building. With the exception of the Union Station building, railroad tracks and railroad passenger platforms, the site is vacant.

An emergency vehicle access would be provided. It could come from Fourth Avenue, using an existing ramp located south of Airport Way and east of Fourth Avenue South. Current use as truck access to the Squire Shop warehouse loading docks at the railroad track level would be maintained but rights to use and possibly rebuild this ramp for emergency access would be secured. The median in Fourth Avenue South would be modified to permit emergency vehicles to enter the ramp from Fourth Avenue South.

A concrete lid capable of being used for parking would cover the area acquired by Metro bounded by Airport Way South and Fourth and Fifth avenues to within about 60 feet of the Union Station building. The exact proximity of the lid would be negotiated with the State Historic Preservation Officer and the Advisory Council on Historic Preservation. Some openings along the lid perimeter may be left to help ventilation in the station. Before entering the tunnel, buses would form bus platoons of up to four buses in the staging area and switch from diesel to electric power. The lid would address concerns about possible noise and aesthetic effects. Uses above the lid would conform with Seattle's land use and zoning policies.

From the platform, a two-lane roadway would pass under the Jackson Street Bridge and east of the Downtowner Apartments. The transit roadway would require structural modification to the Jackson Street Bridge. The Seattle Engineering Department, however, already plans to rebuild part of the bridge. Therefore, Metro would contribute funds to compensate the City of Seattle for the portion of the work resulting from the transit roadway if it is constructed. The road north of the bridge would slope down and go underground just south of South Main Street. Because buses would be operating under electric power, this segment of the transit roadway would not be lidded. The tunnel would extend to the Third South station just north of Jefferson Street. This segment would consist of bored twin tubes, passing under the Burlington Northern tunnel and the Tashiro-Kaplan building. Because this segment would be bored, there would be little or no surface disruption.

The three intermediate stations would be connected by twin bored tunnels. Each bore would be approximately 20 feet in outside diameter for one traffic lane. The Third Avenue south station would be located between Jefferson and Cherry Streets, the Third Avenue north station between Seneca and Union streets and the Westlake stations between Third and Sixth avenues on Pine Street. Because the intermediate stations would extend to the buildings on both sides of the street, areaways under sidewalks would be acquired at those locations during construction.

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Tunnel depth is controlled by factors such as mezzanine elevation and the minimum depth under the Burlington Northern railroad tunnel. The tunnel and stations would vary between 60 and 70 feet in depth. Utilities are generally located 16 feet below the street surface.

East of the Westlake station the tunnel would be a single box structure with two lanes. The north end tunnel portal would be just east of Ninth Avenue in the Ninth and Pine station area.

The Ninth and Pine station would be bounded by Ninth and Boren avenues, Olive Way and Pine Street. The station area could be open or lidded. If lidded, a concrete lid approximately level with Pine Street near Ninth Avenue would be constructed such that parking could occur on top. Because Olive Way is at a lower elevation, the lid would be above street level on Olive Way and would enable buses to have access to and from the street. There could be openings in the lid at the Olive Way access locations, over the platform areas and near the I-5 connection.

If the station area is not lidded, design measures such as screening or landscaping would be taken to enhance the compatibility of the transit operation with the mixed land uses in the neighborhood.

A number of engineering issues have been considered to ensure that the bus tunnel could be converted for rail use in the future. These issues include platform length, horizontal and vertical curve radii for the roadway, tunnel diameter, station exit requirements, ceiling space for overhead wire, and electric power supply.

Stations

Stations would be designed for safe, efficient access to the transit system. Each station would feature stairs, escalators and elevators to ensure wheelchair accessibility. Wheelchairs would be loaded on buses using a mechanical lift on the bus.

Emergency exits would also be constructed in sidewalks near underground stations. These stairways would normally be covered with panels flush with the sidewalk, but would open in an emergency.

Stations would be ventilated to provide fresh air during normal operation and evacuate smoke in an emergency. Metro is not planning to heat or cool stations, as Seattle's climate is moderate and passengers are expected to be in the station only briefly. Stations would still protect patrons from wind and rain.

Metro is not planning any retail activity in the stations, although it may approve small kiosks such as those offering newspapers. Where possible Metro is planning to connect stations to nearby commercial activity such as department stores, especially at the Westlake Station.

Metro would consider joint use of property on which transit facilities are located once construction and operational needs are assured. For this project, joint use refers to the location of transit station access in existing or proposed developments or to providing for the construction of private development above or in the transit facility. Because no specific development is being proposed at this time, it is

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impossible to evaluate the effects of future private development at station locations. If private development is proposed someday, its environmental impacts would be addressed in a separate environmental document. The development would have to conform with Seattle's land use and zoning policies for the specific location.

For the south portal station at Union Station, Metro would acquire the track and platform area between Fourth and Fifth avenues, Airport Way and Jackson Street. Metro would also acquire the land east of the Downtowner Apartments between Jackson and Main streets, but would not require the Union Station building.

Union Station is in a mixed-use neighborhood including the International District to the east, Pioneer Square Historic District to the northwest and warehousing and the Kingdome and commercial uses to the west and south. Passengers would reach the Union Station boarding platforms via escalators, stairs and elevators from South Jackson Street and Weller Street. Future access could be provided from Fourth Avenue South in conjunction with future development. Curb-height linear boarding platforms would be located east of the Union Station building (see Figure 2-2).

The three intermediate stations would have curb-height platforms on each side of the roadway (see Figure 2-3). The platforms would be approximately 380 feet long and 15½ feet wide at the Third North and Third South stations and at least 13½ feet wide at the Westlake Station. Each platform would have four berths to serve 4-bus platoons. The roadway would widen to three lanes at the stations to provide a passing lane. Stations would feature mezzanine-level crosswalks from the platforms to both sides of the surface street.

The Third South station is located in an area generally serving government and office workers. Entrances are being planned in front of the City of Seattle's Public Safety Building and in the King County Courthouse (see Figure 2-4). Entrances are also being planned in Jefferson Street on the west side of Third Avenue and possibly in of the St. Charles Hotel. The eastern half of the segment of Jefferson Street between Third Avenue and Yesler Way would be permanently closed if a station entrance is located here, but access to an adjacent parking garage would be maintained.

Entrances planned for the Third North station (Figure 2-5) would be located in two buildings proposed by private developers on the west side of Third Avenue: the Wright-Runstad development between University and Seneca streets and in the Marathon Corporation's development between University and Union streets (property currently occupied by the University Building, the Heusey Building and the Obzina Building). On the east side of Third Avenue, an entrance is planned in the Third Avenue and University Street parking garage.

The Westlake Station is located in the heart of Seattle's retail district (Figure 2-6). Underground station connections are being planned to the Westlake project and to other retail stores in this district including the Bon, Frederick & Nelson, Nordstrom, Century Square and at 1522 Fifth Avenue.

The Ninth and Pine Station is located in an area of commercial and residential uses. This area is also designated as an office expansion area in the City of Seattle's proposed land-use plan. Access to the Ninth and Pine Station would be from the corner of Ninth and Pine (see Figure 2-7). Additional station access along Olive

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FIGURE 2-2
Union Station plan view
Source: Parsons/Brinckerhoff

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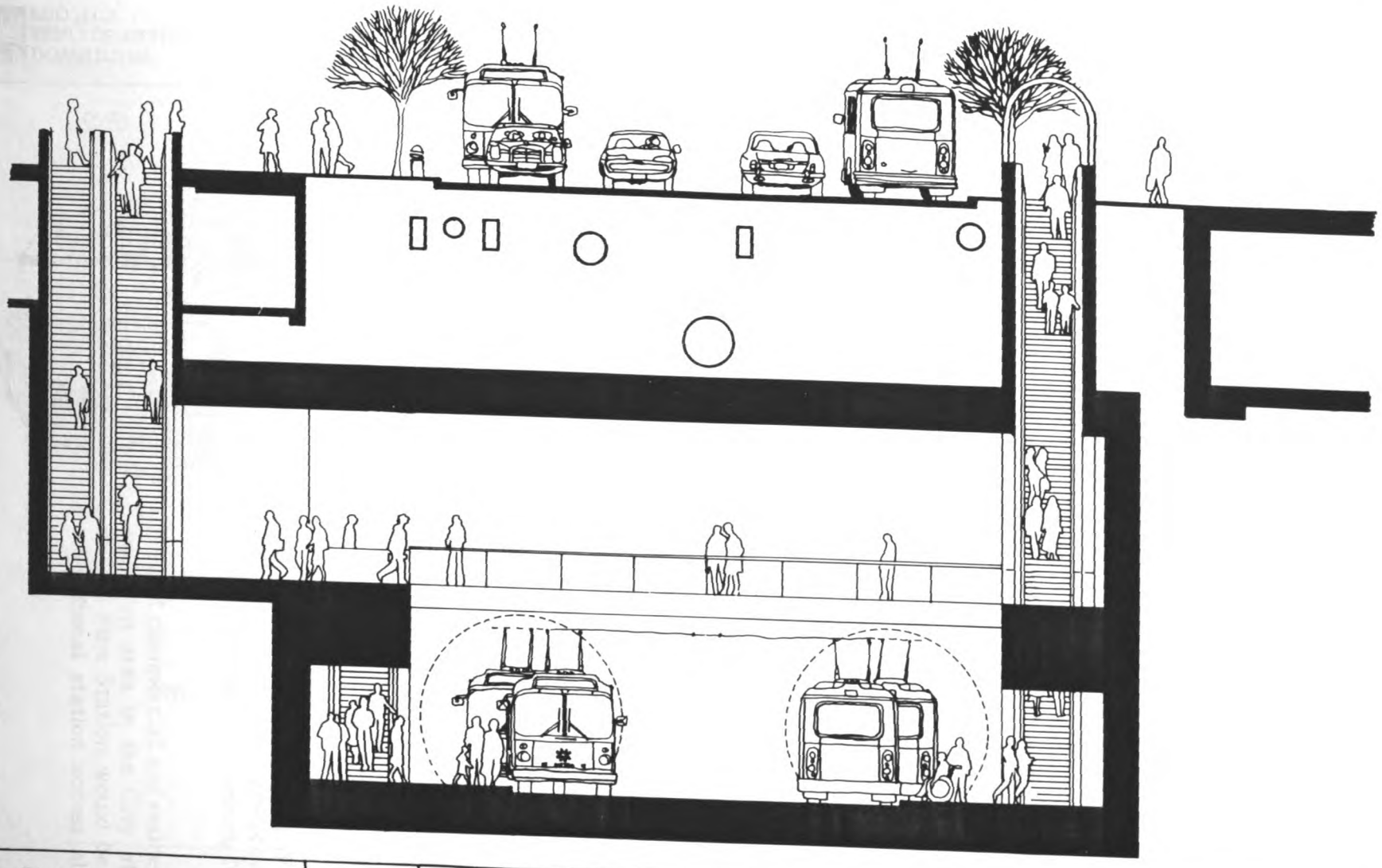

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FIGURE 2-3

Third Avenue prototype station

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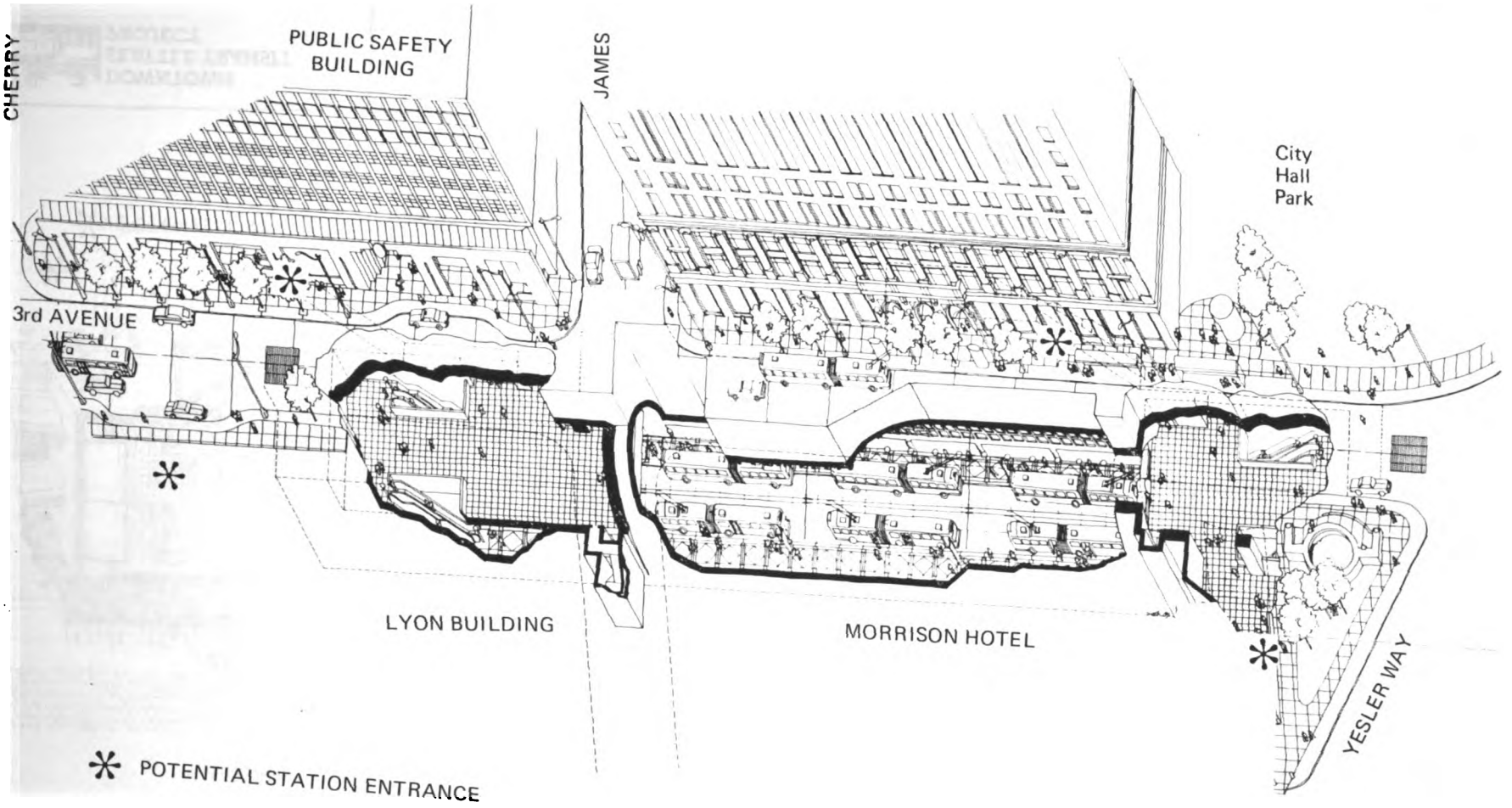

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FIGURE 2-4
Third South Station

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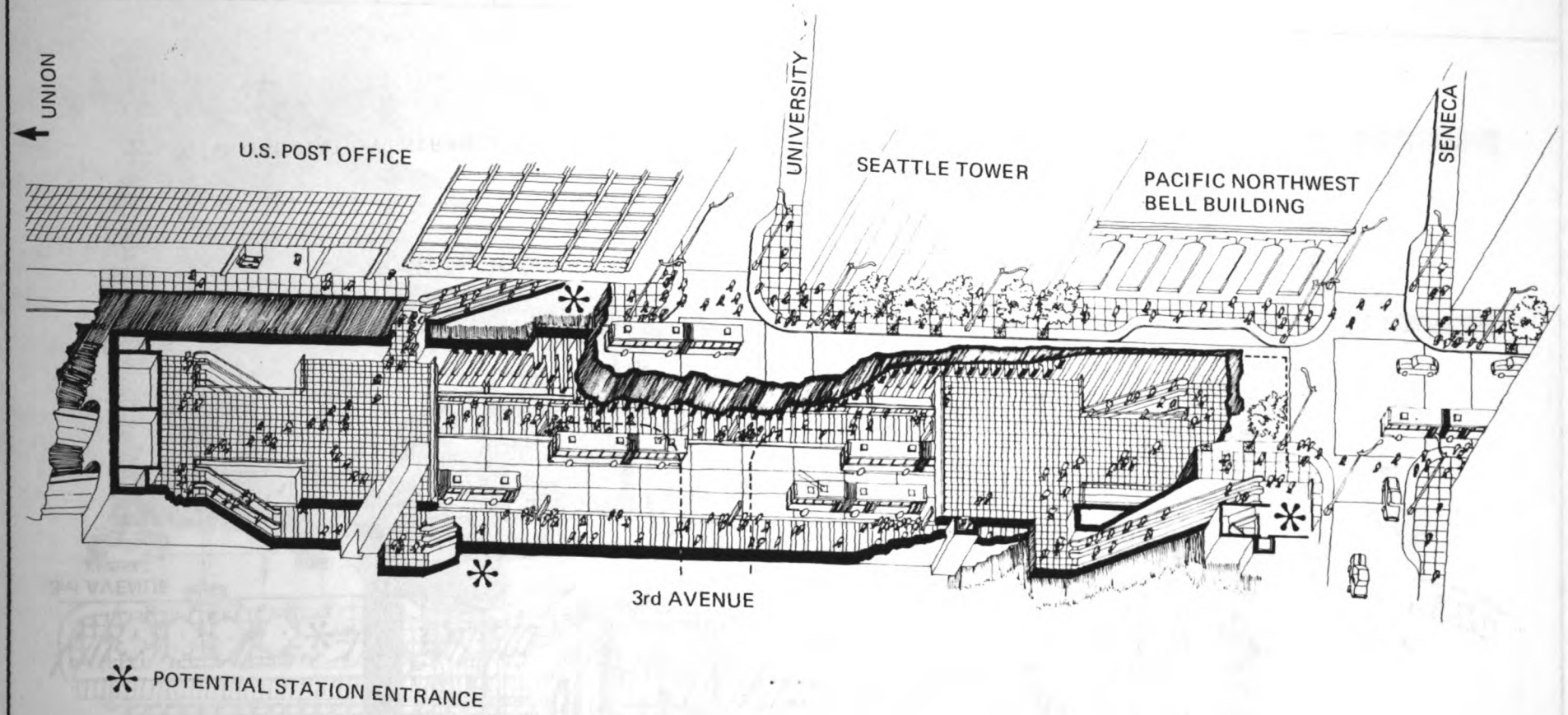

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FIGURE 2-5
Third North Station

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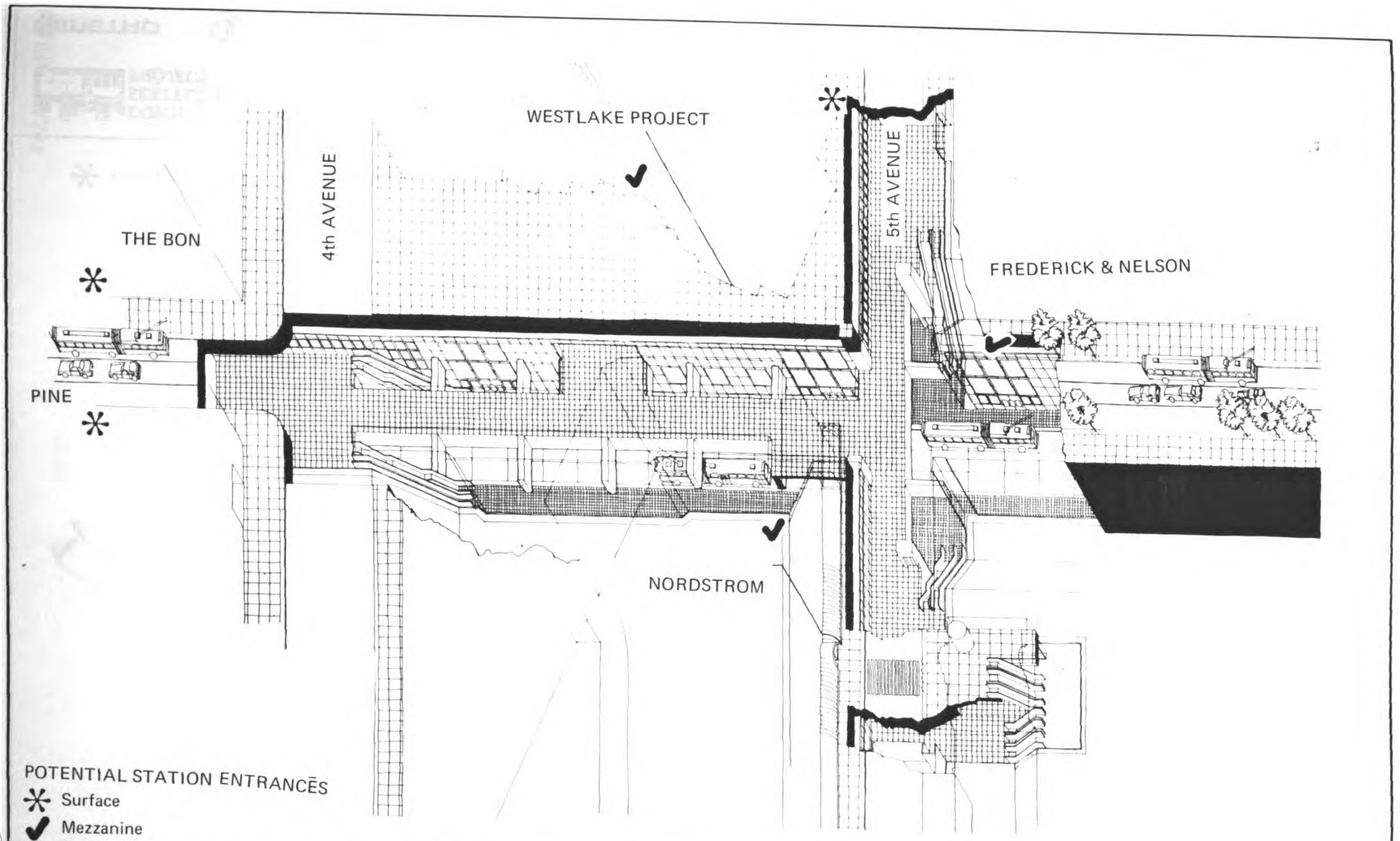

FIGURE 2-6
Westlake Station

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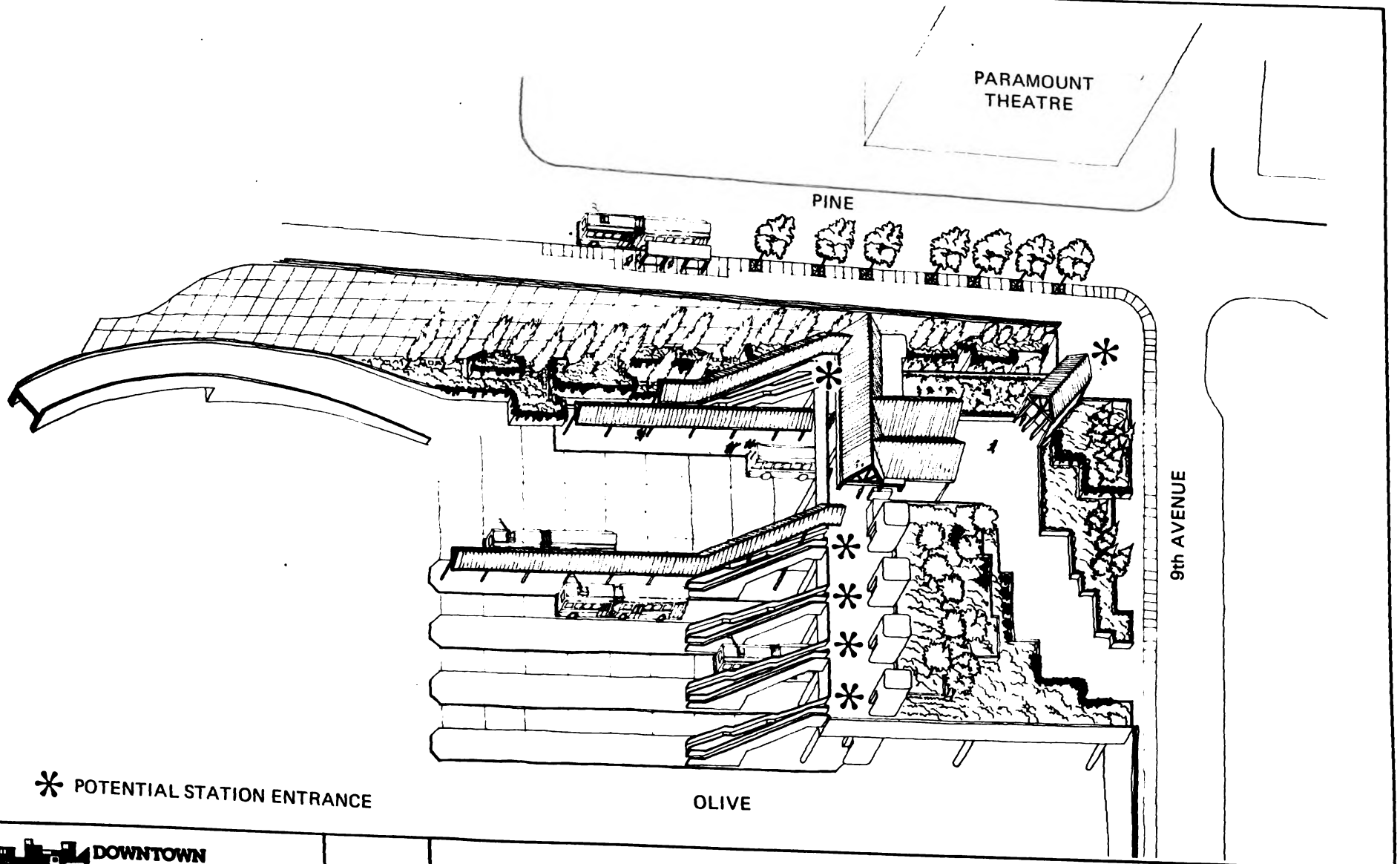

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FIGURE 2-7
Ninth and Pine Station

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Way and at Pine Street near Terry Avenue could be added in conjunction with future development on the site or in the area.

The Ninth and Pine station would require property bounded by Ninth and Boren avenues, Olive Way and Pine Street and the I-5 ramp limited access area. The alley in this block and Terry Avenue would be closed. During construction, the two parking lots on the north side of Pine Street between Eighth and Ninth avenues may also be required.

The existing access ramp connecting I-5 with Pine and Pike streets would be revised to provide a direct transit-only connection between I-5 and the Ninth and Pine station. The Pine Street branch of this ramp would be used to enter or leave the station by buses traveling the reversible freeway lanes. The Pike Street branch of the ramp would be reconstructed and made available for carpools and vanpools. Ninth Avenue between Pike Street and Olive Way may also be changed form a 1-way southbound street to a 2-way street to allow carpools and vanpools to exit the I-5 reversible roadway and reach Pine Street or Olive Way. To mitigate the loss of the Pine/Pike freeway access to general traffic, the Cherry Street HOV access to I-5 would revert to general traffic use.

Surface Improvements

The Third Avenue tunnel option discussed in the draft EIS included a transit mall on Pine Street and Third Avenue. Metro Council's preferred alternative modified this concept by calling for improvements to streets and sidewalks along the tunnel alignment to enhance surface bus operation and pedestrian circulation and ensure adequate access to the tunnel. A major difference between these concepts is that the transit mall would have excluded automobiles - at least during peak hours -- while the council's preferred alternative does not.

Surface improvements would take place along Third Avenue and Pine Street from Yesler Way to Boren Avenue (see Figure 2-8). Sidewalks would be widened to provide more space at bus stops. This would also make access to stations possible while easing pedestrian flow.

Presently, Third Avenue has 15-foot-wide sidewalks, two lanes of traffic in each direction, parking on both sides of the street. Parking is prohibited in the peak hours. Sidewalks would be widened to 19 feet south of Pike Street and to 22 feet between Pike and Pine streets. Two lanes of traffic would be maintained in each direction. Parking would be eliminated except for special provisions made through cut-outs in the sidewalk for truck and passenger loading. General traffic would be maintained.

Pine Street presently has 16-foot sidewalks and three lanes of westbound traffic. Parking is allowed on both sides of the street between Sixth and Boren avenues, but is prohibited on the northside of Pine Street during the peak hours. Sidewalks would be widened to 22 feet and three traffic lanes would be constructed. Two lanes of general traffic would run westbound on Pine Street between First and Eighth avenues. A third lane, on the south side of the street would become a bus-only lane eastbound on Pine Street between First and Eighth avenues. This feature would allow buses to serve the retail core and tunnel bus routes to operate parallel to the tunnel when the tunnel is not in service. It would provide a single connection for

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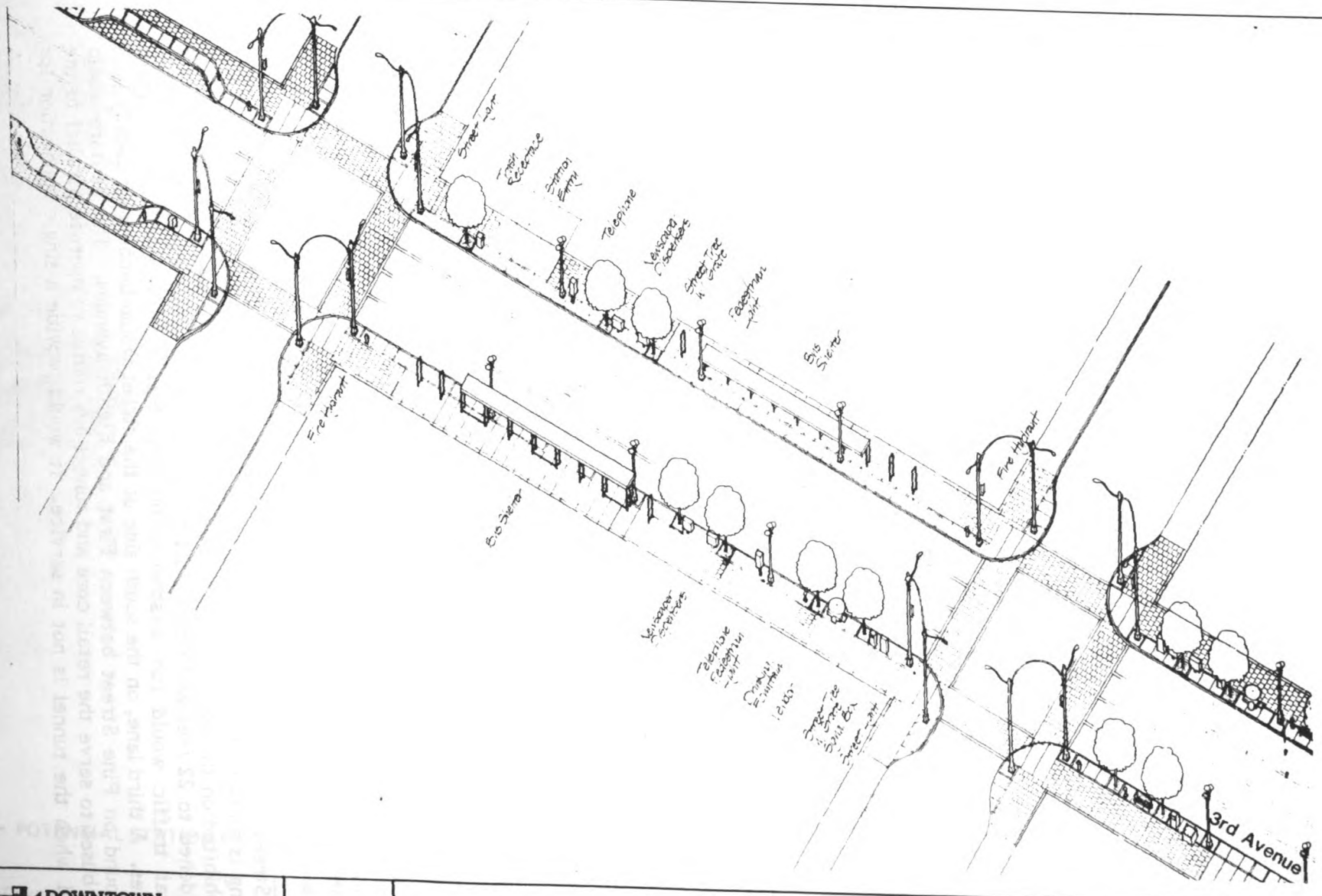

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FIGURE 2-8

Prototypical block — surface improvements
Source: Parsons/Brinckerhoff

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riders to transfer from circulator routes to a station access. It provides an exclusive right-of-way for the high volume of buses that would use Pine Street eastbound. A northbound bus lane would also be instituted on Ninth Avenue between Pine and Olive streets to facilitate circulator routes and the routing of buses when the tunnel is not in service. Pine Street parking would be eliminated except for special provisions made through cut-outs in sidewalks for trucks and passenger loading on the north side of the street.

Improvements would also include new sidewalks, curbs and roadways. Lighting and traffic control systems would be installed and utilities modernized as required. Other items such as signs, sidewalk furniture, bus shelters, vending equipment, trees, planters, fire hydrants and alarm boxes would be located in conformance with a comprehensive design plan. Materials used, location of various street and sidewalk elements and selection of construction methods would be compatible with building and neighborhood settings.

Whenever possible, access to stations would not be located in sidewalks. Escalators, stairs and elevators would be part of street design. Sidewalk width limitations make it preferable to locate some station accesses in adjacent buildings. Historic or cultural resources would be taken for such uses only when no other feasible or prudent opportunities exist.

Tunnel and station ventilation requirements include gratings, shafts and air circulating and emergency venting equipment. Ventilation shafts may be located at each end of subway stations or at midpoints between the stations. Ventilation shafts and grates could be located in buildings, sidewalks, street furniture, landscaping areas or streets.

Overhead wiring for trolley operation would be relocated and rehung from buildings and new poles. New wiring would be required on Pine Street for the eastbound transit lane. Wiring required for the circulation system is shown in Figure 2-6.

Vehicles

Metro Council's preferred alternative specifies that only electric-powered buses would operate in the tunnel. By 1995, Metro proposes to purchase a fleet of approximately 490 dual-power buses which would operate under diesel power when on freeways and surface streets and electric power in the tunnel. The dual-power buses would enable Metro to reduce bus noise and emissions downtown without substantial increases in transfers. The diesel engine would be used in the tunnel only to remove vehicles from the tunnel if the electric motor or power fails. The articulated dual-power buses would have three right-side doors and about 65 seats.

Metro's experience with diesel and electric vehicles, the successful operation of dual-power fleets in revenue operation in several European cities, the revenue operation of a demonstration vehicle in revenue service in Seattle during 1982-83 and the results of the artic trolley/dual-power bus procurement in 1984 have demonstrated that dual- power buses are operationally feasible. However, since any new fleet of buses goes through a shake-down period during which minor problems may be encountered and because of the critical nature of fleet availability to the success of the project, Metro has included special provisions in its procurement strategy for these dual-power buses.

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The bid document would require that the successful manufacturer deliver the dual-power buses in two batches. The first seven would be delivered in mid-1987, at which time they would be placed in revenue service. The routes selected would allow the vehicles to operate under conditions similar to those to be experienced when the tunnel is operational: diesel for a portion of the trip, electric in the downtown area. The remaining 229 dual-power vehicles would be delivered starting in 1988 through late 1989.

The period between the first delivery in 1987 and the production of the remaining vehicles in 1988-89, would allow careful testing and any desired modifications being made before full production. This would allow for minor changes to be made to the vehicles to be used in the tunnel, without the significant extra cost of two bid processes or delays in delivery.

Operating Characteristics

During the peak hour, platoons of up to four buses would be formed in the staging areas at each end of the tunnel. The average speed for buses, including stops at the stations, would be about 11 to 12 mph.

Most buses from the north would enter the Ninth and Pine station and staging area from I-5 via the Pine Street bus ramp leading from the express lanes directly into the staging area. The remaining buses from I-5 regular lanes would exit I-5 at Stewart Street and enter the Ninth and Pine station and staging area via Stewart Street, Ninth Avenue and the Olive Way entrance. Access for in-bound SR-520 buses may be provided in the future directly through the I-5 bus ramps. State DOT studies presently under way propose inbound HOV connections from SR 520 to the I-5 express lanes. Other southbound routes such as those using Eastlake Avenue would enter the Ninth and Pine station at the Olive Way entrance.

Buses entering from the Pine Street ramp would move directly into waiting lines, up to four lanes across, to be assigned into one of four inbound station platforms. Buses would change from diesel to electric power before to entering the tunnel. Buses would move to the assigned platform (see Figure 2-7), load and unload passengers and then await assignment to a platoon for travel through the tunnel. Each platform can accommodate two buses at a time. Buses entering via Olive Way would move into one of six waiting lines, change from diesel to electric power and join the I-5 buses in awaiting assignment to a platform.

During the morning peak hour, loaded buses would wait only long enough to switch to electric power before moving to the platform and into the tunnel. During the afternoon peak, empty buses may use the staging area to park while waiting to begin their southbound trip. Up to 35 buses could be staged at the same time.

In the morning, buses leaving the tunnel at Ninth and Pine may begin another run and return to I-5 via Olive Way and connecting surface streets. Buses would also be able to return to the tunnel by moving to a staging area for this purpose and then awaiting instructions to join a platoon.

In the afternoon most buses leaving the tunnel would enter I-5 via the ramp to the northbound express lanes. Others would enter I-5 via Olive Way, or be routed to Eastlake via Terry Avenue and Howell Street. Buses entering this station from Eastlake or I-5 would use Stewart Street and Ninth Avenue.

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From the south, buses would enter Union Station and staging area via bus and HOV off-ramps connecting both I-90 from the east and I-5 from the south or from Metro bases. Buses entering the station would move directly into waiting lines, four lanes across. Unlike the Ninth and Pine station, platoon assignment would not occur at the platform but in the waiting lines. This is also where buses would change from diesel to electric power. Buses would then be directed to the single inbound platform as a part of the next platoon. After loading and unloading passengers, the platoon would be ready to enter the tunnel.

During the morning peak hour, buses would remain in the staging areas only long enough to assemble into platoons. During the afternoon peak hour, buses would use the staging areas to park while waiting to begin their outbound trips through the CBD. Up to 35 buses could be staged at the same time.

Buses using the tunnel would travel in platoons during the morning and afternoon peak hours. Platoons would generally consist of two to four buses. Buses would be assigned to platoons at the portal stations. They would be designated A, B, C or D bus, classifications generally related to the region that a particular route serves. This would be done so patrons would know which platform position their bus would be in the afternoon peak period. This would also help to reduce conflicts in patron movements on station platforms.

Headways for bus platoons entering the tunnel would range from approximately 80 seconds in the heaviest portion of the peak hour to approximately 2 minutes in the remainder of the peak hour. This would result in approximately 47 buses in each direction in the peak 15 minutes and 145 buses each way for the peak hour. Since all buses are high-capacity articulated buses, the capacity of 9,000 passengers per hour each way is unchanged from the draft EIS analysis.

All buses in the platoon would enter and leave the station as a group. Each bus would have a designated stop zone. A passenger information system may be used to inform passengers of the zone in which their bus would stop. Wheelchair lift operations would occur as a part of the platform boarding or unloading sequence. Delays would occur in the platoon operating the lift. When the system reaches capacity, following platoons may also experience delays in the heaviest portion of the peak hour . All dual-powered buses and stations would be fully accessible as set forth in Metro policy.

The stations would provide sufficient capacity to carry 9,000 passengers during the peak hour in each direction. The total Metro system operating with buses is designed for CBD patronage forecasts to the year 2003. A higher-capacity technology such as light-rail would be needed when greater capacity is required.

Although actual tunnel operating hours have not been determined, facilities would be designed so stations and the tunnel could be locked if less than 24-hour operation is desired.

During hours when the tunnel is not in use, routes that use the CBD tunnel would operate on surface streets. This would provide a service pattern reasonably consistent with service operating in the tunnel. For the most part, buses would stop at surface bus zones located nearby or directly adjacent to station entrances. When the tunnel is closed, these entrances would be posted with information directing riders to the appropriate surface bus stop.

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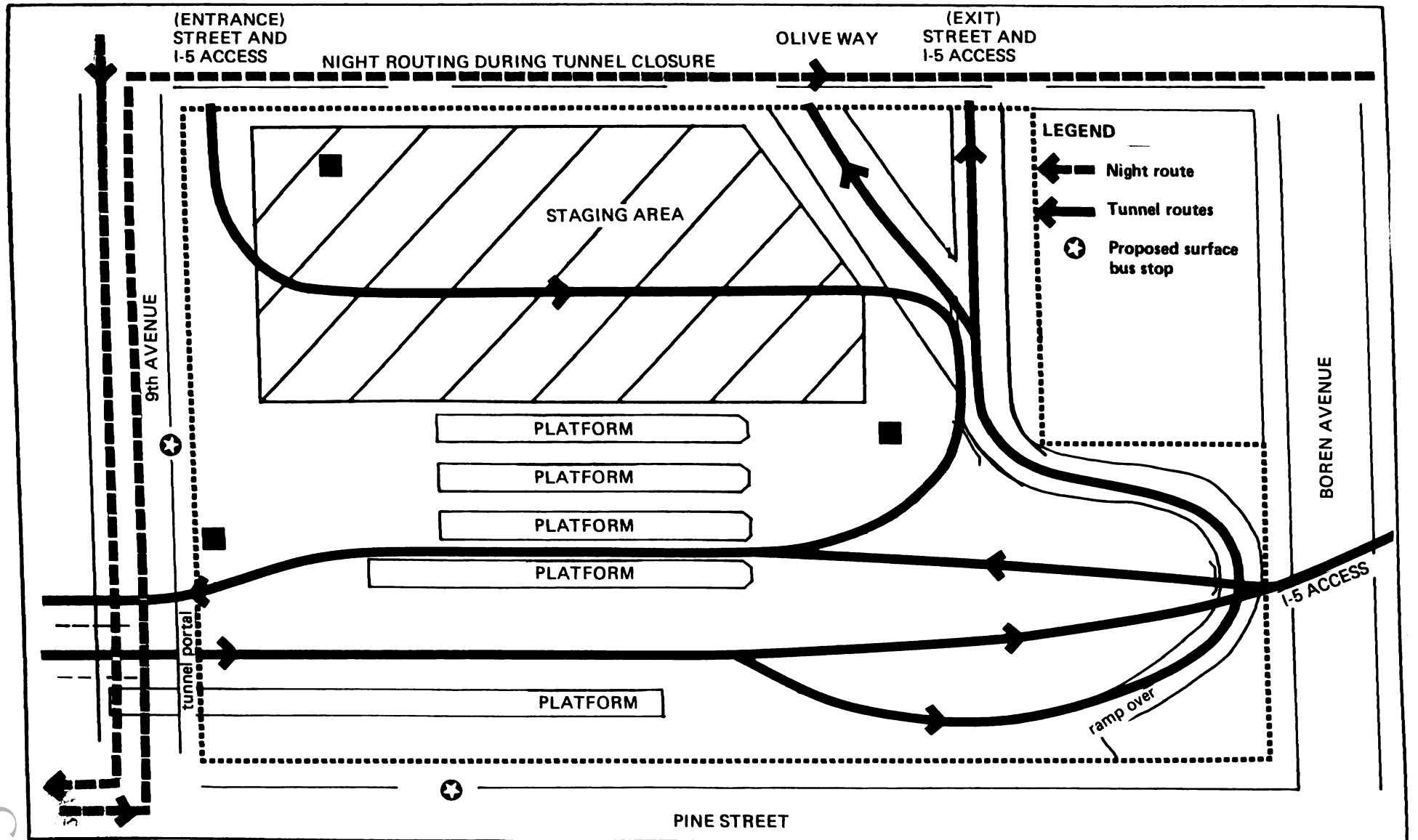

Ninth and Pine station and staging area

FIGURE 2-8b

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Buses could change from diesel to electric power on entering the CBD and use existing surface trolley wire on Pine Street and Third Avenue. Routes terminating in the north end of the CBD could use a new loop circling the Ninth and Pine station that would be built for circulator routes (see figure 2-10). Routes continuing northbound would change from electric to diesel power and continue on. In the south end of the CBD, routes entering from the north could turn around at Union Station. The turnaround loop, if trolley operated, would require new wire on Airport Way from Fifth to Fourth Avenue South, and on Fourth and Fifth avenues south between Airport Way and Jackson Street. Routes continuing southbound would change from electric to diesel power and continue on their route.

Circulation System

A circulation system integrated with the regional transit system and providing access around downtown for commuters and other patrons would be part of the overall project. The surface circulation system would include specially-identified existing trolley routes plus new routes operating only within the downtown (see Figures 2-9 and 2-10). Articulated and regular trolleys would operate on these routes. The remainder of Metro's transit service would also be available for internal circulation. A downtown circulation marketing and rider information system would be developed to facilitate rider use and understanding.

After a review of downtown circulation needs, several areas were identified which needed improvement. This section describes elements of a circulation system to meet those needs. Any new routes or changes in existing routes would be subject to Metro's normal service change process and public comment.

Regular trolley routes to be provided for circulation are shown in Figure 2-9. A portion of the existing trolley service in downtown would be specifically signed for circulation service. Modifications would be made to several of these routes to provide improved connections between the various downtown districts and adjacent neighborhoods.

Trolley routes 10 and 12 would be moved from Third to First Avenue to provide increased east/west circulation and serve the Pine and Madison Street corridors. This shift would further improve First Avenue circulation and provide connections between the proposed Convention Center and the Pike Place Market.

The circulation system would also include routes 15 and 18 operating on First Avenue. These routes would be converted to trolley service as part of Metro's Trolley Overhead Expansion Project. The trolleys would be rerouted to travel to the International District via Jackson Street, turn around and return along the same downtown route to provide regular service to Ballard.

The hours of operation and frequency of service provided for these trolley routes would be similar to existing service or would have service changes consistent with Metro's program of improving service based on demand and operating conditions.

Figure 2-10 shows the location of the proposed independent circulation routes to be added to regular trolley and other downtown service. Three new independent routes would be operated to serve Third Avenue/Pine Street, First Hill and First Avenue.

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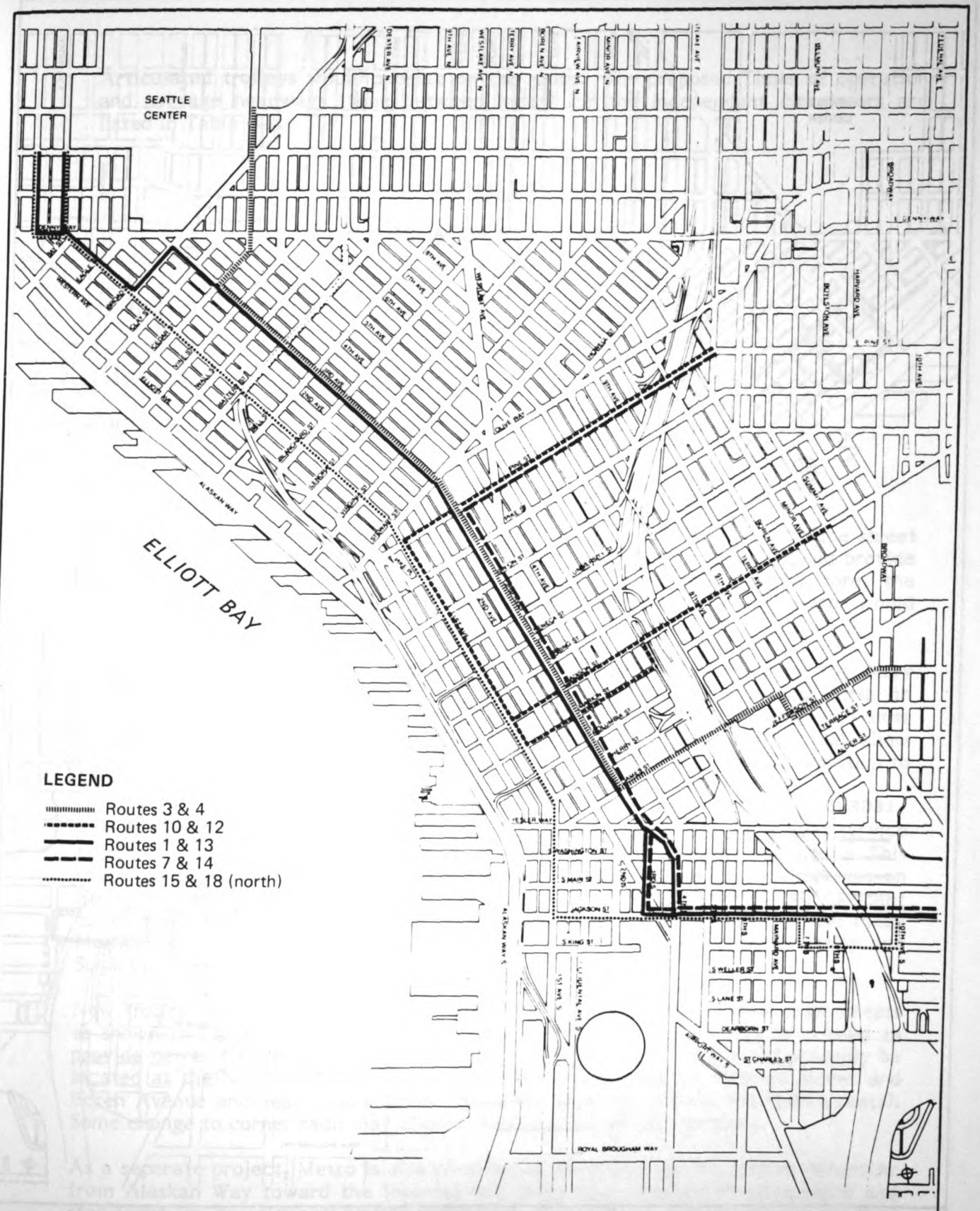

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FIGURE 2-9

Regular trolley routes to be used for circulation

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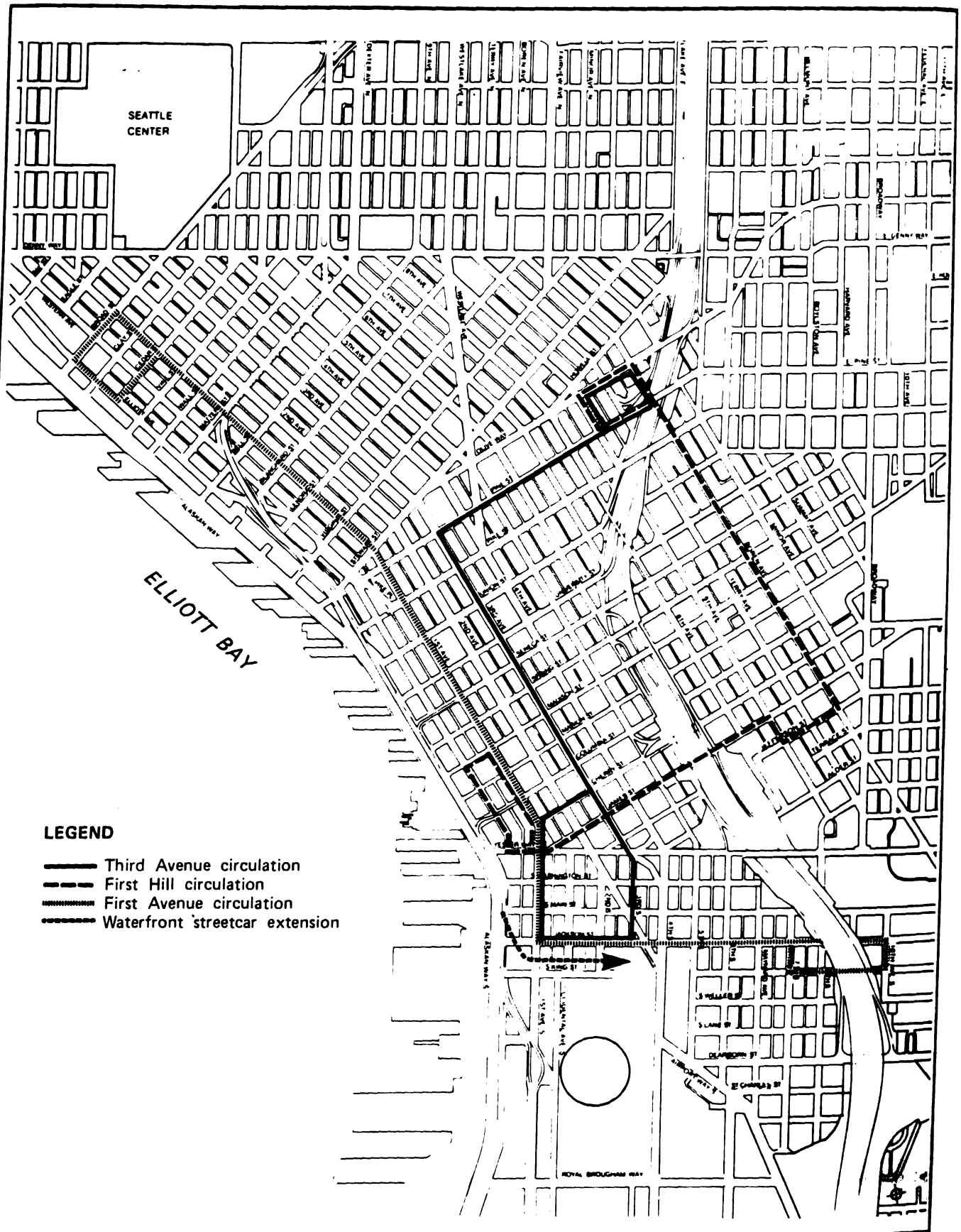

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FIGURE 2-10

Independent circulation routes

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Articulated trolleys would operate on the route. The proposed Times of operation and average headways (time between buses) for the independent circulators are listed in Table 2-1.

TABLE 2-1

CIRCULATOR HEADWAYS
(minutes)

	peak	midday	night	Sat	Sun
First Hill	7.5	—	30	—	30
Third Avenue	—	5	15	7.5	15
First Avenue	—	15	—	15	15

The Third Avenue circulator would operate above the Third Avenue and Pine street tunnel and loop around a portion of Pioneer Square. This circulator would provide high-frequency midday service connecting Pioneer Square, the retail core, the proposed Convention Center and the northeast office area. The circulator would also operate at night and on weekends.

A First Hill circulator route would be added during peak hours from the ferry terminal area along James and Jefferson streets to Boren Avenue and north on Boren Avenue to the Ninth and Pine station. This route would provide direct access to First Hill from the Waterfront and the Third South tunnel station and allow commuters from the northend going to First Hill to bypass downtown. In addition to weekday peak hours, this route would also operate at night and on Sunday.

The First Avenue independent circulator route would supplement the midday service provided by the revised regular trolley routes 15 and 18 described earlier. This route would extend to the north end of the Waterfront Streetcar and operate on First Avenue and Jackson Street. Both routes 15 and 18 and this independent circulator would connect the International District with Pioneer Square, Pike Place Market and the Denny Regrade. This route would also operate on Saturday and Sunday.

New trolley wire for the circulation system would be installed on downtown streets as shown in Figure 2-11. In addition, three rectifier stations would be needed to provide power for the circulation system. The rectifier stations would probably be located at the Ninth and Pine station, near the intersection of Madison Street and Boren Avenue and near Union Station (probably between Jackson and Main streets). Some change to corner radii may also be needed at some intersections.

As a separate project, Metro is also considering extending the Waterfront Streetcar from Alaskan Way toward the International District. Alternative alignments and stop locations are currently being evaluated. This would complement the internal circulation system described above.

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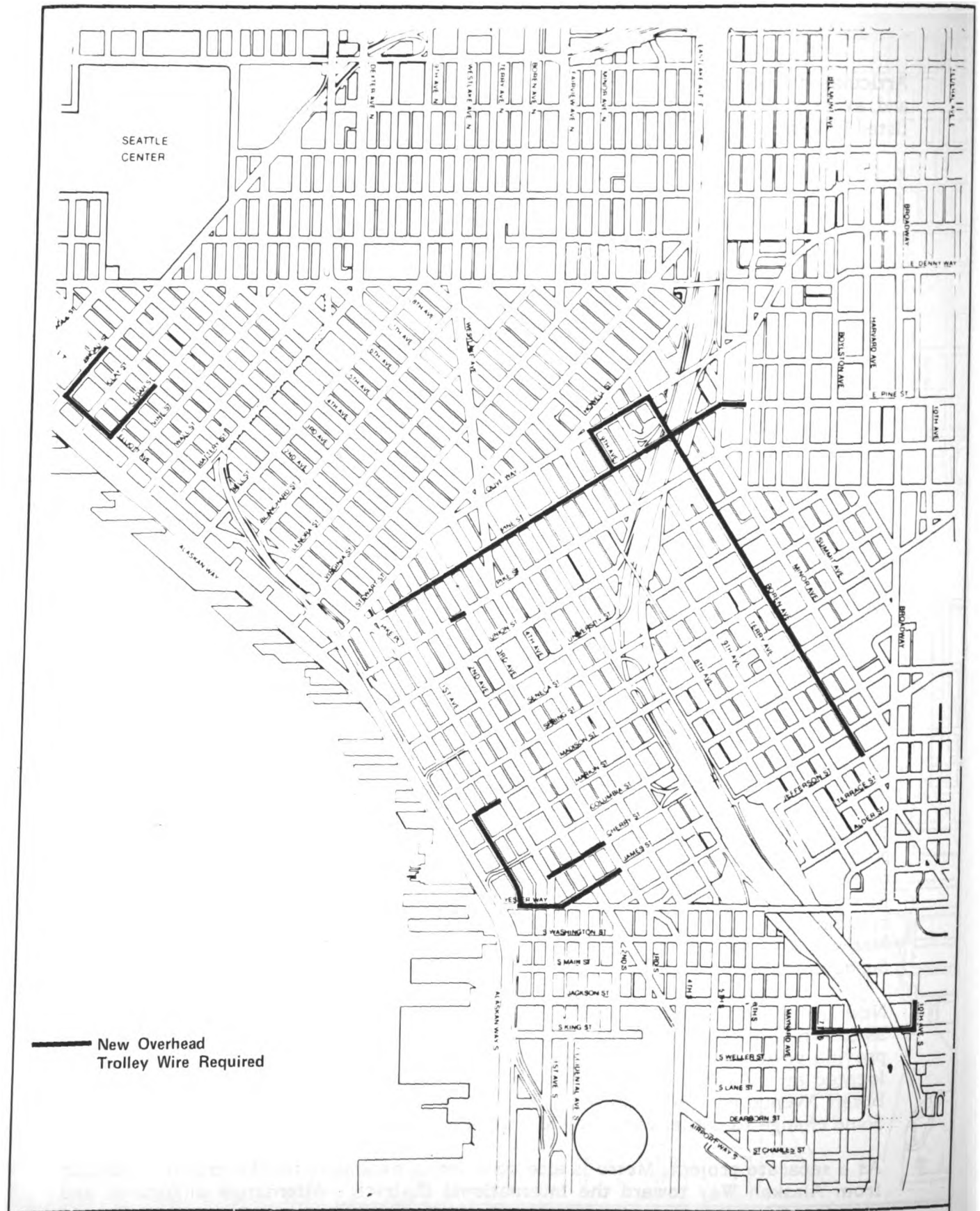

FIGURE 2-11

Additional overhead trolley wire requirements

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Construction

A number of construction methods were evaluated in terms of cost, feasibility and amount of surface disruption. The draft EIS discussed cut-and-cover, boring and mining approaches to tunnel and station construction. As a result of preliminary engineering, a combination of these methods is proposed to construct the transit tunnel (see Figure 2-12).

This section describes these construction methods and measures to minimize adverse impacts. Additional discussion of impacts and mitigating measures is provided in Chapters 4 and 5. For information regarding transit and traffic circulation during construction, see Section 4.1.

The portal stations and staging areas would be constructed primarily in off-street areas. The disruption caused by this construction would be similar to that encountered in major downtown office building construction.

Construction activities causing minor on-street impacts are underpinning, boring tunnel line segments, and construction of the staging areas. At the beginning of the project, utility relocation and building underpinning would take place along the project alignment. Underpinning work would occur at selected buildings whose existing foundations require support during construction. Underpinning would occur inside, outside or both inside and outside for a given building. The decision to work inside or outside would depend on building requirements for underpinning. Exterior work would require closure of the sidewalk in the immediate area of the underpinning for a period of several days as the work is completed.

Boring the tunnel would have essentially no impact on surface activities. Bored tunnel segments would pass below existing utilities, so surface disruption to protect utilities would be unnecessary (see Figure 2-13). Metro has therefore proposed to use this method where practicable. Based on preliminary engineering, boring would be practicable from the Westlake station on Pine Street to Third Avenue, under Third Avenue to Yesler Way and then under the Tashiro-Kaplan building, the Burlington Northern tunnel and Fourth Avenue South to the southern portal just south of Main Street. The underground stations, however, would be constructed using the cut-and-cover method (see Figure 2-14).

Boring the tunnel would have less effect on surrounding areas than the cut-and-cover method since the street surface and utilities would not be appreciably disturbed and there would be less dust, noise and traffic disruption. The specific tunneling technique used depends on the type of soil materials encountered. In soft ground, tunnels are constructed using tunnel boring or digger-arm machines mounted inside shields to hold the ground in place and minimize surface settlement.

The transit tunnel construction would be carried out by mechanical shield-type excavators. The tunneling would begin at construction staging areas located at the south end near Jackson Street.

Two smaller diameter tunnels (twin bore) were chosen for Third Avenue rather than a larger, single bore because it would allow shallower tunneling, be less expensive and disruptive and have less potential for settlement. Above the bored tunnel

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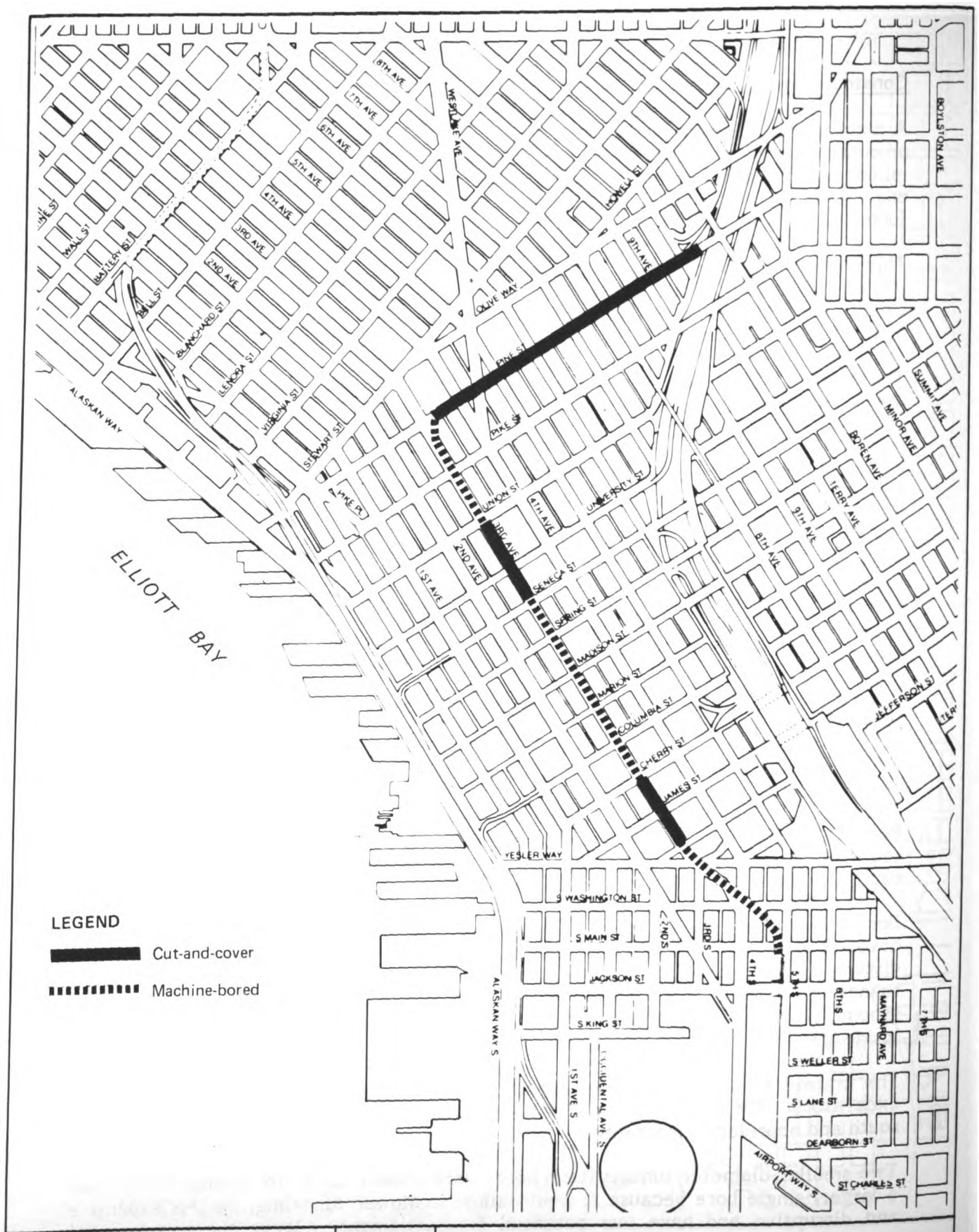

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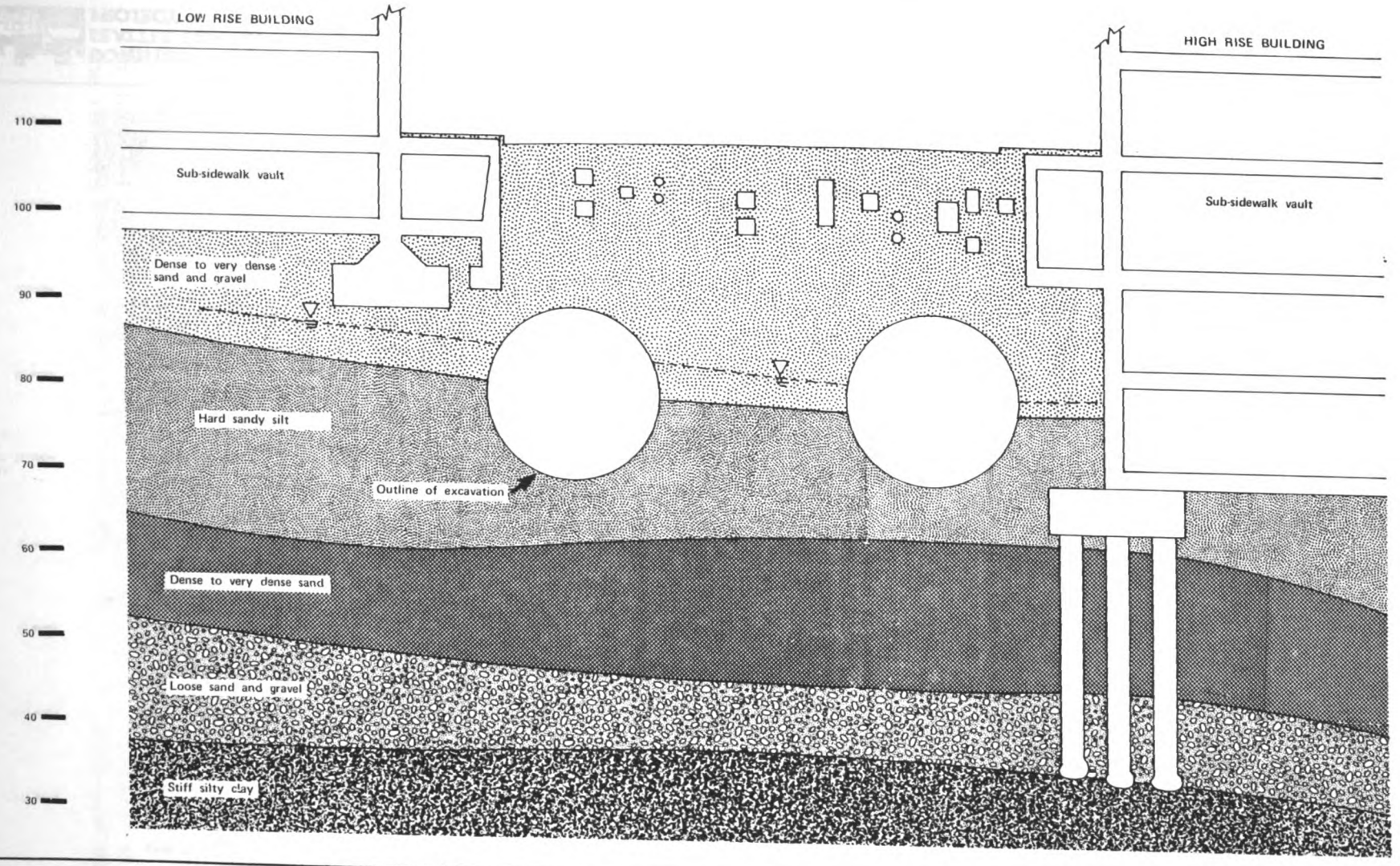

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FIGURE 2-13

Twin-bore transit tunnel
Source: Parsons/Brinckerhoff

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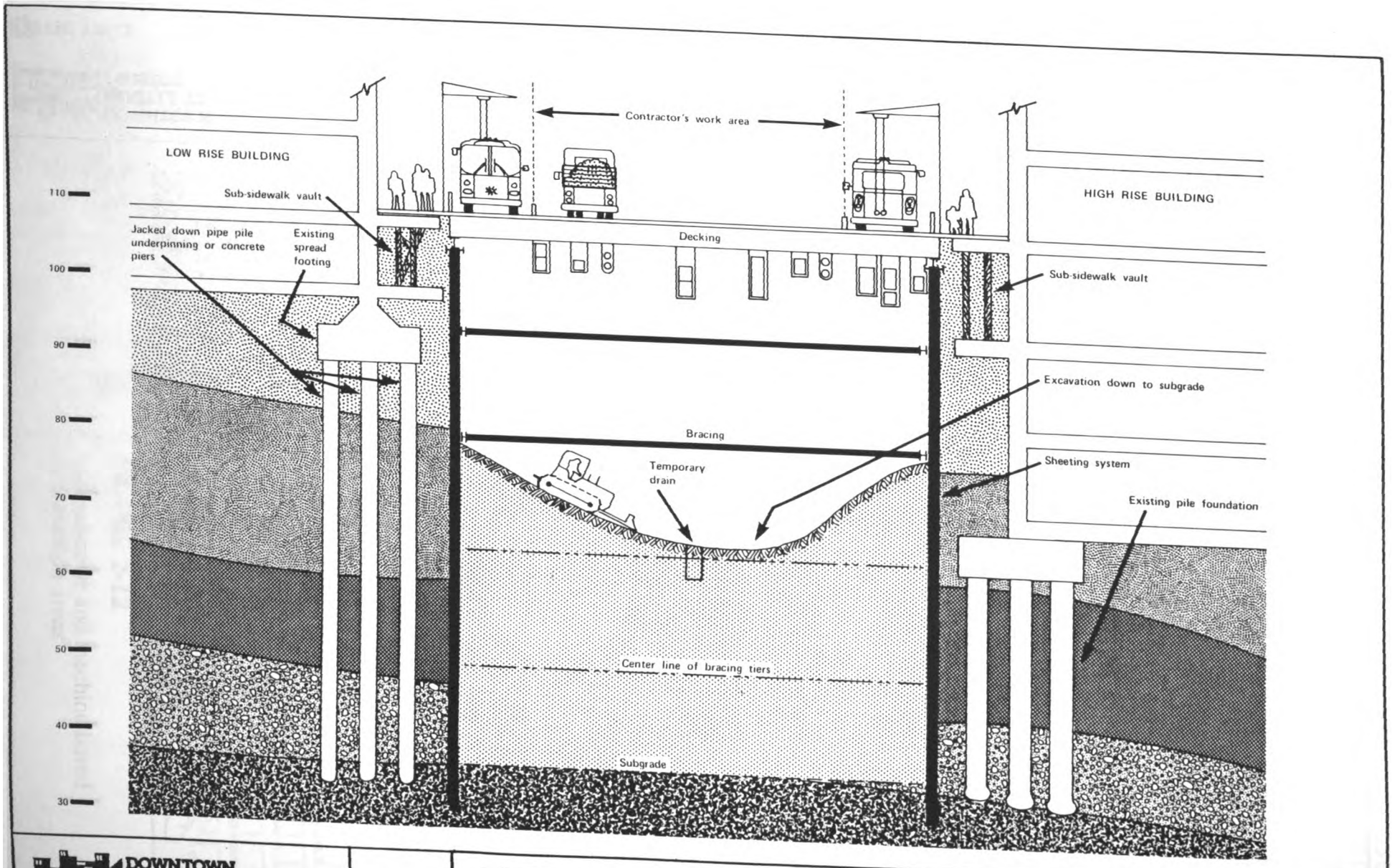

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FIGURE 2-14

Cut-and-cover station construction
Source: Parsons/Brinckerhoff

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segments, street improvements would be constructed on approximately half the street at a time.

Underground stations would be located on Pine Street between Third and Sixth avenues (Westlake station) and on Third Avenue between Union and Seneca streets (Third North station) and between Cherry and Jefferson streets (Third South station). The segment of the Pine Street tunnel between Sixth and Boren avenues would also be constructed using a cut-and-cover construction. Cut-and-cover must be used in this tunnel segment because the tunnel would be climbing from the underground station at Westlake to the Ninth and Pine portal station, and the shallow depth would preclude safe bored construction.

The two strategies for cut-and-cover construction are:

- Inverted Construction: This strategy consists of two phases (see Table 2-2). In the first phase, all traffic would be diverted and the full side street width would be excavated. After a permanent new street deck was installed, general traffic would be restored. Phase I would last from 9 to 14 months.

  In Phase II, final excavation would be completed, the tunnel segment or station completed, and stairways or other vertical access installed. At the end of Phase II, the tunnel would begin operation and the final transit routing schemes would be implemented.

  Concurrently, the street improvements above the bored tunnel segments on Third Avenue between stations would be constructed on approximately one-half of the street at a time from building line to centerline while two lanes remain open to traffic. This work would last approximately 10½ months for each half street --21 months total.

  This strategy would severely disrupt traffic for a shorter time than the standard approach.

- Standard Cut-and-Cover Construction: This strategy includes three major phases as shown in Table 2-2. In Phase I, supports for excavation and soldier piles would be installed. The Pine Street segment and all three intermediate stations would be initially excavated to a depth sufficient to install a temporary deck. Two traffic lanes would be available through the Third Avenue construction areas. On Pine Street, through traffic would be prohibited in one block-long construction areas as the construction proceeds along the street. Access to other blocks would be maintained.

  In the second phase, traffic would be restricted to two lanes through all the cut-and-cover areas on both Pine Street and Third Avenue on temporary decking for approximately 15 months. Below the temporary deck, excavation would be completed and the tunnel and station shell would be constructed. Concurrently, the work on the surface improvements would be performed on Third Avenue between stations, one side of the street at a time, building line to street center line.

  In the third phase, traffic would again be diverted from Pine Street to remove the temporary deck, backfill the excavation, install the permanent structural

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TABLE 2-2

CONSTRUCTION ALTERNATIVES AND APPROXIMATE DURATIONS

Location	INVERTED CONSTRUCTION		STANDARD CUT-AND-COVER CONSTRUCTION		
	Phase I	Phase II	Phase I	Phase II	Phase III
Pine Street Tunnel & Westlake Station	-Initial excavation -No through traffic -Surface improvements construction one block at a time -9 to 14 months	-Permanent deck in place -Open to through traffic with some disruption -Trolley wire in place by end construction -13 months	-Initial excavation -No through traffic -Surface improvements construction one block at a time -9 months	-Work under temporary deck -2 lanes through traffic -15 months	-Install street improvements one block at a time -Trolley wire in place by end construction -No through traffic -5 months
Third Ave. Stations	-Initial excavation -No traffic -Surface improvements construction as permanent deck -8 months	-Permanent deck in place -Traffic restored with some disruption -13 months	-Initial excavation -2 lanes traffic -9 months	-Work under temporary deck -Traffic restored some disruption -14 months	-Surface improvements constructed above stations -No through traffic -5 months
Third Ave. Between Stations	-Bore tunnel sections---------- -Restore street, surface improvements constructed on-half street at a time, one block at a time---------- -21 months----------		-Bore tunnel sections---------- -Restore street, surface improvements constructed one-half street at a time, one block at a time.---------- 21 months----------		

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deck and place the street improvements on the reconstructed street. The temporary deck on Third Avenue station areas would be removed and the permanent deck and surface improvements would be constructed. The surface improvements would be completed on Third Avenue between stations. The third phase would last about four to five months. Upon completion, general traffic would be restored and the final transit routing scheme implemented.

A third construction alternative, called full width cut-and-cover, is available which combines features of the Inverted and the Standard cut-and-cover alternatives. Its impacts are sufficiently similar to the other two alternatives that it is not presented in detail here.

The full width cut-and-cover alternative is similar to the standard cut-and-cover alternative in that it is constructed in 3 phases, with a temporary deck for traffic provided in the middle phase. However it is also similar to the inverted construction alternative in that in its most disruptive phases (first and last phases) it occupies the full width of the street, not just half, and all traffic must be diverted from the station areas during these phases. Traffic routing schemes appropriate for the inverted construction method would be used.

Overall the full width cut-and-cover alternative might take slightly less construction time and offers the potential for slight cost reduction due to giving the contractor the full street width for his work and equipment.

Table 2-2 summarizes the approximate duration of construction activities for each alternative construction method. The total construction time for the project is the same for both cut-and-cover construction methods.

At least partial use of cross streets and sidewalks in areas of cut-and-cover construction would be maintained. Emergency access to buildings on Third Avenue would also be maintained during construction.

Utilities would be relocated and buildings underpinned along the alignment before constructing the tunnel, stations and surface improvements. One or two lanes of the street would typically be closed in each work location where relocation or underpinning is required.

Construction of the tunnel, stations and surface improvements would require staging areas where construction equipment and supplies can be stored. At this time, the Ninth and Pine site, the Union Station site and the Westlake street right-of-way south of Pine Street are planned as construction staging areas. The haul routes and disposal locations for soil excavated from the stations and tunnel would be developed by the construction contractor, but would comply with applicable local regulations. The haul route from Union Station would probably include the state DOT proposed transit-only roadway as far as Spokane Street.

The freeway ramps from the I-5 reversible roadway to Pike and Pine streets would be closed to traffic during reconstruction. The Pine Street ramp would be closed as soon as the Ninth and Pine station is under construction, but the Pike Street ramp would remain open to general traffic.

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At some point, however, the Pike Street ramp would be closed for one year while it is rebuilt. After reconstruction, the Pine Street ramp would be reopened for buses only and the Pike Street ramp would become a carpool-vanpool ramp.

The tunnel segment between Yesler Way and the portal south of South Main Street would be constructed using bored tunnel techniques. The tunneling machines would begin work at the existing earth embankment at the south portal near Fifth Avenue South and South Main Street and proceed to the northwest. Several buildings along the route would be surveyed before construction and monitored during construction to maintain structural integrity. They include the Downtowner Apartment building, the Prefontaine building, the Young-Me Restaurant and the Tashiro and Kaplan buildings. One lane of Prefontaine Place would be out-of-service during underpinning of the Prefontaine building, if required.

The southern lane and sidewalk of South Main Street between Fourth Avenue South and Fifth Avenue South would be out-of-service during construction of the tunnel portal, but there would not be long-term street impacts.

Construction impacts on the Burlington Northern railroad tunnel would be similar to those described in the draft EIS on pages 2-71 and 2-72. Instruments would be placed in and around the railroad tunnel to detect ground movement during construction. If necessary, chemical grouting, compaction grouting or other suitable methods to protect the railroad tunnel from unacceptable ground movement would be used. Workers would have to be inside the railroad tunnel intermittently up to 10 weeks during design and construction to place instruments and grout, soil boring and concrete core sampling. These 10 weeks would not necessarily be contiguous. Each track in the two-track tunnel would be intermittently closed, requiring trains to be rescheduled or rerouted to the other track during these periods. Metro anticipates that at least one track would always be operating during construction.

Similar precautions would be taken where the proposed transit tunnel alignment crosses above the existing Burlington Northern railroad tunnel near the intersection of Third Avenue and University Street. A station is proposed for the transit tunnel at the crossing point. During construction of this station, the Burlington Northern tunnel would be fitted with instruments and monitored during construction. No concentrated loads would be placed on the Burlington Northern railroad tunnel by the transit station. Special structures would be placed if necessary to protect the structural integrity of the Burlington Northern railroad tunnel from construction and long-term operational impacts.

2.1.3 No Action

Transit and general traffic demand in the project area are estimated for a design year of 1990 using population and employment data from the Puget Sound Council of Governments' King Sub-Regional Council land-use plan. Travel estimates are compatible with the PSCOG's Regional Transportation System Plan for 1990 and the adopted Land Use and Transportation Plan for Downtown Seattle.

The No Action alternative assumes the 1990 Metro Comprehensive Plan for Public Transportation will be implemented in King County's service area. Metro assumes that some existing diesel routes in downtown would be converted to electric

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trolleybus routes and a mix of vehicle types in the 1990 fleet would be achieved as planned.

The No Action alternative would not meet any of the project objectives. The alternative would mean that high volumes of diesel and electric buses mixed with automobile traffic would continue to operate. Congestion would increase as bus and automobile volumes increase. About 18 percent of a total peak-bus volume of 656 buses in the downtown would be electric trolleybuses. Sidewalks would not be widened, urban design amenities would not be added to downtown, an independent transit circulation system would not be established, and facilities would not be constructed that would eventually be converted to elements in a regional guideway transit system. Downtown transit capacity would be reached in 1985.

The No Action alternative would attempt to meet projected transit demand through Metro's ongoing planning and management efforts. Little or no capital would be invested in the CBD. Additional bus purchases are proposed by 1990, although they would not be a component of the Downtown Seattle Transit Project. System management and planning efforts would include schedule adjustments, added service as called for in the Mid-Range Program, reallocation of service among CBD streets and ramps to take advantage of unused street and sidewalk capacity and relocating or splitting bus stops and other similar strategies.

There would be no street closures, no right-of-way taken, no additional existing street right-of-way dedicated to exclusive transit use and no changes to the traffic signal system to benefit transit. Bus shelters would be added as part of the ongoing shelter program.

The existing transit features, including with-flow, peak-hour bus lanes on Second and Fourth avenues, the contraflow bus lane on Fifth Avenue from Terrace Street to Cherry Street and the I-5 express lane ramp at Fifth Avenue and Cherry Street for buses and carpools would remain.

The state DOT-constructed busway from I-90 would terminate at Airport Way South.

Buses would continue to use on-street curb space for staging -- the operation of bringing peak-hour buses to the edge of the CBD for a short layover to allow the trip through the CBD to begin on time. The Denny Regrade north of Stewart Street and the southern edge of the CBD, primarily south of Yesler Way, are currently used for staging operations. Scarce on-street parking would continue to be preempted by bus staging.

2.1.4 Transportation System Management (TSM)

Three TSM options are being considered: the Third Avenue Transit Street (TSM Mall), the Second and Fourth Avenue Dual Contraflow Transit Lanes and the Non-intercept Mall. TSM attempts to meet project objectives with limited capital investments and intensive traffic management. As noted in the next section, however, the options discussed in this section have not proved to be satisfactory in meeting these goals.

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The TSM Mall would be a low-cost transit mall on Third Avenue (see Figure 2-15). Third Avenue and Prefontaine Place South between Stewart Street and Fourth Avenue South would be restricted from 6 a.m. to 6 p.m., Monday through Saturday, to buses. This option would include additional contraflow bus lanes, I-5 ramp modifications, parking restrictions, traffic signal adjustments, a flextime promotion program and continuing existing TSM elements.

The TSM Mall would entail a four-year design and construction period. The construction of the I-90 transitway connection and the installation of new channelization, signing and signals for the TSM Mall would disrupt pedestrian and mixed traffic movement only minimally.

Contraflow lanes are roadway lanes that enable buses to operate in the direction opposite that of general traffic on normally one-way streets. Contraflow lanes on Second and Fourth avenues between Jackson and Stewart streets would allow buses with doors only on the right-hand side to pick up passengers from both sides of the street (Figure 2-16). This would increase the curb space available for bus stops.

The dual, transit-only contraflow lanes on Second and Fourth avenues would operate 24 hours a day with bus-only traffic between 7 a.m. and 9 a.m. and between 3 p.m. and 6 p.m. Truck traffic could also use the lanes during other hours. This option would include an additional contraflow bus lane on Stewart Street, traffic signal adjustments, parking restrictions, a flextime promotion program and the continuation of existing TSM improvements.

During peak periods the five lanes on Fourth Avenue, for example, would be for buses only going southbound in the two western-most lanes, northbound general traffic in the next two lanes and buses and right-turning general traffic in the east lane. Second Avenue would have a similar arrangement in the opposite direction to complete the couplet. Parking would be allowed off-peak at the eastern curb of Fourth Avenue and western curb of Second Avenue; but no parking would be allowed in peak periods, identical to the existing parking restrictions policy. On the opposite sides of the two streets, in the contraflow lanes, no parking would be allowed at any time except for off-peak truck loading, in contrast to current parking policy which allows off-peak parking at the curb.

The TSM Contraflow Lanes alternative would entail a four-year design and construction period. The construction of an I-90 transitway connection, the reconstruction of the curb lanes and the installation of new traffic signals would disrupt pedestrian and street traffic movement only minimally.

2.1.5 Non-intercept Mall (TSM)

The Non-intercept Mall (TSM) alternative would attempt to meet project objectives through reconstructing and dedicating one street through the CBD to exclusive transit use at least during peak periods and possibly at all times. Buses would be separated from general traffic on a bus-only mall on Third Avenue and Pine Street (see Figure 2-17). Dual-power buses, opeating on electric power in the downtown, would be used to minimize the noise and air quality efforts of diesel buses. The mall would ease crowding as the sidewalks are widened and the roadway narrowed along the mall. This would eliminate existing on-street parking and loading.

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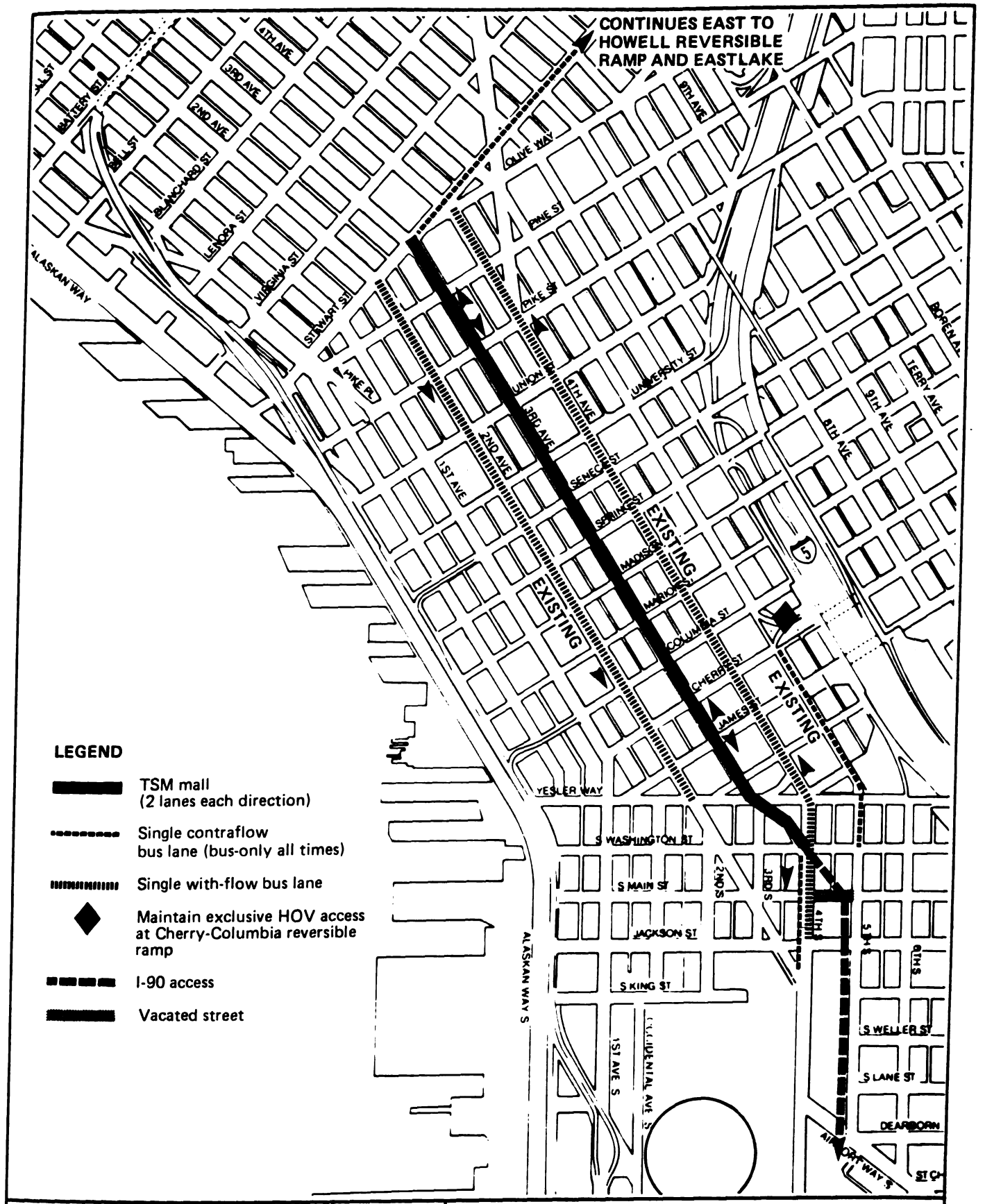

FIGURE 2-15

TSM mall option

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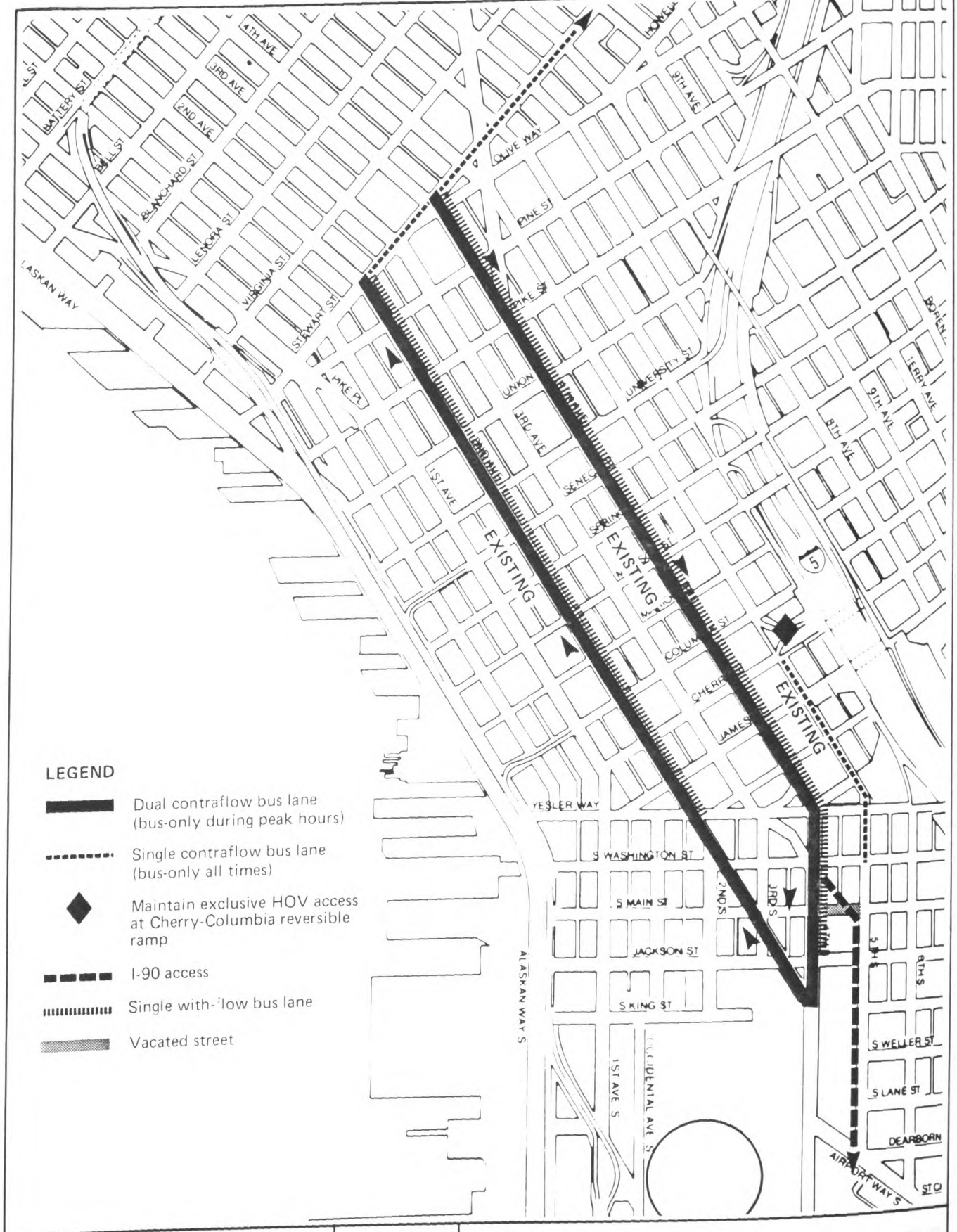

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FIGURE 2-16

TSM contraflow lanes options

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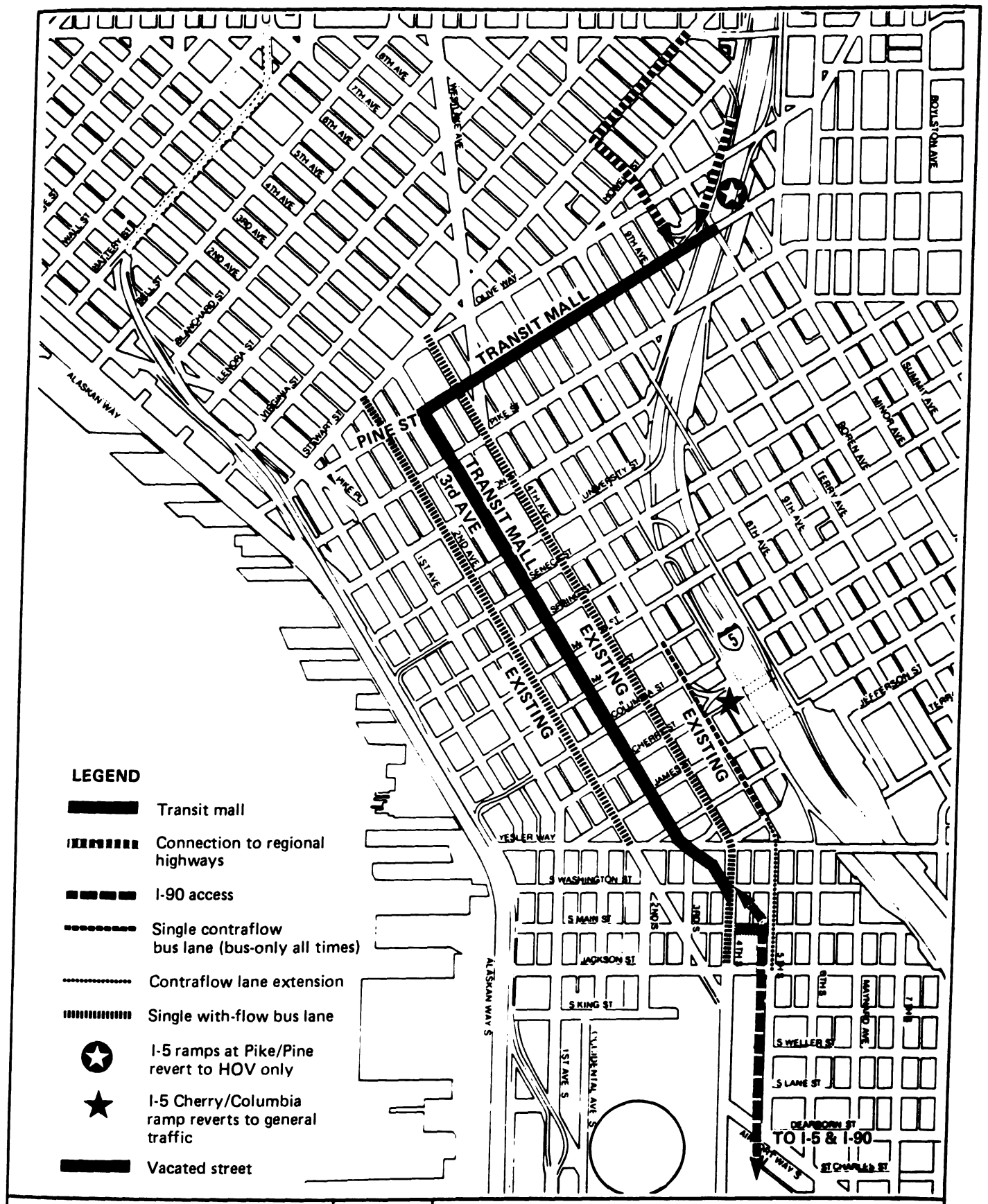

FIGURE 2-17

Non-intercept mall alternative

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Pine Street would change from a one-way westbound configuration to two westbound and one eastbound lanes. Third Avenue would change from a two-way, six-lane configuration to a two-way, four-lane operation. Pedestrian amenities would be included on the sidewalks, and streets would be repaved to increase load-carrying capacity and durability.

The I-90 busway would be constructed from Airport Way South to the intersection of Fourth Avenue South and Prefontaine Place South to provide direct access to the mall from the interstate highway system.

The bus-carpool lane would be moved to the west side of the I-5 reversible roadway and the Pine Street ramp from I-5 would become a bus-only ramp. The Cherry Street ramp would revert to a general traffic ramp from its current bus and carpool-only designation. The ramp from I-5 to Pike Street would be used only by carpools.

The existing single contraflow bus lane on Fifth Avenue would be extended north to Marion Street and south to Jackson Street. Terry Avenue between Olive Way and Howell Street would change to a two-way street.

Primarily in-city trolleybus routes and I-5 routes serving north suburban areas would operate on the mall. These routes would benefit from the separation from mixed traffic. East and south suburban routes would benefit from the I-90 connection. Southern routes would enter this busway from an at-grade intersection at Royal Brougham Way, but they would be assigned primarily to Second and Fourth avenues as in the existing operation.

The mixed trolley and dual-power bus mall alternative would entail a four-year design and construction period. The state DOT's Downtown I-90 Access Project schedule anticipates construction to begin in May 1986 and end in late 1989. During transit mall construction, activity would proceed sequentially block-by-block. Twenty-three weeks would be required to substantially complete each block. During that 23-week period, street traffic, except delivery trucks, would be rerouted. Alternative utility service connections would be provided. Pedestrian access would be maintained on temporary structures with only minor interruptions. During the last six weeks of each calendar year, the contractors would shut down the project and reopen the sidewalks and street to facilitate heavy pedestrian and vehicular traffic during the holiday season.

Although the No Action alternative is commonly used as a baseline against which action alternatives are compared, UMTA also compares high capital cost alternatives to a low-cost alternative—Transportation System Management.

When selecting an appropriate TSM measure for UMTA's comparison (see Chapter 7), it is important that the TSM option be implementable and that it meets the project goals. It became apparent after evaluating the TSM options described in Section 2.1.4 that they do not satisfy these criteria. Both options preempt scarce street capacity without offering substantive urban amenities. Neither option addresses sidewalk congestion problems related to transit patrons competing for sidewalk space with other users.

Therefore, this EIS uses the Non-intercept Mall (TSM) alternative as the TSM measure for UMTA to compare with the locally preferred alternative. This is the

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least expensive alternative which could be constructed entirely with local funds and still meet most of the project objectives.

2.1.6 Mall with Transit Centers

The Mall with Transit Centers alternative would attempt to meet project objectives by constructing a transit mall on the same alignment as the Non-intercept Mall (TSM) alternative, but would add transit centers at either end of the mall or at intermediate locations.

As in the case of the Non-intercept Mall (TSM) alternative, two operation methods would be possible with respect to general traffic. Under one method no general traffic would be allowed on the mall. In the other method, off-peak traffic would be allowed westbound on Pine Street and both ways on Third Avenue.

Some diesel buses, generally from suburban service areas, would be intercepted at the transit centers, and their passengers would be transferred to high capacity electric trolleybuses. The trolleybuses would operate on and off the mall, carrying passengers to their CBD destinations. Some passengers would walk from the transit centers to their destination. Diesel-bus volumes and their impacts would be reduced in downtown.

Two transit center sizes are under consideration. Investigation of the larger-sized center or terminal led to concern about the high volumes of passenger transfers and possible ridership losses due to delay and inconvenience. The smaller transit center or station concept would reduce the number of transfers for riders. The term station describes the operating strategy where some bus routes would not terminate at the transit center but continue through it under electric power like a train passes through stations. Terminals would intercept 48 percent of all peak-hour buses approaching downtown. Stations would intercept 29 percent.

Terminals would be capable of intercepting 150 diesel buses an hour. Diesel-feeder buses would enter these terminals from the regional highway system, unload passengers and either load new passengers or return to the base. Disembarking passengers would (1) leave the terminal and walk to their destinations, (2) board electric-shuttle vehicles which would depart at frequent intervals, or (3) board circulator buses which would serve areas off the mall, such as the waterfront and First Hill.

Stations would be capable of intercepting 90 buses an hour. This would require using dual-power vehicles as through-buses. The dual-power vehicles would operate as diesel buses on the regional highways and transfer to trolley wires for electric propulsion in downtown.

If the stations were located at either end of the mall (peripheral stations), the dual-power vehicles would enter the station along the same route as diesel-feeder buses, pass through the station after loading and unloading passengers and travel along the transit mall, stopping enroute and at the station at the far end before reentering the highway under diesel power.

If the stations were located at intermediate locations along the mall (close-in stations), regional diesel buses would approach and depart through access tunnels to

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each station. Dual-power buses would operate as trolleys in the CBD at either end of the mall. They would continue along the mall to the stations but would not enter.

Transit passengers would have fewer transfers with stations, since more people would be within walking distance of their downtown destinations. The station, however, would generate a greater volume of vehicles on the transit mall.

The bus-carpool lane on the I-5 reversible roadway would be moved to the west side of the roadway, and the Pine Street ramp from I-5 would become a bus-only ramp to the Ninth and Pine site and would not connect to Pine Street. The Cherry Street ramp would revert to a general traffic ramp from its current bus and carpool-only designation. The ramp from I-5 to Pike Street would be used only by carpools.

Peripheral Transit Center Options

Three sites were investigated for peripheral transit centers: the Ninth and Pine site at the north end of the alignment and both the Yesler site and the Union Station site at the south end (see Figure 2-18).

In addition to the Pine Street freeway ramp, diesel buses would access the Ninth and Pine transit center from Olive Way. The shuttle and circulator trolleybuses would enter via Ninth Avenue and Pine Street one-way ramps. Pedestrians would enter the transit center from Pine Street.

The I-90 connection to the Yesler transit center would be constructed at the existing railroad track level under Airport Way South, South Jackson Street and South Main Street. Ramps would connect the Union Station railroad yard staging area with the Fifth Avenue/Airport Way South and Fourth Avenue/Airport Way South intersections.

A short tunnel segment under Fourth Avenue and Yesler Way to Third Avenue at Dilling Way would allow electric shuttle buses to reach the mall from the Yesler terminal. The Yesler Way Bridge over Fourth Avenue, however, would have to be reconstructed. A low-cost shuttle bus connection to the mall via Prefontaine Place would also be feasible with other Yesler Way site layouts. Pedestrians would enter the Yesler transit center from Yesler Way and Fourth and Fifth avenues.

The I-5/I-90 ramp connection would provide direct access to the Union Station transit center from the freeway. A two-lane, bus-only ramp would connect the transit center with the intersection of Fourth Avenue, Prefontaine Place and Washington Street.

The mall between the north and south transit centers would begin at Ninth Avenue and Pine Street and end at Fourth Avenue and Prefontaine Place. The mall on Pine Street would include two westbound lanes and one eastbound lane as in the Non-intercept Mall (TSM) alternative. Third Avenue would have four lanes with loading medians down the center or loading islands one lane from the curb on alternating sides of the same street.

The peripheral stations options are scaled-down versions of the peripheral terminals options. General configuration, bus and pedestrian access, land to be acquired,

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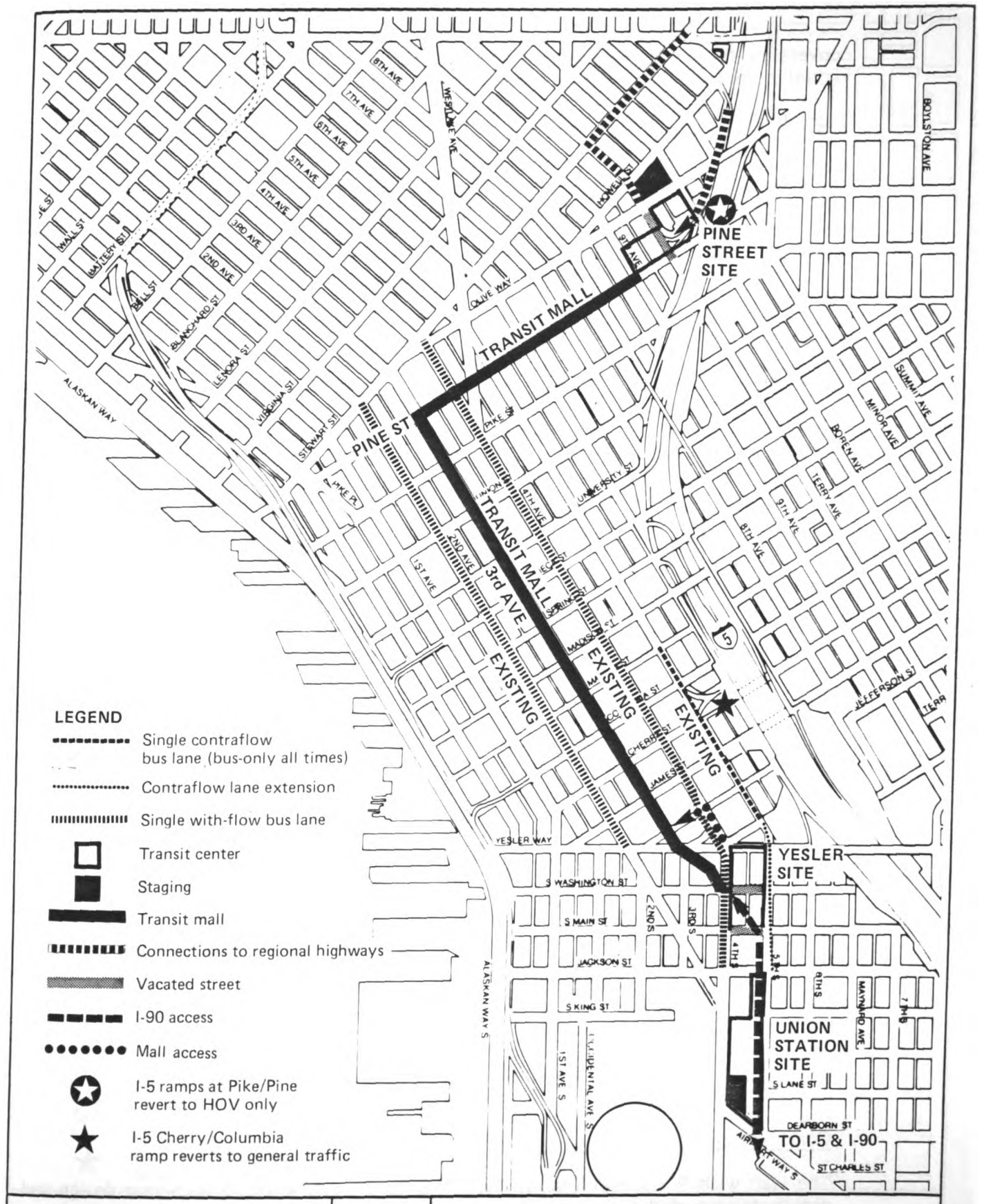

FIGURE 2-18
Mall with peripheral transit centers option

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conversion to a future high-capacity system and mall cross sections would be virtually identical under the peripheral terminal and station options.

Close-In Transit Centers Options

Close-in transit centers were evaluated at the Third and Pine site and the Fourth and Columbia site (see Figure 2-19). The two close-in transit center options would require small peripheral stations at the Ninth and Pine site and the Union Station site. These mini-stations would allow passengers to load and unload but would not have to intercept the diesel buses. Close-in transit centers would be underground and closer to the center of existing ridership demand.

Land comparable to that acquired for the Ninth and Pine and Union Station transit centers would have to be purchased for bus staging areas. I-5 and I-90 access to the two mini-stations would be identical to the access for the Ninth and Pine and Union Station transit centers.

Access from the Pine Street mini-station to the Third and Pine terminal would be via a three-lane tunnel under Pine Street with a portal northeast of the Ninth and Pine intersection. Access to the Fourth and Columbia terminal from the south mini-station would be via a three-lane tunnel under Fourth Avenue with a portal between Fourth and Fifth avenues south of South Main Street. The Yesler Street Bridge would have to be rebuilt over Fourth Avenue.

The mall connecting the two mini-stations would follow the alignment proposed for the peripheral transit centers, but would have a three-lane cross section on Third Avenue. This would preclude the use of the Third Avenue mall by general traffic. The center lane would be for emergency vehicles and for passing disabled buses. The Pine Street mall would be the same as for the peripheral terminal transit center options.

Close-in stations at the Third and Pine site and the Fourth and Columbia site would be similar to, but smaller than, the close-in terminals. The stations would have six diesel bays as opposed to 10 in the terminal option.

With stations, dual-power buses would have access to the mall at street level at Ninth and Pine and Fourth and Prefontaine. Third Avenue would have four traffic lanes and a median or islands rather than the three traffic lanes proposed in the terminal option.

At each mini-station, about 90 out of 150 regional buses (same routes as peripheral transit centers) per peak hour would continue to the underground stations via access tunnels. They would turn back after unloading all their passengers. The remaining 50 dual-power buses would convert to electric trolley operation and operate on the mall. Acting partly as shuttles as they pass the close-in stations, the dual-power buses would carry passengers closer to their CBD destinations, reducing the number of transfers. This option would slightly reduce transfers beyond that achieved in the close-in terminal option.

Construction Schedule and Strategy

The Mall with Peripheral Transit Center options would entail a four-year design and construction period.

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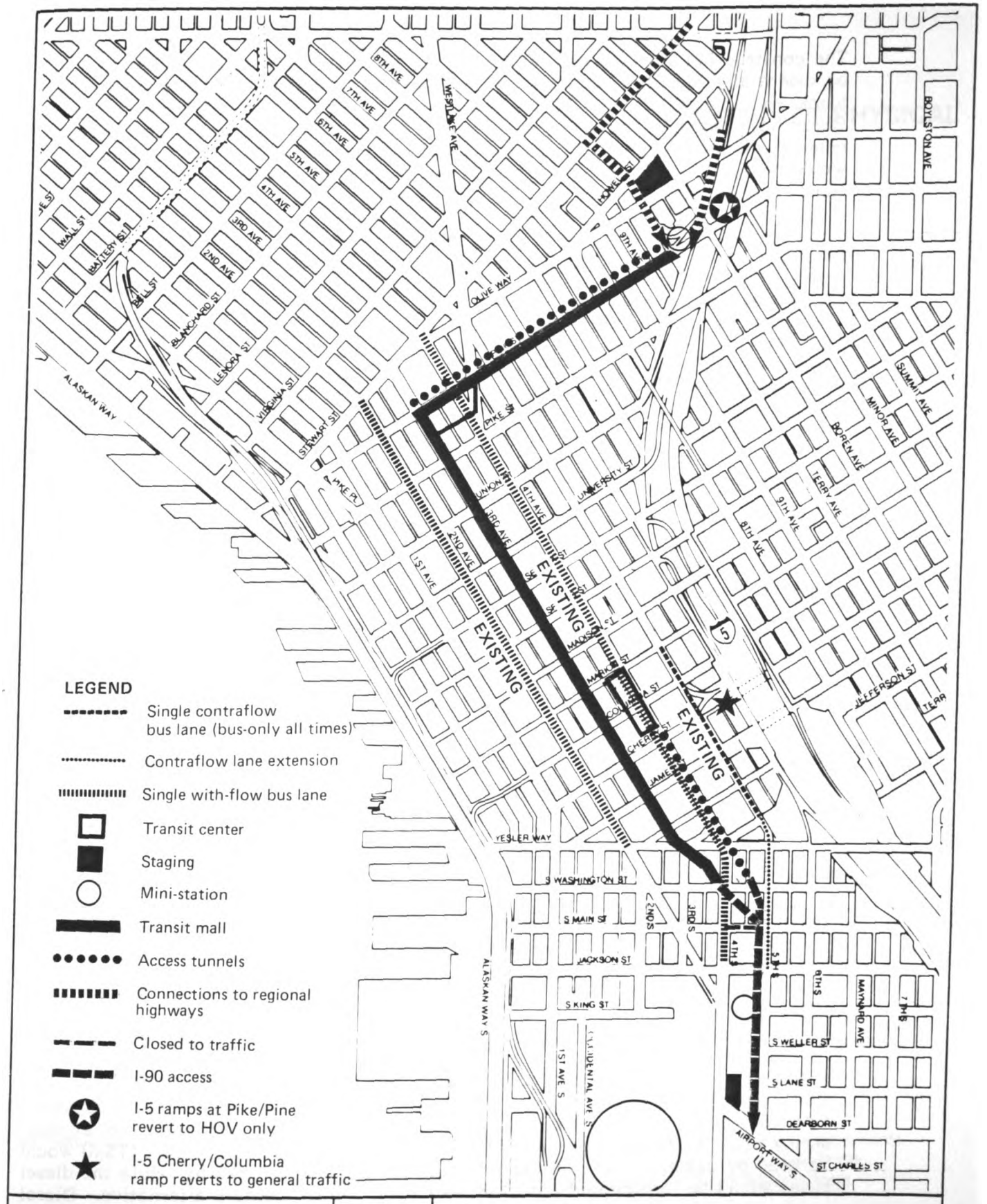

FIGURE 2-19

Mall with close-in transit centers option

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The construction strategy and sequencing for the mall portion of each option would be essentially the same as under the Non-intercept Mall (TSM) alternative. Each block would be closed for a 23-week period and construction would cease during the Christmas season. The peripheral transit centers would be constructed simultaneously and would minimally disrupt pedestrian and street traffic. The disruption would be similar to that encountered in major downtown office building construction.

The Mall with Close-in Transit Center options would entail a five-year design and construction period. The construction strategy for the close-in options would center around the construction of the underground access tunnels. Metro assumes a traditional cut-and-cover method would be used to construct these access tunnels. The street surface would first be removed and then decked over to allow pedestrian and street traffic. By sequencing cut-and-cover activity, two street lanes would be maintained at all times and pedestrians can reach buildings along the length of construction area. New utility systems would replace existing utilities. The transit center and underground access tunnel constructions would occur simultaneously. Material would be removed from the close-in sites through the access tunnels.

2.2 Comparison of the Alternatives

The 1983 draft EIS for the Downtown Seattle Transit Project evaluated a No Action alternative and four action alternatives: Transportation System Management (TSM), a Non-intercept Mall (TSM), a Mall with Transit Centers and a Tunnel. Descriptions, environmental impacts and costs for each of these alternatives were provided.

Since Metro Council identified an electric bus tunnel as its preferred alternative, preliminary engineering has been conducted to further refine this alternative and to improve the environmental impact analysis. This final EIS incorporates this new information, but readers should refer to the draft EIS for details of other alternatives.

This section is composed of a series of summary tables which provide a concise comparison of all the alternatives and their environmental impacts. Brief narrative discussion is also provided. Readers should refer to the text of this document, the draft EIS and technical reports for more detail.

Description of the Alternatives

Tables 2-3 and 2-4 provide summaries of physical and operating characteristics, respectively, for all of the alternatives. While the No Action alternative would provide no capital improvements other than those in Metro's Mid-Range Program, transit-related street improvements would be incorporated with all the action alternatives. While the TSM options would offer additional street capacity at the least cost, no pedestrian environment improvements would be included.

A transit mall is the primary component of the Non-intercept Mall (TSM) and Mall with Transit Centers alternatives. Both offer wider sidewalks and other pedestrian amenities and could restrict Third Avenue and Pine Street to transit use, at least during peak traffic hours. They differ in that the Non-intercept Mall (TSM) would be used by diesel buses carrying riders directly from the suburbs, while the diesel buses would be intercepted with the Mall with Transit Centers alternative. Diesel

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TABLE 2-3: SUMMARY OF PHYSICAL

Alternatives	Capital*** Costs 1983 $	Transit center location	Street configuration and treatment
1. No Action	No cost above mid-range plan	None	None
2. Transportation Systems Management			
— TSM mall	$37.5M	None	Four-lane mall designated on Third and Prefontaine South from Stewart to Fourth Avenue. No street alteration.
— TSM Contraflow Lanes	$47.3M	None	None
— TSM Non-intercept mall	$101.1M*	None	Pine: 2 westbound lanes, 1 eastbound lane; Third: 4 lanes. Substantial pedestrian amenities and urban design features. Improved passenger information system.
3. Mall with Transit Centers			
— Peripheral terminals	$234.3M	Option 1: north—Ninth & Pine south—Yesler & Fourth; Option 2: north—Ninth & Pine south—Union Station	Same as Non-intercept Mall except that islands on median are included.
— Peripheral stations	$234.2M	Same as peripheral terminals (above)	Same as peripheral terminals
— Close-in terminals	$327.8M	North—Third & Pine, south—Fourth & Columbia; (mini stations at Ninth & Terry and Union Station).	Cross section: Third-36 (2 or 3 lanes), Pine-2 lanes westbound, 1 lane eastbound Substantial pedestrian amenities and urban design features. Improved pedestrian information system.
— Close-in stations	$346M	Same as close-in terminal.	Cross-section: Third-4 lane; median or island; Pine-2 lanes westbound, 1 lane eastbound.
4. Tunnel			
— Third Avenue and Pine	$351.3M**	Five stations, 1 at each end of tunnel, 1 under Pine, and 2 at locations under Third Avenue	Third Avenue tunnel surface improvements option includes significant pedestrian amenities and urban design features.
— Fourth Avenue and Pine Street	$249.5M	Five stations, 1 at each end of tunnel, 1 under Pine, and 2 at locations under Fourth Avenue	Fourth Avenue tunnel has no surface improvements.

* Dual-power bus costs are not included. For discussion of dual-power bus costs see Chapter 7.
** No bus costs are included. For discussion of dual power bus costs see chapter 7.
** Although this cost is in 1984 dollars, 1983 and 1984 cost estimates are comparable because the construction cost index for the Seattle area did not change between 1983 and 1984.

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CHARACTERISITICS OF THE ALTERNATIVES

Sidewalk treatment	Other transit priority features
None	Existing system: with-flow peak lanes, Second & Fourth: contra-flow lanes Fifth; I-5 express ramp Fifth and Cherry for HOVs
None	Transit-only 6am-6pm Monday-Saturday on TSM mall; contraflow lane on Stewart; modifications to Stewart/Howell I-5 ramp; HOV at Cherry/Columbia ramp; transit priority signalization; contraflow lane on Fourth from South Washington to Second Extension South, I-90 connection.
None	Dual contraflow lanes on Second & Fourth between Jackson/Stewart; contraflow lane on Stewart; modifications to Stewart/Howell I-5 ramp; transit priority signalization; extend I-90 transit lanes to ramp at Fourth & Prefontaine South; extend existing contraflow lane on Fifth; maintain HOV Cherry/Columbia ramp and existing with flow lanes on Second and Fourth.
Sidewalk width: Pine 22 ft.; Third: 19 ft.; substantial pedestrian amenities; improved passenger information system.	Mall: Pine from Boren to Third; Third from Pine to Prefontaine; Prefontaine to Fourth. Other streets: I-90 busway from Airport Way South to Fourth & Prefontaine to mall; Pine bus-only ramp on I-5; general traffic moved to Cherry ramp.
Sidewalk width: Pine: 22 ft.; Third: 15 ft.	Mall (Non-intercept Mall, but with electric buses); I-5 Cherry ramp would become a general traffic ramp; Pine, a bus-only ramp; Pike, a car-pool ramp; I-90 connection at track level; Second, Fourth and Fifth Avenue bus lanes. For Union Station option: 2-lane bus ramp from terminal to Fourth/Prefontaine/Washington.
Same as peripheral terminals	Same as peripheral terminals
Sidewalk width: Pine: 22 ft.; Third: 24 ft.	Same as peripheral terminals, plus addition of a contraflow lane on Fifth.
Sidewalk width: Pine: 22 ft.; Third: 15 ft.	Same as close-in terminals.
Sidewalk width: Pine: 22 ft.; Third: 19 ft.	Transit-only roadway underground, 1 lane each direction and passing lane at stations; I-5 and I-90 access same as close-in terminal; I-5 reversible ramp at Cherry converts to general traffic.
Sidewalk width: Pine: 22 ft.; Fourth: 19 ft.	Same as Third Avenue tunnel.

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TABLE 2-4: SUMMARY OF OPERATING

Alternatives	1990 annual operating savings over No Action (millions of 1984 $)	CBD peak hour rider capacity and year capacity reached	1990 peak hour CBD ridership	Number of peak hour transfers
1. No Action	None	25,000(1985)	25,000	7,380
2. Transportation Systems Management				
— TSM Mall	$3.9 M	31,000(1991)	29,100	7,190
— TSM Contraflow Lanes	$3.9 M	31,000(1991)	29,100	7,520
— TSM Non-intercept Mall	$3.8 million	31,000(1991)	29,300	7,350
3. Mall with Transit Center				
— Peripheral Terminals	$3.8 M	33,000(1993)	27,300	19,360
— Peripheral Stations	$3.0 M	31,000(1991)	28,300	14,400
— Close-in Terminals	$4.1 M	33,000(1993)	28,400	14,160
— Close-in Stations	$3.3 M	31,000(1991)	29,100	11,490
4. Tunnel				
— Third Avenue and Pine Street (Preferred Alternative)	$4.4 M*	43,000(2003)	30,000	8,100
— Fourth Avenue and Pine Street	$4.4 M	43,000/2003	30,100	8,390

* The tunnel would not be operating at capacity in 1990. When the tunnel is operating at capacity in the year 2000, annual operating savings would be $8.7 million in 1984 dollars.

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CHARACTERISTICS OF THE ALTERNATIVES

Independent transit circulation downtown	CBD transit travel minutes saved over No Action	Staging	Peak hour CBD surface buses diesel/electric/total
None	—	Continue to use on-street curb space	521/121/642
Off-peak: First and Fifth/Sixth at 15 min. headways; peak: First Hill at 6 min. headways.	3.3	Continue to use on-street curb space	521/121/642
Off-peak: First and Fifth/Sixth at 15 min. headways; peak: Third at 5 min. headways.	3.3	Continue to use on-street curb space	521/121/642
Off-peak: First and Fifth/Sixth at 15 min. headways; peak: First Hill at 6 min. headways.	4.2	Continue to use on-street curb space	521/121/642
First and Fifth/Sixth, 3/5 minutes; First Hill, 9/15 min.; Third, 2/3 min	2.0	Staging on street and north: bounded by Howell, Olive, Terry, Boren; south: bounded by Fourth South, Fifth South, Airport Way, South Jackson staging on street and in areas in peripheral terminals	200/282/482
Same as peripheral terminals.	3.3		210/328/538
Similar to peripheral terminals except less service on Third Avenue during peak hours.	3.6	Staging on street and north: Howell, Terry, Pine, Boren; south: Union Station	217/222/439
Similar to peripheral stations except no service on Third Avenue during peak hours.	5.1	Staging on street and north: Howell, Terry, Pine, Boren; south: Union Station	210/321/531
Off-peak: Third and Pine at 5 min. headways; peak: First Hill at 7.5 min. headways.	7.0	Staging on street and north: Ninth and Pine including the block bordered by Ninth, Pine, Terry, Olive Way and Boren; south: Union Station	1990: 349/121/488 2000: 242/161/393
Same as Third Avenue.	7.0	Same as Third Avenue	1990: 349/121/470 2000: 242/151/393

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buses would be intercepted at transit centers; riders would walk, ride an electric shuttle bus on the mall or ride an electric circulator bus to their CBD destination.

The Tunnel alternative would provide a new transit roadway through the CBD without sacrificing existing street capacity. Surface improvements to Third Avenue and Pine Street would enhance pedestrian access to transit but would not restrict general traffic from the streets.

Table 2-4 indicates that the tunnel would have the longest life before reaching capacity, have the highest operating savings compared with No Action and would provide the most time saved in a trip through the CBD. It is also among the more costly alternatives. All alternatives offer an independent electric circulation system.

Peak-hour transit volume on CBD streets would be lower than No Action with the Mall with Transit Centers or the Tunnel alternatives. From an air quality perspective, the halving of diesel bus volumes with these alternatives is especially important.

Construction/Soils

The action alternatives with the shortest construction period (24 months) include the TSM, peripheral transit center and Non-intercept Mall (TSM) alternatives. Both Close-in transit center options would require an additional year to construct because of the transit center and access tunnel construction in downtown Seattle. A tunnel would have the longest construction period (45 months).

Action alternatives that require excavation for tunnels, stations or terminals could produce soils-related impacts. The Tunnel alternative has the highest potential for settlement and subsequent damage to nearby pavement, utilities and buildings. The other alternatives that include stations or terminals in downtown and open-cut exclusive ramps and roadways could result in local soils impacts wherever large foundation and roadway excavations occur. Potential impacts of the tunnel alternative are greater because of the size and larger number of such excavations. Alternatives that include only surface street improvements would not create soils-related problems because no major excavating work would be done.

The Tunnel alternative would create the most severe local disruption, particularly near station construction areas. There would also be severe disruption during construction of transit centers, approach ramps and access tunnels in the Close-in transit centers options. Construction of surface street improvements in blocks other than tunnel station construction areas would result in approximately the same level of disruption for the same period of time for a given block, regardless of the alternative chosen. This is because the nature of street improvements is basically the same for all alternatives that include surface street improvements.

Displacement and Relocation

All the action alternatives would displace some business and parking to provide a connection to the I-5/I-90 transit lanes at Airport Way South. As shown in Table 2-5, additional businesses would be required for the Mall with Transit Centers and Tunnel options. The close-in transit center options require the most property

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TABLE 2-5: SUMMARY OF DISPLACEMENT

(This includes business relocations, residential relocation and instances where existing uses would be changed because of potential acquisitions.)

TSM

Union Station Corridor

1. Union Pacific Rail Yard[5]
2. Korea House Restaurant
3. Stadium Tavern
4. Cosmos Travel
5. Young Me Restaurant
6. Parking Lots[1]

NON-INTERCEPT MALL

Union Station Corridor

1. Union Pacific Rail Yard[5]
2. Korea House Restaurant
3. Stadium Tavern
4. Cosmos Tavern
5. Young Me Restaurant
6. Parking Lots[1]

MALL WITH PERIPHERAL TRANSIT CENTERS

Union Station Corridor

1. Union Pacific Rail Yard[5]
2. Korea House Restaurant
3. Stadium Tavern
4. Cosmos Tavern
5. Young Me Restaurant
6. Parking Lots[2]

Ninth & Pine

1. Spag's Tavern
2. The Clock Restaurant
3. Yuen Lui Studio
4. Riach-Central Olds/Honda
5. Warehouse
6. Office
7. E&E Meats
8. Parking Lots
9. Pine Street Men's Club
10. WSDOT I-5 ramp and limited access area
11. Best Apartment

MALL WITH CLOSE-IN TRANSIT CENTERS

Union Station Corridor

1. Union Pacific Rail Yards[5]
2. Parking Lots[3]
3. Korea House Restaurant
4. Stadium Tavern
5. Cosmos Tavern
6. Young Me Restaurant
7. Parking Lots[1]

Fourth & Columbia

1. Jerry's Garage
2. Sears Car Rental
3. Pacific Hotel
4. Parking Garage[4]

Third & Pine

Century Square Office Tower

1. 12 business/professional offices
2. V.A. Outpatient Clinic
3. USDA Food & Nutrition Ser
4. Flair Camera
5. The Haven Restaurant
6. Naturway
7. Bomar Ancient Coins
8. Downtown Stamp & Coin

Century Square Commerical Building

1. Design Oriental Rug
2. Taffy's Dancewear
3. Washington Conditioning
4. Ferrera's Restaurant
5. Men's World
6. The Gap
7. Fashion Conspiracy
8. Sunbanque
9. Generic Make-up
10. B. Dalton Books
11. Vacant (2)

Other Businesses

1. Cascade/Hallmark
2. Lindy Shoes
3. McDonald's Restaurant
4. Capital Music
5. Bartell Drug

Ninth & Pine

1. Spag's Tavern
2. The Clock Restaurant
3. Yuen Lui Studio
4. Riach-Central Olds/Honda
5. Office
6. E&E Meats
7. Parking Lots
8. Pine Street Men's Club
9. WSDOT I-5 ramp and limited access area
10. Best Apartment
11. Camlin Hotel Parking (10-25 spaces)

TUNNEL 4th AVENUE

Union Station Corridor

1. Union Pacific Rail Yards[5]
2. Parking Lots[3]

Ninth & Pine

1. Spag's Tavern
2. The Clock Restaurant
3. Yuen Lui Studio
4. Riach-Central Olds/Honda
5. E&E Meats
6. Parking Lots
7. Pine Street Men's Club
8. Camlin Hotel Parking (10-25 spaces)
9. Best Apartment
10. WSDOT I-5 ramp and limited access area

TUNNEL 3RD AVENUE CUT AND COVER

Union Station Corridor

1. Union Pacific Rail Yards[5]
2. Squire Shop Warehouse

Westlake Station

1. Shelly's Tall Fashions
2. B. Dalton Booksellers
3. The Workout
4. Salon Cardeau
5. Allen's 5th Avenue Jewelers
6. La Petite Boulangerie
7. Lindy's Shoes

Ninth & Pine

1. Brocklinds, Inc.
2. Bruce Caplan Parking
3. E & E Meats
4. Group Health Cooperative Health Promotion and Fitness Center
5. Group Health Community Health Services
6. 921 Pine Street
7. Spag's Tavern
8. System Parking, Inc.
9. The Clock Restaurant
10. Vance Car Parks
11. Warehouse Artists
12. Yuen-Lui
13. Gerald Kumata & Assoc.
14. Ange's French Cleaners

[1] Between Washington, Main, 4th & 5th Avenues.

[2] For Union Station Transit Center same as Non Intercept. For Yesler site Transit Center, the parking lots located between Yesler, Main, 4th & 5th Avenues would also be removed.

[3] Area between Yesler, Washington, 4th & 5th Avenue.

[4] For terminal option only the Fourth and Columbia parking garage would be removed.

[5] While Union Station may be required, no change in the present use of the building is anticipated.

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because densely developed downtown core property would be required in addition to property at Ninth and Pine and at Union Station.

In assessing the relocation and displacement impacts of the preferred alternative, all businesses that could possibly be affected have been identified. Further engineering would be required to define the specific impact of tunnel construction on surface properties. Some businesses identified may not need to be displaced. Other businesses displaced may not be permanently displaced but could return once construction was completed.

Table 2-6 indicates that only the Mall with Transit Center and Tunnel alternatives would displace residents. The Best Apartments (16 units) at the Ninth and Pine site would be required for either of these alternatives. The Pacific Hotel (123 units) would only be required for the close-in transit center option.

TABLE 2-6

RESIDENTIAL DISPLACEMENT

Alternative	Best Apts.	Pacific Hotel	Total People Displaced	Total Units Displaced
No Action			0	
TSM			0	
Non-intercept Mall			0	
Mall with Peripheral Transit Centers	X		18	16
Mall with Close-in Transit Centers	X	X	82[1]	123
Tunnel	X		18	16

Source: Technical Background Report on Neighborhood Characteristics and Impacts, July 1983 and Draft Relocation Program Plan, October 1984.

[1] This number is based on actual counts of tenants in the Pacific Hotel on August 1983 and the Best Apartments on October 6, 1984. The Pacific Hotel has about 65 residents. There are 123 total units, thus, there is a possibility of more occupants at the time of acquisition and relocation.

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Transportation/Circulation

The No Action, TSM and Non-intercept Mall (TSM) alternatives would have the same distribution of diesel and electric buses and would result in the largest volumes of diesel buses on surface streets. The Mall with Transit Center alternative would have the lowest volumes of surface diesel buses. Peak-hour surface diesel bus volumes for the Tunnel alternative would be approximately 60 percent higher than the Mall with Transit Center alternative, but would be 35 percent less than the No Action, TSM and Non-intercept alternatives.

The number of peak-hour transfers made by transit patrons would be considerably different under two broad groups of alternatives. The TSM, Non-intercept Mall (TSM) and Tunnel alternatives provide access without significant numbers of additional transfers to reach people's intended destinations. In contrast, the Mall with Transit Centers alternative would result in increased numbers of transfers ranging from 56 percent to 162 percent more than the No Action alternative.

All action alternatives would offer travel time savings in the CBD compared to the No Action alternative. The Tunnel alternative would offer the best travel time savings (seven minutes) compared to the No Action. Second best is the Close-in Stations option. The other six action alternatives offer significantly lower (in the range of two to four minutes) time savings.

All action alternatives would reduce 1990 automobile volumes in the CBD compared with No Action.

The No Action and TSM alternatives would result in more reductions in intersection Level-of-Service (LOS) than the Tunnel alternative (see Table 2-7). The Non-intercept Mall (TSM) and Mall with Transit Centers alternatives offer some improvement over the TSM alternatives but would still result in reductions in LOS at many intersections. The Tunnel alternative would not reduce the LOS expected with No Action at any intersection; at a number of intersections, LOS would improve.

Two intersections would be seriously affected by all alternatives, including the No Action alternative. The intersections of Fifth and Second avenues with Union Street would be reduced from their current LOS of C and B, respectively, to LOS D or E under No Action and all action alternatives.

Only the Tunnel alternative would result in an increase in general traffic speeds in Downtown Seattle (+5.7 percent) compared with No Action. All other alternatives would contribute to an overall reduction in general traffic speeds ranging from -4.8 percent to -13.5 percent. The tunnel would add street capacity while all other alternatives would remove existing street capacity from general traffic use, thus reducing traffic speeds.

The Tunnel alternative would have the least long-term impact on off-street parking, particularly in the International District. The bored tunnel, in particular, would avoid displacing large numbers of parking places in the northwest part of the International District. In the downtown core, the close-in transit centers alternatives would result in the largest loss of off-street parking, largely because of the existing off-street parking that would be eliminated to build the transit centers. All action alternatives except the TSM and Non-intercept Mall (TSM) alternatives would

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result in approximately the same number of displaced parking spaces in the Ninth and Pine area. The peripheral transit centers would displace slightly more parking because of their larger surface area coverage.

TABLE 2-7

SUMMARY OF SELECTED INTERSECTION LEVEL OF SERVICE IMPACTS
P.M. PEAK HOUR
(Year 1990)

Ref. No.	Intersection	Existing	No-Action	TSM Mall	TSM Contra-flow	Non-intercept Mall	Mall With Terminals	Third Ave. Tunnel	Fourth Ave. Tunnel
1.	Stewart/Denny[a]	E	E	E	E	E	E	E	E
2.	Howell/Yale	E	E	(D)	(D)	(D)	E	(D)	(D)
3.	7th/Stewart	A	B	[D]	[D]	B	(A)	(A)	(A)
6.	Pine/Fifth	C	D	E	D	(A)	(A)	(A)	E
7.	Pine/Third	A	B	B	(A)	C	[D]	(A)	B
11.	Union/Fifth	C	[E]	E	(D)	E	E	E	E
12.	Union/Second	B	[E]	E	E	E	E	(D)	(D)
14.	University/Third	A	B	(A)	(A)	(A)	(A)	(A)	(A)
15.	Madison/Second	B	C	C	(B)	C	C	(B)	(B)
17.	Marion/First	A	A	[C]	A	A	A	A	A
21.	James/Fourth	A	B	A	B	C	C	B	B
23.	Second Ext/Fourth	A	A	C	[E]	A	A	A	A
25.	Jackson/Second	C	D	(C)	E	(B)	(B)	(B)	(B)
26.	Jackson/Fourth	A	B	(A)	C	C	B	(A)	(A)
27.	Stewart/Third	A	[C]	[E]	(B)	C	A	(A)	(A)
28.	Westlake/Stewart	A	A	[C]	C	A	A	A	A
29.	Stewart/Second	A	A	[C]	A	A	A	A	A
30.	Stewart/Fourth/Olive	A	[C]	D	[E]	(B)	(B)	(A)	(A)
31.	Pike/Third	A	A	[C]	A	C	A	A	A
32.	James/Sixth	E	E	C	C	E	E	E	E

[a] a.m. peak hour calculation.

(○) = Improvement in LOS over No Action (over existing for No Action alternative).

[□] = Reduction (at least two levels-of-service) in LOS from No Action (from existing for No Action alternative).

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All action alternatives except a tunnel built without surface improvements would displace 10-16 percent of the existing noon-hour, on-street parking in the study area bounded by First Avenue, Stewart Street, I-5 and Yesler Way. A tunnel alternative built without street improvements would displace only about 5 percent of the existing noon-hour supply. This is because any alternative that includes surface improvements would result in displacing the on-street spaces along the route of the improvements.

The percentage of spaces displaced would increase to 20-25 percent of the p.m. peak hour on-street spaces. In this case the percentage would be higher because peak-hour parking restrictions reduce the on-street supply of spaces during the designated peak period. A tunnel without surface improvements would displace only about 10 percent of the p.m. peak on-street supply.

Air Quality

Air quality impacts were evaluated on a citywide basis and at specific locations. The citywide results distinguished only between the No Action and action alternatives, since all the action alternatives would provide sufficient transit capacity to meet ridership demand in 1990. Table 2-8 indicates that CBD vehicle emissions of carbon monoxide, nitrogen oxides, hydrocarbons and particulate matter would be significantly lower in 1990 than in 1981. This would be due to the gradual replacement of older, more polluting vehicles with newer vehicles designed to meet stringent emission standards and to the phasing out of leaded gasoline. The slight emission reduction that the action alternatives provide would be due to the slightly lower automobile trips which are projected to occur.

Analyses of carbon monoxide and particulate matter were conducted at specific locations. Carbon monoxide concentrations were predicted at six intersections and all 1990 projections were substantially less than 1981 concentrations and health-protecting standards. As noted in the citywide analysis, the major difference was between the 1981 and 1990 concentrations; differences in concentrations among the alternatives were much smaller. During the 1990s, however, alternatives with less capacity would result in more traffic congestion, and vehicle emissions would increase.

Vehicle particulate matter emissions from Fourth and Fifth avenues and the proposed transit roadway to the I-90 transit ramp at Airport Way South were analyzed because of the existing and anticipated high volume of diesel buses and the proximity to the International District. Emissions from buses in the Union Station site were also included when appropriate. The particulate matter analysis found a minimal increase in particle concentration compared with the air quality standards.

Qualitative evaluation of potential odor impacts indicates that the No Action, TSM and Non-intercept Mall (TSM) alternatives would produce more diesel exhaust odor in the CBD than existing conditions; the Mall with Transit Centers and Tunnel alternatives would produce less diesel exhaust odor than today because fewer diesel buses would operate on downtown streets.

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TABLE 2-8

EMISSION BURDEN FOR SEATTLE CENTRAL BUSINESS DISTRICT

(Kilograms)

Pollutant		Existing 1981	No Action 1990	Action 1990
Carbon Monoxide	1 hour	2,500	959	911
	8 hour	15,000	6,040	5,680
	24 hour	25,800	10,420	9,790
	annual	6,380,000	2,570,000	2,420,000
Nitrogen Oxides	1 hour	107	65	62
	8 hour	651	412	387
	24 hour	1,120	710	667
	annual	277,000	175,000	165,000
Hydrocarbons	1 hour	227	86	82
	8 hour	1,380	541	509
	24 hour	2,390	933	877
	annual	589,000	230,000	217,000
Exhaust Particulate Matter	1 hour	6	4	4
	8 hour	36	27	26
	24 hour	62	47	44
	annual	15,200	11,640	10,900

Noise

Both peak-hour (Leq) and average daily (Ldn) sound levels were evaluated at 12 downtown locations. Table 2-9 indicates that increased diesel-bus volumes associated with the TSM and Non-intercept Mall (TSM) alternatives would increase peak-hour Leq by up to 3 dBA in locations near these bus routes. Sound levels would decrease up to 3 dBA at other locations. If dual-powered buses were used in the electric mode on the Non-intercept Mall (TSM), street noise would be somewhere between sound levels expected with an all-diesel mall and the Mall with Transit Center electric bus mall. Use of dual-powered buses in the electric mode on the Non-intercept Mall (TSM) would mitigate diesel exhaust impacts from using an all-diesel fleet.

With the Mall with Transit Centers alternative sound levels along the all-electric bus mall on Third Avenue and Pine Street would be up to 6 dBA lower than with No Action. Near the staging areas at Ninth and Pine and at Union Station, however, peak-hour sound levels would increase by up to 9 and 7 dBA, respectively, due to diesel-bus activity. This increase could be mitigated by enclosing the staging area.

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TABLE 2-9

ESTIMATED PEAK-HOUR SOUND LEVELS (Leq, dBA)

Site	Location[a]	Existing	No Action	TSM Mall	TSM Contra-Flow	Non-intercept Mall (TSM)	Mall and Transit Centers				Tunnel	
							Peripheral		Close-In		Third Ave	Fourth[b] Ave
							Station	Terminal	Station	Terminal		
1	9th & Stewart	69	69	69	69	72	69	69	69	69	69	69
2	9th & Pine	67	68	67	67	71	68	68	68	68	67	68
3	Pine & 4th	73	72	72	72	72	69	69	68	68	72	71
4	2nd & Union	77	77	76	78	76	76	76	76	76	76	75
5	Main & 4th	65	64	65	65	65	72	72	72	72	64	72[c]
6	4th & Spring	76	77	76	78	76	75	75	75	75	75	74
7/10	3rd & Columbia	75	76	77	74	77	71	70	71	70	75	73
8	4th & Jefferson	76	77	76	78	76	75	74	75	74	77	74
9	3rd & James	75	76	77	73	77	71	70	71	70	75	72
11	5th & King	70	72	72	68	72	74	74	74	74	71	69[d]
12	Maynard & Jackson	68	68	67	67	67	67	67	67	67	67	68

Note: All values represent level at 30 feet from the centerline of the street. Peak hour is the hour with the maximum traffic volume.

[a] Intersections listed are close to the monitoring site. Actual locations are detailed in Table 3-16.

[b] Sound levels are based on the diesel bus Fourth Avenue tunnel alternative described in the draft EIS.

[c] assumes acoustic treatment of tunnel and portal adjacent to site

[d] assumes Union Station track-level activity close to the wall at Fifth Avenue

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The Tunnel alternative would generally decrease downtown sound levels slightly by reducing the number of diesel buses. Noise impacts from station and staging activities at Union Station would not be significant. The noise and vibration technical report indicates there would be a 2 to 3 dBA increase in peak-hour sound level at the Ninth and Pine station although this would not be a significant increase, a lid or noise barriers at this site would also reduce noise from bus activities.

Historic Properties

All of the action alternatives would include an I-90 access route south and east of the Union Station building at track level. The Union Station building would not be directly affected; however, without appropriate mitigating measures the proposed lid to the south and east could adversely affect the setting of the station and its original significance as a transportation center.

The TSM and Non-intercept Mall (TSM) alternatives would not adversely affect any other historic properties. The Mall with Transit Centers alternative could have adverse impacts on the Pacific Hotel, Union Station, City Hall Park and the Yesler Way Bridge and retaining walls.

A Fourth Avenue tunnel could have adverse impacts on City Hall Park, the Yesler Street Bridge, the Burlington-Northern tunnel and Union Station.

Besides affecting the Union Station setting, the Third Avenue tunnel with surface improvements could have adverse impacts on the King County Courthouse and the Telephone Building where station entrances are proposed. Metro, however, would adhere to the Secretary of Transportation's standards for rehabilitation to avoid adverse impacts. In addition, because of the tunneling under the Tashiro and Kaplan buildings and the Burlington Northern tunnel crossing at Third and University, appropriate measures such as monitoring and grouting of foundations would be carried out to protect those historic properties.

Energy

The greatest amounts of vehicle energy would be consumed with the No Action alternative. The action alternatives would provide small fuel savings. With the action alternatives, the greatest electrical energy consumption by transit would occur with the close-in terminal and the electric tunnel. The TSM and Non-intercept Mall (TSM) alternatives would consume the most transit diesel energy. In addition to vehicle energy, the stations and transit centers of the Tunnel and Mall with Transit Center alternatives would also consume energy.

The energy cost of constructing the TSM Mall and the TSM Contraflow options would be low since no major construction would be required. The tunnel would have the greatest energy construction cost. The four transit center options have construction costs roughly midway between these alternatives.

Utilities

The greatest amount of potential utility description would result from alternatives requiring major street reconstruction. Cut-and-cover segments of the Tunnel alternatives and the Mall with Close-In Transit Centers would have the greatest

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potential impact to utilities. The TSM options would have the least potential impact. Because temporary utility provisions would be in place before existing utilities were removed, little actual utility disruption is expected with any of the alternatives.

Economic Activity

Disruption during construction is a primary concern of street-level businesses along Third Avenue and Pine Street although construction impacts would be similar for all action alternatives, the duration of disruption would vary. Concerns include pedestrian and vehicular access to buildings in the construction area, confusion due to traffic reroutes, loss of delivery zones, pick-up zones and parking, and noise and dust from construction work. Although several construction options are being considered for the preferred alternative to minimize disruption, the Tunnel Mall with Transit Centers and Non-Intercept Mall (TSM) alternatives would have longer construction periods than the other TSM options.

The project is expected to benefit economic activity when it is complete. Improving the transit system's reliability and efficiency would support planned downtown growth and economic vitality. Although all action alternatives would improve transit service and enhance economic activity in the early 1990s, only the Tunnel alternative has the reidership capacity to continue meeting planned growth past the year 2000.

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CHAPTER THREE

AFFECTED ENVIRONMENT

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AFFECTED ENVIRONMENT

3.1 Land Use, Population and Housing

3.2 Relationship to Other Planned Projects

3.3 Transportation/Circulation

3.4 Economic Activity

3.5 Visual and Aesthetic Qualities

3.6 Air Quality

3.7 Noise

3.8 Vibration

3.9 Ecosystems and Natural Resources

3.10 Water Quality

3.11 Utilities

3.12 Public and Social Services

3.13 Energy

3.14 Soils

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CHAPTER 3

AFFECTED ENVIRONMENT

This chapter describes existing and the expected 1990 environmental conditions (No Action alternative) in the study area if none of the action alternatives takes place. This information provides a base to compare with the environmental impacts identified in Chapters 4, 5 and 6. Additional detail is available for each element in supporting technical reports.

3.1 Land Use, Population and Housing

This section describes land use, zoning, housing and population characteristics in the Seattle Central Business District and neighborhoods in the project area. Relevant local and regional plans and policies are briefly discussed in Chapter 5.

3.1.1 Land Use

Existing Conditions

The city of Seattle, which comprises 91.6 square miles, contained 493,846 persons in 1980, a 7-percent decrease since 1970. The Metro service area, which comprises 2,128 square miles, contained approximately 1.2 million persons in 1980, an 8.7 percent increase in population since 1970.

Downtown Seattle is the Puget Sound region's primary commercial center serving regional, national and international markets.

Most of downtown is zoned for office, retail, commercial or residential use. Figure 3-1 illustrates existing zoning in the study areas. The City of Seattle has adopted new land-use policies and has adopted new zoning districts for much of the downtown area. The permanent zoning controls and the zoning for the remainder of downtown Seattle is still under consideration, but City Council action is expected by June 1985.

The CBD comprises a number of general districts (see Figure 3-2):

The International District contains moderate-density housing and retail, commercial and light manufacturing.

Pioneer Square has offices and retail and residential uses. The area is Seattle's original central business district and is in the National Register of Historic Places.

The Office Core has government offices in the south, the financial district at the center and the retail core to the north. Many buildings contain retail and service uses at street level and office uses above. This area also contains a significant number of low-income housing units in older residential hotels. New developments

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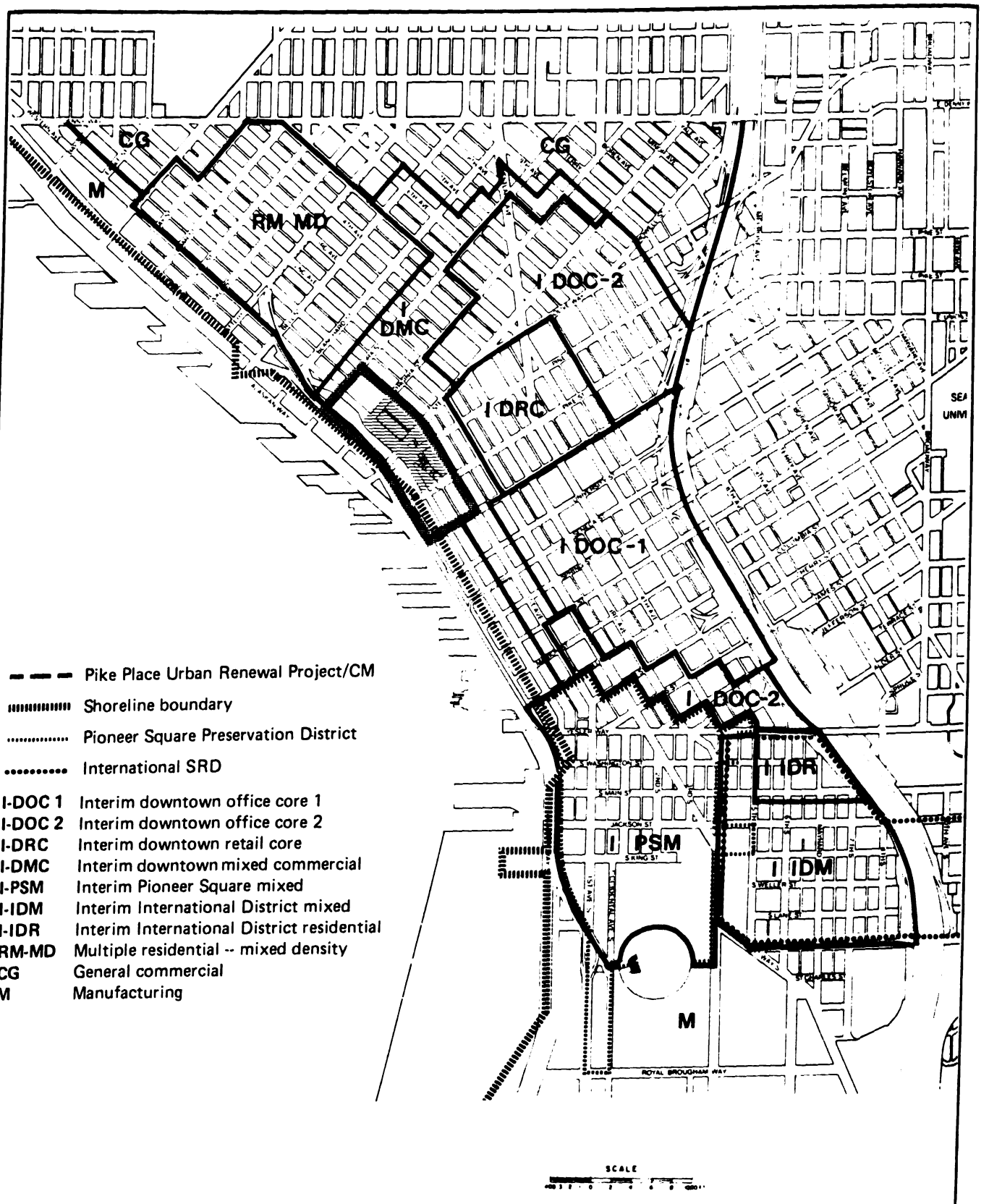

DOWNTOWN SEATTLE TRANSIT PROJECT

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FIGURE 3-1

Current zoning — special districts

Source: City of Seattle Land Use and Transportation Project, February, 1985

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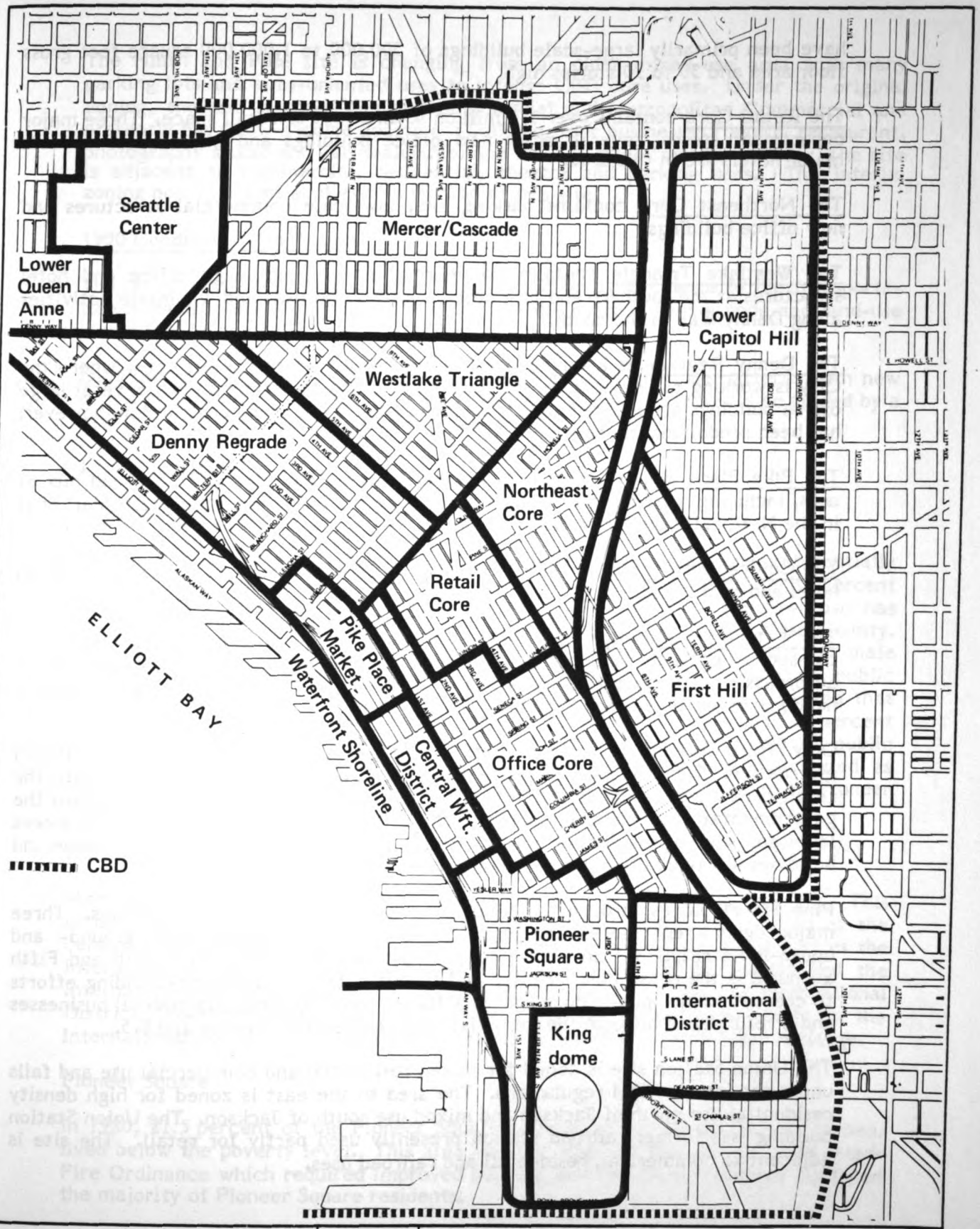

DOWNTOWN SEATTLE TRANSIT PROJECT

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FIGURE 3-2

Land use districts
(Source: Downtown Land Use and Transportation Project, Background Report, City of Seattle, March 1981)

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have been primarily large-scale buildings of 500,000 to 1,000,000 square feet gross floor area and 30 to 50 stories high.

The Retail Core contains over 3.5 million square feet of retail space. Three major department stores, several major new office buildings and most of downtown's major hotels are in this area.

The Northeast Core contains parking lots, low-scale commercial structures and new office buildings.

The Westlake Triangle contains commercial uses, from large office and hotel structures at the southern end to motels, auto-related uses and wholesale activities along Denny Way in the north.

The Denny Regrade is a mixed-use area northwest of the retail core, where the City is working to create a dense, downtown residential community. Several large office buildings are located along Fourth Avenue. Most new construction, however, has been predominantly housing.

The Pike Place Market contains a number of new structures with a broad mix of uses, including mixed-income housing, retail and office. The Pike Place Market is in the National Register of Historic Places.

The Central Waterfront has been significantly rehabilitated for residential, office, hotel and retail uses.

The Waterfront Shoreline uses are predominantly related to recreation, tourist and transportation with some retail uses concentrated in the old pier sheds. Three auto/passenger ferry terminals, a public park, an aquarium and the Port of Seattle headquarters are located in the area.

Only Third Avenue and Pine Street would be directly affected by the tunnel alternative. Third Avenue going north passes through the office core and into the retail core north of University Street. The Third Avenue office core contains the governmental and financial sectors with office buildings, retail shops at street level and several residential hotels. Retail uses predominate on Third Avenue and buildings are typically older and smaller.

Pine Street passes through the retail core from Third to Seventh avenues. Three major department stores and numerous buildings containing both ground- and upper-level retail are on Pine Street. Westlake Mall, between Fourth and Fifth avenues, is the retail core's center and the site of the City's long-standing efforts to create a major public open space. Offices, some housing, commercial businesses and a refurbished historic theater exist between Seventh Avenue and I-5.

The Union Station site is zoned for mixed residential and commercial use and falls under the interim IDM regulations. The area to the east is zoned for high density residential use north of Jackson and mixed use south of Jackson. The Union Station building is a former railroad station presently used partly for retail. The site is adjacent to commerical, residential and railroad uses.

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The Ninth and Pine site is changing from an older mixed-use area with many parking lots and auto-oriented uses to intense CBD core uses. Under the original zoning, the site is zoned General Commercial and Metropolitan Commercial and presently has a low-income apartment building, four businesses (tavern, restaurant, photography studio and car dealership) and 200 off-street parking spaces. The site is adjacent to commercial, residential, theatre and parking uses. The interim zoning now in effect applies to a portion of this site.

1990 Conditions: No Action

The No Action alternative assumes there would be little change to the transportation infrastructure in downtown Seattle, and the current zoning code and land-use plan would be replaced by new land-use policies.

Land use in downtown Seattle would resemble existing land-use patterns with new office growth in the northeast core and office core. Land use would be guided by a new land-use code with development incentives.

3.1.2 Population

Existing Conditions

As indicated in Table 3-1, downtown neighborhood population declined substantially between 1960 and 1970. Since 1970, however, there has been an 11 percent increase resulting in a 1980 population of about 10,400 persons. The downtown has the highest proportion of low-income single persons in Seattle and King County. The 1980 downtown population is predominantly white (72.7 percent) and male (58.2 percent). In 1980, over 70 percent of the households relied on public transportation. Twenty-three percent of the people ages 16 to 64 reported that they had physical handicaps and about 3 percent of this group and nearly 16 percent of those over 65 reported handicaps that interfered with their use of public transportation. The downtown population in each neigborhood is distributed as follows: Denny Regrade, 40 percent; Central Business District, 40 percent; Pioneer Square, 10 percent; and International District, 10 percent (see Figure 3-3).

International District

More than 30 percent of the International District population is over 65. This census tract also has the lowest family income in downtown. A portion of the census tract includes the Yesler Terrace Housing Project which is not part of the International District neighborhood as defined by the City of Seattle and the International District community. Census and housing data for the International District, however, includes Yesler Terrace. Persons of all races reside in the International District. The majority of residents, however, are of Asian heritage.

Pioneer Square

In 1980, 21.5 percent of the Pioneer Square population, mostly single elderly men, lived below the poverty level. This area was the original "Skid Road." The Ozark Fire Ordinance which required improved building and fire code standards displaced the majority of Pioneer Square residents.

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TABLE 3-1

POPULATION CHANGE IN THE DOWNTOWN STUDY AREA

Census Tract	1960[1]	1970[2]	1980[3]	Percent Change 1960-1970	Percent Change 1970-1980
72	1,805	1,396	2,021	(22.6)	44.8
73	1,086	635	371	(41.5)	(41.5)
80	2,267	2,051	2,017	(9.5)	(1.6)
81	3,737	1,821	2,455	(51.3)	34.8
82	1,448	880	1,000	(39.2)	13.6
83	379	278	204	(26.6)	(26.6)
85	158	149	167	(5.7)	(12.1)
91	2,432	1,092	877	(55.1)	(19.7)
92	2,286	921	1,173	(59.7)	27.4
93	NA	108	67	NA	(38.0)
Total	15,598	9,331	10,352	(40.2)	10.9

Source: LUTP, October 1983

[1] 1960 Census of Population and Housing for census tracts 80, 91 and 92. LUTP estimates for census tracts 72, 73, 82, 85 and 91.

[2] 1970 Census of Population and Housing; block statistics.

[3] 1980 Census of Population and Housing; block statistics.

NA = Not Available

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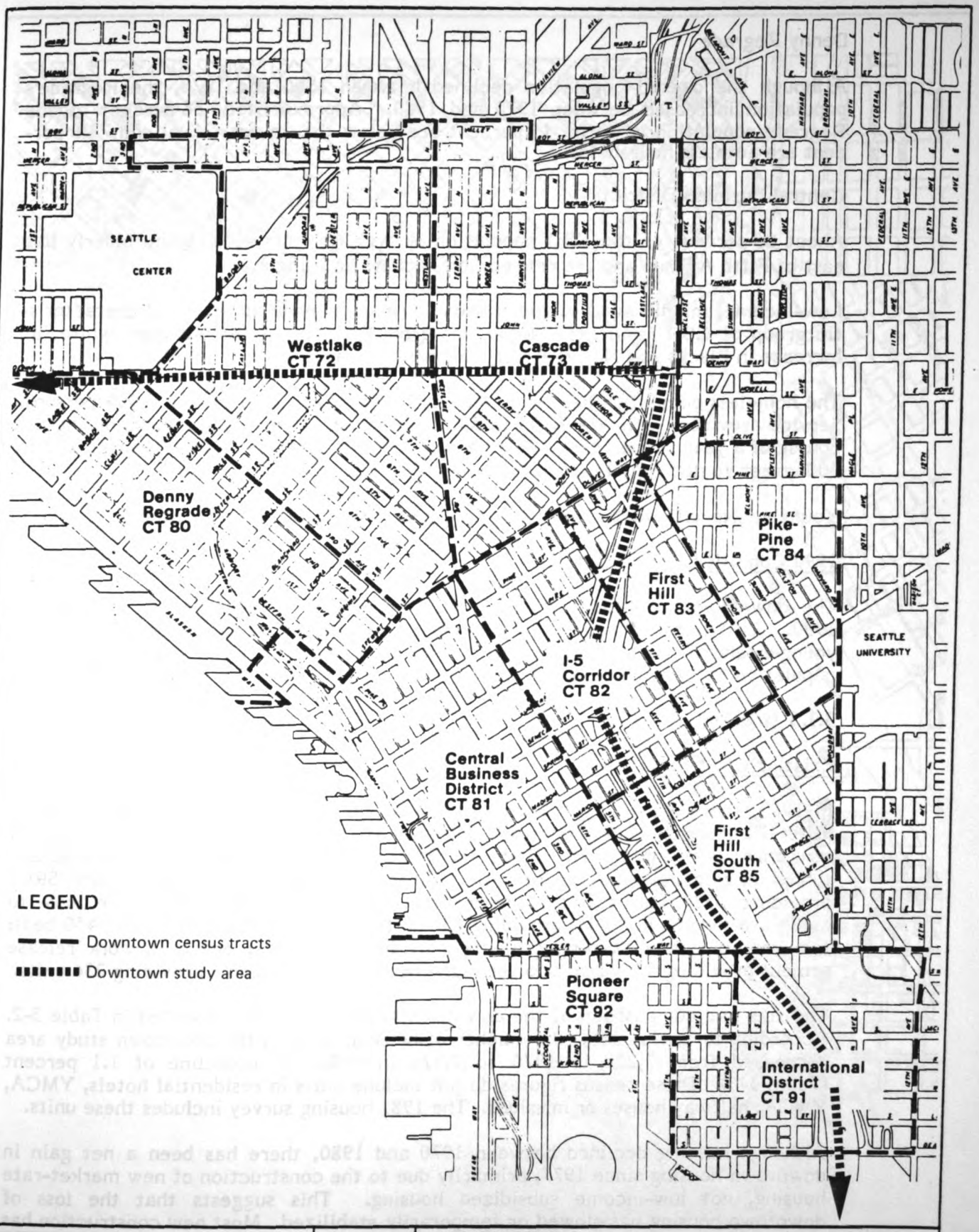

DOWNTOWN SEATTLE TRANSIT PROJECT

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FIGURE 3-3

Downtown census tracts

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Denny Regrade

Although the overall population declined between 1960 and 1970, the Regrade's population increased between 1970 and 1980. Approximately 88 percent of the Regrade population is white, 15 percent are below the poverty level and 78.6 percent are autoless households.

Central Business District

About 25 percent of the CBD population is over 65 years old. Many elderly live east of Fifth Avenue and are retired, low-income and single.

Low-income, middle-aged, single-person households make up a second characteristic group of CBD residents. While this group has been predominantly white, an increase in Blacks and Native Americans has been noted.

The homeless population has increased from 1970 levels of 1,000 to 2,000 persons. Service providers estimate 4,000 to 5,000 people will live on the streets during the course of a year in the 1980s. For the past three to five years, an estimated 200 to 300 street youths ages 14-21 have resided in the area.

Young adults with moderate incomes are also moving into the downtown.

1990 Conditions: No Action

The downtown population, residents and employees, is projected to increase by 1990. The trend is toward more elderly individuals living below poverty and younger and more affluent people. The City's goal is to attract a downtown population of 25,000 by the year 2000.

3.1.3 Housing

Existing Conditions

In 1982, there were 13,093 housing units in the downtown study area, of which 9,164 (70 percent) were in occupied buildings and 3,929 (30 percent) were in vacant structures (see Table 3-2). There are 26 residential buildings along the mall and tunnel alignments (see Figure 3-4). Seven buildings are vacant; 15 are SROs providing 638 units; two are low-income providing 26 units; three are low- to moderate-income buildings providing 157 units; two are shelters providing 450 beds; two are subsidized housing projects providing 474 units; one is a work release project providing 55 units; two are high-income condominiums providing 236 units.

The size and composition of the downtown housing stock is presented in Table 3-2. According to census data, the number of housing units in the downtown study area decreased from 7,204 in 1970 to 7,124 in 1980, or a decline of 1.1 percent (Table 3-3). These census figures do not include units in residential hotels, YMCA, YWCA, halfway houses or missions. The 1982 housing survey includes these units.

Although housing declined between 1970 and 1980, there has been a net gain in downtown housing since 1977, primarily due to the construction of new market-rate housing, not low-income subsidized housing. This suggests that the loss of downtown housing has slowed or temporarily stabilized. Most new construction has

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FIGURE 3-4

Housing in downtown Seattle
(Source: Downtown Land Use and Transportation Project, Background Report, City of Seattle, March 1981)

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TABLE 3-2

1982 HOUSING UNITS BY TYPE
DOWNTOWN SEATTLE STUDY AREA

AREA	Total[1,2] Low Income	Middle-Income Apt.	High-Income Apt.	Owner-Occupied Units[3]	Total Occupied Units	Vacant Units[4]	TOTAL UNITS	PERCENT OF TOTAL
Central Business District	1,123	20	80	46	1,269	717	1,986	15.2
Northeast Central Business District	849	77	175	0	1,101	286	1,387	10.6
Denny Regrade	2,744	399	0	701	3,844	485	4,329	33.1
Pike Place Market	339	59	0	165	563	0	563	4.3
Pioneer Square	620	71	0	8	699	915	1,614	12.3
International District	1,636	52	0	0	1,688	1,526	3,214	24.5
TOTAL UNITS	7,311	678	255	920	9,164	3,929	13,093	100.0

Sources: Seattle Department of Community Development Housing Survey, November-December 1982, LUTP, October 1983

1 Includes some low-income subsidized apartments, but excludes 526 units/beds classified as temporary shelter located in centers or missions.

2 Does not include 111 low-income subsidized units under construction.

3 Excludes 640 units under construction or planned.

4 Represents units in vacant structures.

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TABLE 3-3

1970-1980 HOUSING CHANGE
DOWNTOWN STUDY AREA

Census Tract	1970	1980	Percentage Change 1970-1980
72	1,237	1,455	17.6
73	610	262	(57.0)
80	1,639	1,657	1.1
81	1,313	1,044	(20.5)
82	797	711	(11.2)
83	300	188	(37.3)
85	149	126	(15.4)
91	558	795	42.5
92	554	879	58.7
93	47	7	(85.1)
TOTAL	7,204	7,124	(1.1)

Sources: U.S. Census Bureau, 1970 and 1980 Census of Population and Housing, block statistics for blocks within downtown study area boundaries.

been directed toward upper- and lower-income households and occurred in the Denny Regrade, Pike Place Market and south Central Business District areas (DCD Housing Survey Nov.-Dec. 1982) Overall, housing opportunities have increased for high-income persons and decreased for low-income persons in the downtown area even though some new low-income housing have been constructed in recent years. The decreasing low-rent housing stock continues to shift this demand to the remaining units, displacing the current population and changing the characteristics of the downtown population.

International District

The community and the City of Seattle considers the International District housing situation critical. Typical buildings in the International District are three- to four-story brick walkups (built around 1910) with ground floors designed for commercial/retail use. Most buildings cover 100 percent of their lots, with no setbacks at the street side of the property.

The 1970 census counted 558 units in census tract 91 (Figure 3-3). This number increased to 795 units in 1980 for a net increase over 10 years of 42.5 percent. The City of Seattle's analysis of demolition and building permits shows that while

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188 units were lost to demolition from 1970 to 1979, 323 units were added, a net gain of 135 units during that period. The City of Seattle estimated that the district had 22 buildings with 1,688 occupied units and 1,526 vacant units in 1982.

There are several new housing rehabilitation projects under way in the International District. These projects would meet some of the community's housing needs.

Rents in the International District have increased dramatically over the last 20 years, particularly during the 1970s. International District rents, however, are low compared with other areas of the city.

Pioneer Square

Housing units increased in census tract 92 between 1970 and 1980 (see Table 3-3). There are 234 federally subsidized, fair-market-rent housing units at the Frye Apartments and about 141 nonsubsidized and 245 subsidized units at the Morrison Hotel which provide the only permanent low-income housing in Pioneer Square. Several recently rehabilitated historic buildings provide middle- to upper-income units. In 1982, there were 699 occupied units and 915 vacant units in Pioneer Square buildings (Table 3-2).

The Pioneer Square missions meet special housing needs. The Union Gospel Mission provides space for 180 persons, the Harbor Light-Salvation Army provides 42 beds for alcoholic treatment, the Lutheran Compass Center provides 53 beds and the Bread of Life provides 35 beds. The emergency shelter in the Morrison Hotel provides an additional 225 beds.

Denny Regrade

In 1982, there were 3,844 occupied units and 485 vacant units in the Denny Regrade (Table 3-2). In 1981, 30 percent of the housing were single-room-occupancy units, 41 percent subsidized and unsubsidized apartments and 15 percent condominiums. There are also 9 vacant buildings with 353 units.

Residential buildings are generally located west of Fifth Avenue. Structures with 10 units or more typify the housing stock. The Regrade has the highest concentration of subsidized housing and luxury condominiums in downtown.

The 1970 census counted 2,876 units in census tracts 72 and 80. The number increased to 3,112 units in 1980, for a net increase of 8.2 percent. According to the City of Seattle's study, 933 apartments and SRO units in 25 buildings were demolished in the Regrade between 1960 and 1980. Most of this demolition occurred before 1970. Parking lots now occupy more than 50 percent of the sites. Since 1969, 1,043 new units have been added. Sixty-one percent of these are middle/upper and upper-income condominiums, the remaining 39 percent are subsidized low-income housing. Rent increases in the Regrade are comparable to rent increases in downtown Seattle as a whole, where rents doubled between 1973 and 1979. Unsubsidized rental construction has not occurred since 1969.

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CBD Office Core

This area has lost more housing units than any other downtown neighborhood between 1970 and 1980 (see Table 3-2). Much of the remaining housing stock is substandard or in need of repair.

In 1982, the CBD neighborhood had 1,269 occupied units and 717 vacant units.

Substantial housing development in the Pike Place Market generated 332 subsidized units and 137 middle and upper-income units. About 250 luxury residential units are also being constructed at First Avenue and Spring Street. Plans have been announced for other projects, including upper-income housing, in this area.

1990 Conditions: No Action

A new land-use policy which includes development incentives is expected to replace current zoning code and land-use plans. Because of the new plan, the rate of low-income housing loss would slow. New housing would be primarily moderate- and high-income units. While there would be a net gain in units downtown, some low-income units would be lost (LUTP, October 1983).

3.2 Relationship to Other Planned Projects

Several other major projects which affect the CBD are currently in the planning or design stages. Although these projects are completely separate from the Downtown Seattle Transit Project, Metro and the City of Seattle have coordinated with staff associated with these projects to improve compatibility. In addition, representatives from the Puget Sound Council of Governments, the City of Seattle and the Washington State Department of Transportation were included on the project's Technical Advisory Committee.

3.2.1 Interstate 5 and Interstate 90 Seattle Access Project

The Interstate 5/Interstate 90 Seattle Access Project is a Washington Department of Transportation highway improvement project which would complete the Connecticut Street interchange. The preferred alternative identified for the final EIS for the project would include a viaduct from the existing incomplete interchange to Fourth Avenue South north of Royal Brougham Way.

The Seattle Access Project would also extend transit/carpool lanes from I-90 and I-5 to the vicinity of the Airport Way South and Fifth Avenue South intersection. The carpool lanes would meet these streets at street level. The transit lanes would meet at street level or descend to track level to connect with the transit roadway being designed for all of the action alternatives. Construction is expected to begin in May, 1987 and end September, 1989.

Finally, the Seattle Access Project would provide exclusive I-5 transit connections using a busway in the Union Pacific rail corridor from South Royal Brougham Way to South Spokane Street and existing ramps at the Spokane Street interchange.

All Downtown Seattle Transit Project action alternatives include a transit-only connection to the Seattle Access Project's proposed HOV ramp near Airport Way

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South. This would enable buses to use an exclusive right-of-way extending from the CBD directly to the interstate highways. Although the proposed I-5/I-90 transit ramps would complement the Downtown Seattle Transit Project by providing improved transit access to and from the CBD, the Downtown Seattle Transit Project would not require the Seattle Access Project ramps for success.

3.2.2 Washington State Convention and Trade Center

In March 1983, the Washington State Convention and Trade Center Corporation designated the freeway site north of Freeway Park as its preferred site. A final EIS was issued March, 1984. The project's CBD location would be expected to reduce the number of private automobiles attracted to the Convention Center and increase the amount of pedestrian traffic downtown.

The Downtown Seattle Transit Project would provide significant improvements to downtown circulation which would assist convention center guests without automobiles. A tunnel station at the Ninth and Pine site would be especially useful to the convention center guests due to its close proximity.

3.2.3 Multi-Corridor Project

The Multi-Corridor Project has evolved from the North Corridor Transportation Alternative Analysis. The broadened scope of this project is to evaluate future public transportation improvements in the corridors north, east and south of downtown Seattle. The Puget Sound Council of Governments and Metro are conducting the Multi-Corridor Project in cooperation with local governments and the State Department of Transportation.

The Downtown Seattle Transit Project is an independent project which is focused on a near/mid-term solution to transit congestion in the Seattle CBD. Although the Downtown Seattle Transit Project's geographic focus is on a much smaller area and is on a more near-term problem, it is a regional project and compatibility with regional solutions is one of its objectives. Specifically, the objective states that the downtown solution is to "preserve the opportunity to phase the expansion of the metropolitan transit system so that the mid-term actions can be taken while longer-term solutions are being planned." All of the action alternatives preserve the opportunity to phase into the long-term solution in the future.

3.2.4 Westlake Project

The City of Seattle intends to sell Westlake area property to a private developer to create an attractive public open space and focal point for retail activity in the downtown area. The Westlake area is defined as approximately two-thirds of the block located between Pine and Olive streets and Fourth and Fifth avenues. The monorail terminal at Westlake is also to be improved and relocated.

The Seattle City Council selected the Rouse Company to develop the Westlake property and the Westlake EIS has been approved. Underground passenger connections to the Westlake project and to nearby retail stores are being planned as part of the Downtown Seattle Transit Project.

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3.2.5 Westlake Park

The City of Seattle also plans to develop a park in Westlake right-of-way south of Pine Street and east of Fourth Avenue, and a small adjacent triangle of land now occupied by a bookstore. The Westlake Park planning would be pursued to coordinate the park construction with the Downtown Seattle Transit Project. The park would be completed shortly after the transit project in coordination with the Rouse Westlake Project. Although the park site could be used for construction staging there would not be a station entrance in the park (for more details refer to Chapter 6 and 4(f) Technical Appendix).

3.3 Transportation/Circulation

3.3.1 Existing Conditions

Region

The CBD is the hub of the regional transportation system for auto and transit travel. Ramps to and from I-5 and state Route 99 (Aurora Avenue and the Alaskan Way Viaduct) are primary access points in the CBD. Public transit, generating a large percentage of trips to and from the downtown, has been a major influence in development.

In 1980 the Metro transit system carried 66 million riders on approximately 140 routes in King County and several inter-county routes serving Snohomish County. The transit system is composed of standard coaches, articulated diesel coaches, limited van service, electrified trolley buses in the higher density close-in neighborhoods and over 9,000 park-and-ride spaces. The CBD is served by both express and local service.

Approximately 85 percent of all transit routes directly serve downtown and trips to and from the area account for about 45 percent of all transit riders. On an average weekday, about 40 percent of all downtown workers commute by transit and of these, almost a fifth drive to a park-and-ride lot as their means of accessing the transit service (PSCOG, 1983).

Downtown is also an important transfer point since riders can reach most Metro service areas via a transfer in downtown (Figure 3-5). In 1980, over 20,000 riders passed through or transferred in downtown each day on their way to other destinations, adding to the trips imposed on transit into and through the downtown.

The regional transportation system affects the transportation accessibility of the Seattle downtown area. Adequate capacity in the highway and transit networks is necessary for planned growth in employment and the diverse social, educational and cultural activities located in the downtown area. The capacity of the highway and transit facilities within the downtown area and in the corridors serving the area determine the level of service in the peak and off-peak periods and hence the relative accessibility of downtown activities in relation to those located elsewhere.

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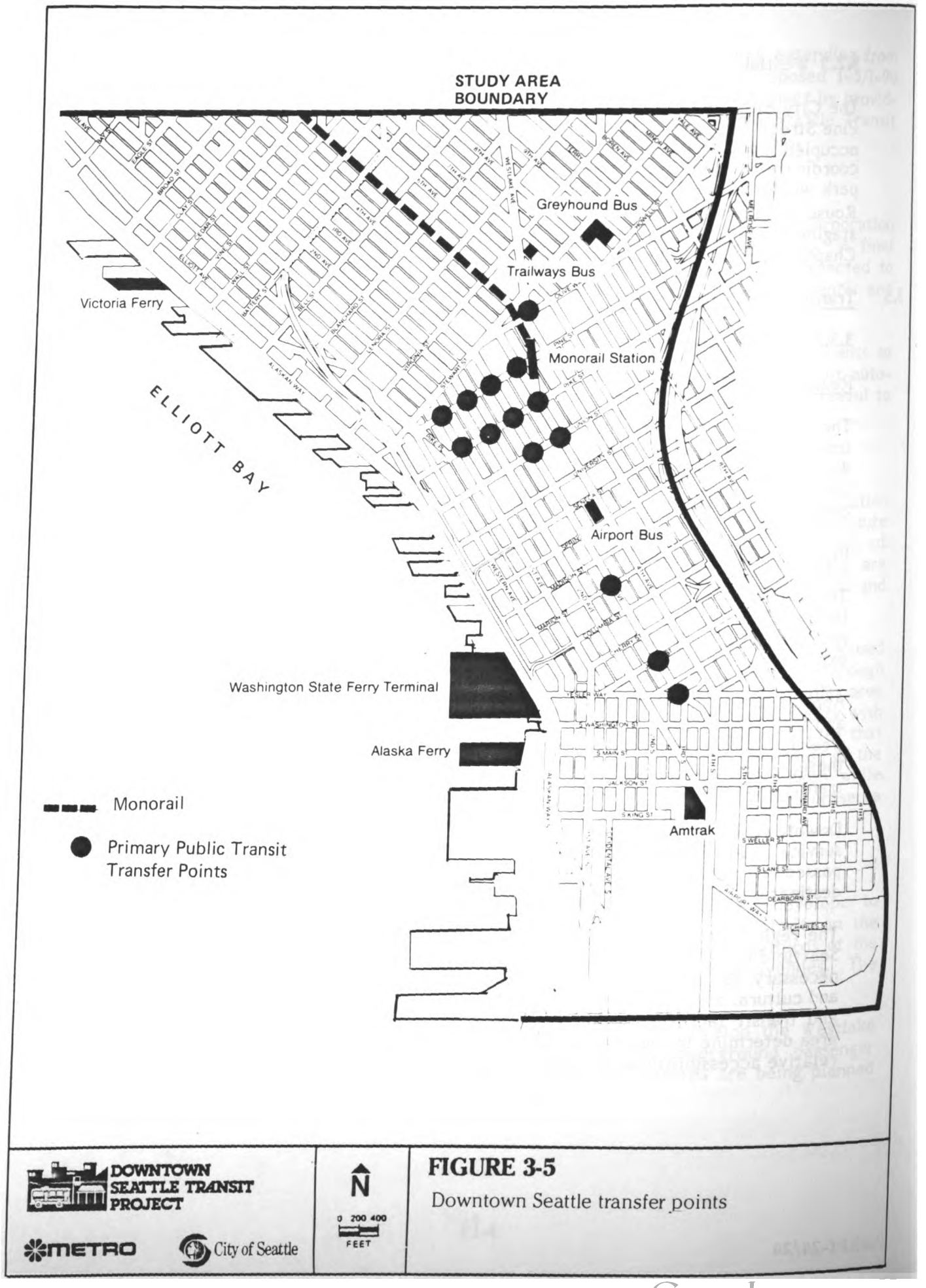

FIGURE 3-5

Downtown Seattle transfer points

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Traffic

The CBD comprises a grid system of north/south and east/west streets. Steep hills limit travel in the east/west direction. Because the CBD is squeezed between Elliott Bay and I-5, eight streets provide the primary service for north/south traffic--First through Sixth avenues, Western Avenue and Alaskan Way.

The downtown street system capacity is governed by the capacity of key intersections. Because of this, existing peak-hour traffic, including buses, is within 20 percent of the practical capacity of the downtown street system as a whole. Downtown traffic circulation begins to break down as demand exceeds capacity at key intersections.

Forty-one intersections were studied in the project study area (see Figure 3-6 and Table 3-4). Most of these intersections had LOS C or better during the p.m. peak hour but a few operated at LOS D or worse. LOS is defined on Table 3-5. Although the LOS for general traffic was acceptable at many intersections, bus LOS was considerably lower due to bus queuing and turning that conflict with pedestrian and general traffic.

Existing downtown transit routes are shown in Figure 1-3. Both trolleybuses and diesel buses operate in the downtown on Third Avenue and First Avenue. Except for one block of Sixth Avenue, the block between Marion and Madison streets which is also served by trolleys, the remaining north/south streets are only served by diesel buses.

The average speed of buses operating through the downtown on north/south streets is approximately 5 mph during the evening peak hour. On Fourth Avenue northbound, the scheduled volume is approximately 94 buses during the evening peak hour. On Second Avenue, the scheduled volume is approximately 135 buses (Figure 3-7). At those volumes, the congestion and delay at loading zones has begun to affect overall speeds and reliability.

Travel demand estimates and mode-split for the downtown study area were developed for 1980, using the trip generation and distribution results from the PSCOG regional model reconciled to agree with 1980 transit ridership and traffic counts (see Table 3-6).

There were about 480,000 total person-trips generated daily in the downtown study area in 1980 of which about 114,000, or one-fourth, were by transit. Trips to and from work in the downtown area were the largest single category, amounting to about 175,000, of which 72,000 were by transit and the remainder by automobiles. According to these estimates, the daily transit mode-split was 40 percent for work trips and about 24 percent for all-purpose trips. This represents a substantial increase in the transit mode-split over what it was as recently as 1977. Historical data indicate that the transit mode-split for work trips did not change much between 1960 and 1975, being between 31 to 35 percent (PSCOG, 1983).

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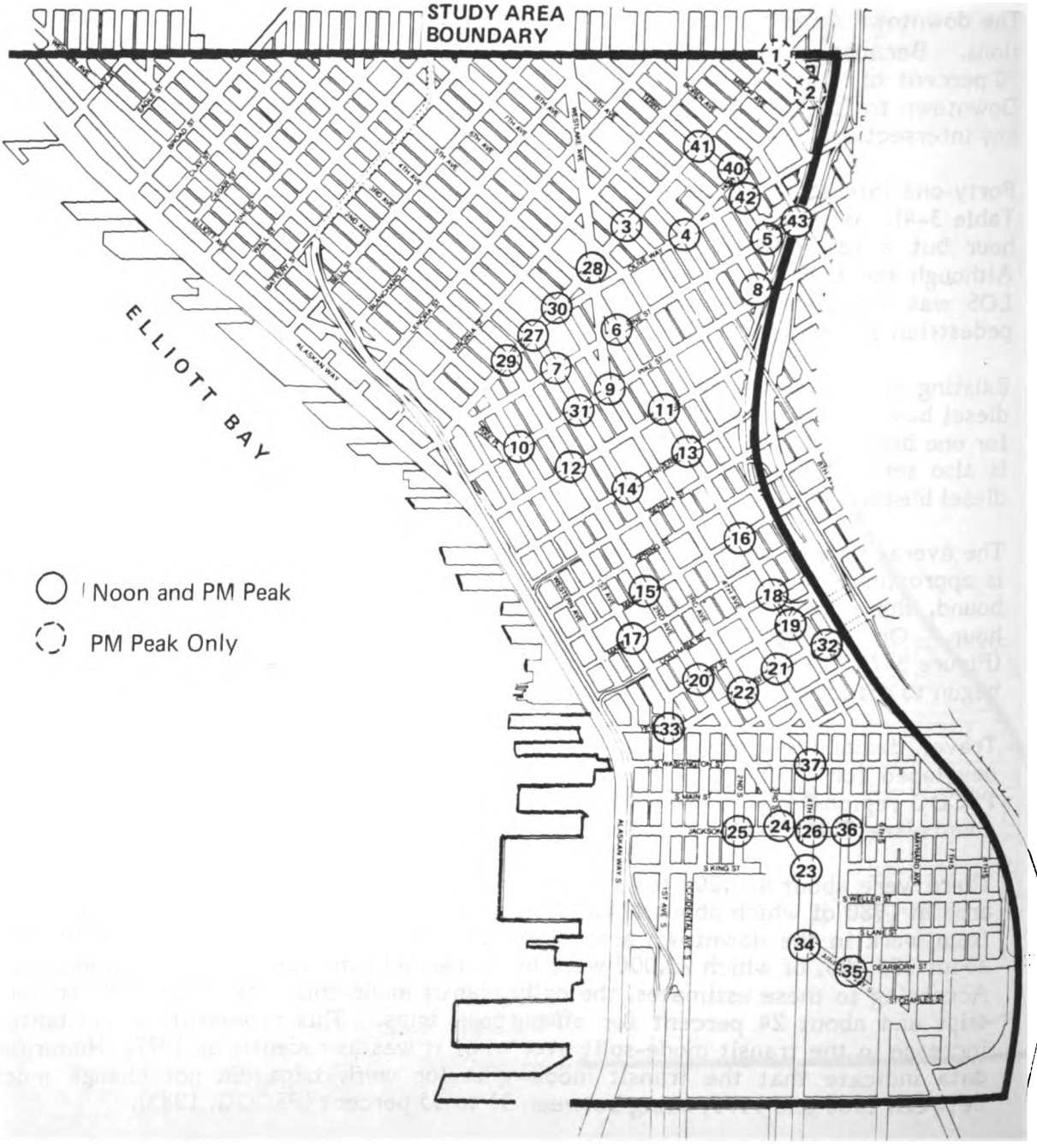

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FIGURE 3-6

Studied intersections within the study area

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TABLE 3-4

1982 LEVEL-OF-SERVICE[1] AT SELECTED DOWNTOWN INTERSECTIONS

Number	Intersection	Noon Hour		P.M. Peak Hour	
		Level-of-Service	Percent[a] Saturation	Level-of-Service	Percent[a] Saturation
1	Stewart/Denny	X	X	E	96
2	Howell/Yale	X	X	F	104
3	7th/Stewart	A	28	A	44
4	Olive/8th Avenue	A	38	A	35
5	Pine/Terry	A	18	A	20
6	Pine/5th Avenue	C	73	C	72
7	Pine/3rd Avenue	A	36	A	38
8	Pike/9th Avenue	A	27	A	52
9	Pike/4th Avenue	A	37	A	42
10	Pike/1st Avenue	A	55	A	39
11	Union/5th Avenue	C	73	C	71
12	Union/2nd Avenue	A	34	B	60
13	University/5th Avenue	A	40	A	42
14	University/3rd Avenue	A	51	A	47
15	Madison/2nd Avenue	A	42	B	63
16	Madison/5th Avenue	A	33	A	39
17	Marion/1st Avenue	A	38	A	31
18	Columbia/5th Avenue	A	30	A	40
19	Cherry/5th Avenue	A	30	A	46
20	Cherry/2nd Avenue	A	19	A	36
21	James/4th Avenue	A	42	A	57
22	James/3rd Avenue	A	29	A	33
23	2nd Avenue Ext/4th Avenue	A	26	A	42
24	Jackson/3rd Avenue	A	16	A	19
25	Jackson/2nd Avenue	A	37	C	70
26	Jackson/4th Avenue	A	28	A	45
27	Stewart/3rd Avenue	A	32	A	53
28	Westlake/Stewart	A	26	A	40
29	Stewart/2nd Avenue	A	27	A	41
30	Stewart/4th/Olive	A	45	A	54
31	Pike/3rd Avenue	A	36	A	38
32	James/6th Avenue	A	52	F	118
33	Yesler/1st Avenue	A	38	A	42
34	Airport Way/4th Avenue	A	40	A	51
35	Airport Way/5th Avenue	A	20	A	34
36	South Jackson/5th Avenue	A	23	A	28
37	Prefontaine/Washington/4th Ave	A	27	A	41
38	Howell/Terry	A	15	A	32
39	Stewart/Terry	A	24	A	32
40	Olive/Terry	A	30	A	34
41	Pine/Boren	A	35	B	59

[a] Percent Saturation = ratio of actual volume to estimated capacity
X means LOS was not calculated

[1] See Table 3-5 - Definition of Level-of-Service.

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TABLE 3-5

DEFINITION OF LEVEL-OF-SERVICE[1] AT SIGNALIZED INTERSECTIONS

Level-of-Service A - typical intersection appears open, turns are easily made and nearly all drivers maneuver vehicles easily.

Level-of-Service B - many drivers begin to feel somewhat restricted among other vehicles.

Level-of-Service C - stable operation continues. Most drivers feel somewhat restricted, but not objectionably so.

Level-of-Service D - substantial delays may occur when traffic becomes temporarily congested within the peak-hour period, but enough signal changes with lower demand occur to permit periodic clearance of queues, preventing excessive backups.

Level-of-Service E - capacity occurs. The maximum number of vehicles any intersection can accommodate is reached. There may be long queues of traffic and delays may be great (up to several signal changes).

Level-of-Service F - jammed conditions. Back-ups may restrict or prevent travel; hence, volumes carried are not predictable.

*Source - Highway Capacity Manual, 1965

[1] Refer to Table 3-4 - 1982 Level-of-Service at Selected Downtown Intersections.

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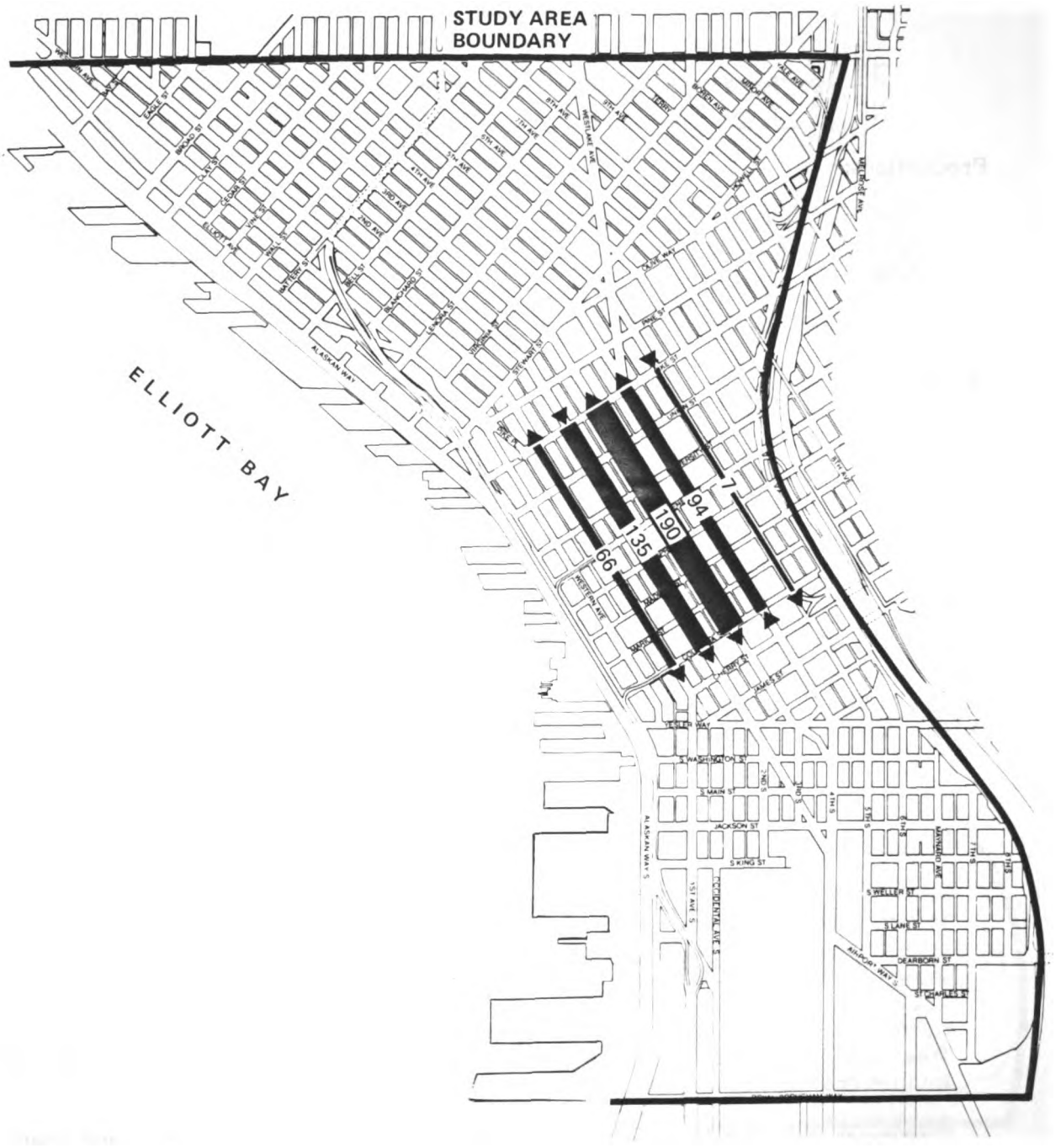

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FIGURE 3-7

1982 relative P.M. peak-hour transit bus volumes

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TABLE 3-6

AVERAGE DAILY TRIP GENERATION AND MODE - SPLIT IN THE DOWNTOWN STUDY AREA (1980)

	Total Trips	Transit Riders	Percent Transit	Auto Persons	Avg. Occup.	Autos
Productions:						
HBW	6,590	1,350	20.5	5,240	1.30	4,030
HBO	12,030	1,530	12.7	10,500	1.70	6,180
NHB	84,000	6,100	7.3	77,900	1.43	54,480
Total	102,620	8,980	8.8	93,640	1.45	64,690
Attractions:						
HBW	175,350	69,900	40.0	105,450	1.30	81,100
HBO	118,320	28,800	24.3	89,500	1.74	51,450
NHB	84,000	6,100	7.3	77,900	1.43	54,480
Total	377,670	104,800	27.7	272,870	1.46	187,030
Total	480,290	113,780	23.7	366,510	1.46	251,720

HBW = Home-Based Work/College
HBO = Home-Based Other
NHB = Non-Home-Based

Source: PSCOG, 1983.

Pedestrian

Pedestrian volumes are particularly high near the retail core bounded by University Street, Sixth Avenue, Olive Way/Stewart Street and First Avenue. Daily pedestrian volumes in 1975 ranged up to 13,900 on a single sidewalk. Figure 3-8 shows pedestrian LOS in the downtown study areas. Pedestrian LOS, as defined in Table 3-7, is expressed in levels from A-F, with each level corresponding to a range of pedestrian flow volumes per unit walkway width per minute. LOS A is free and open pedestrian flow well below the capacity of the walkway; LOS F implies crowded conditions, with the walkway over capacity.

Passenger capacity is exceeded at many bus shelters. Bus volumes and boarding passengers on Fourth Avenue northbound and Second Avenue southbound are at or near capacity. Third Avenue shelters hamper sidewalk pedestrian flow because of the narrow sidewalk width.

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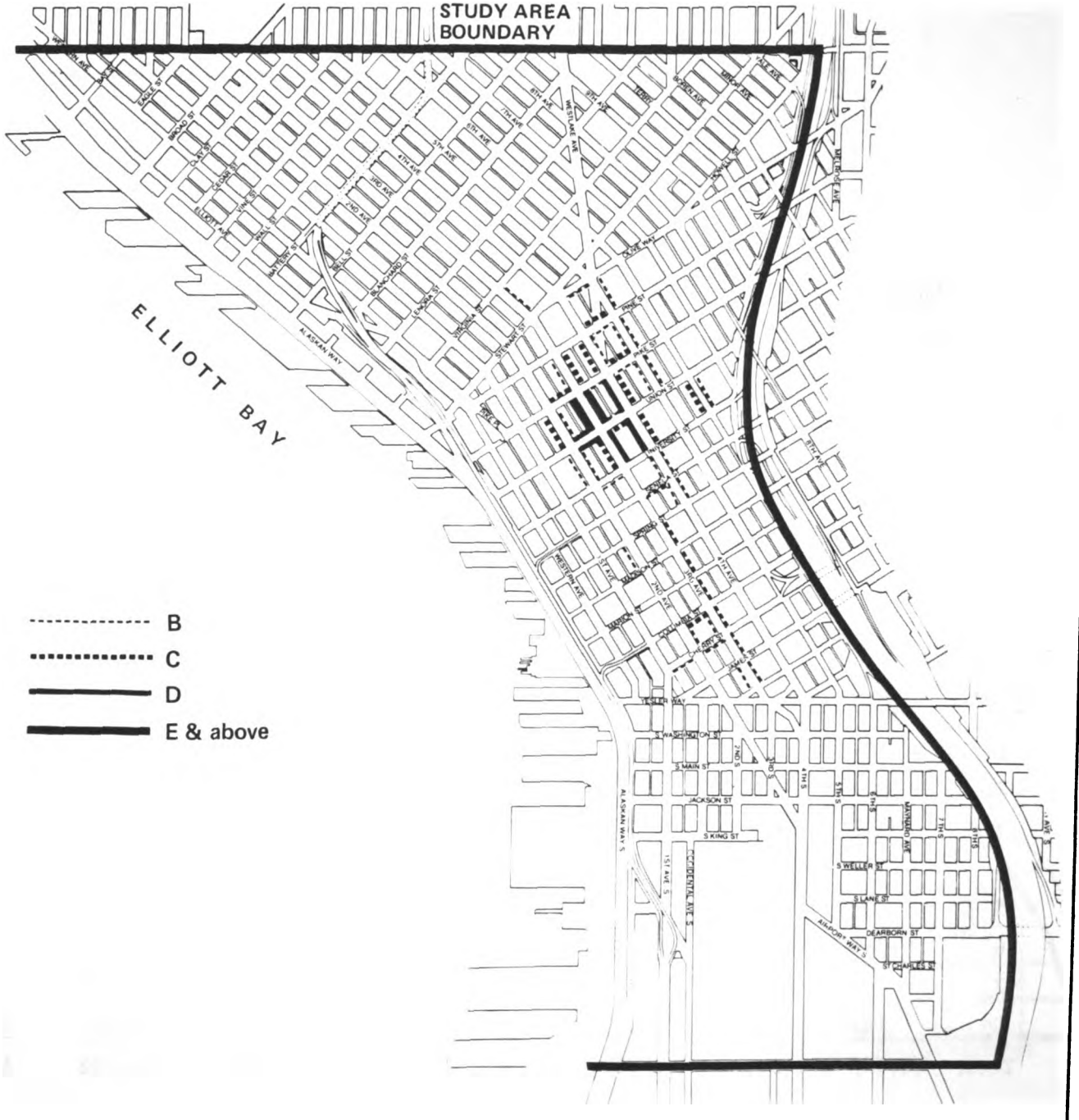

FIGURE 3-8

1982 pedestrian levels of service — peak period of day

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TABLE 3-7*

PEDESTRIAN WALKWAY LEVEL-OF-SERVICE (LOS) RANGE

Range	Average Flow Volume (PFM)
A	7 or less
B	7-10
C	10-15
D	15-20
E	20-25

PFM = Pedestrians per foot width of walkway, per minute.
(see Figure 3-8)

Parking

About 42,000 parking spaces exist in downtown Seattle, with 85 percent in off-street facilities. Table 3-8 shows the parking supply, and Table 3-9 compares midday use rates. The parking spaces are well used.

TABLE 3-8

PARKING SUPPLY (1980)

	Garages		Lots		Curb		Total	
Zone*	Parking Spaces	Percent Occupied	Parking Spaces	Percent Occupied	Parking Spaces	Percent Occupied	Parking Spaces	Percent Occupied
1	4,255	85	6,182	80	2,250	90	12,687	83
2	219	80	1,885	82	260	70	2,364	81
3	403	88	2,728	91	350	105	3,481	91
4	4,901	87	557	73	440	92	5,898	86
5	1,797	70	1,075	55	610	57	3,482	66
6	6,769	85	1,148	79	1,150	90	9,067	85
7	53	60	2,270	50	425	112	2,748	60
8	141	50	1,840	83	800	90	2,781	83
Total	18,538	84	17,685	78	6,325	88	42,508	82

* Refer to Figure 3-9

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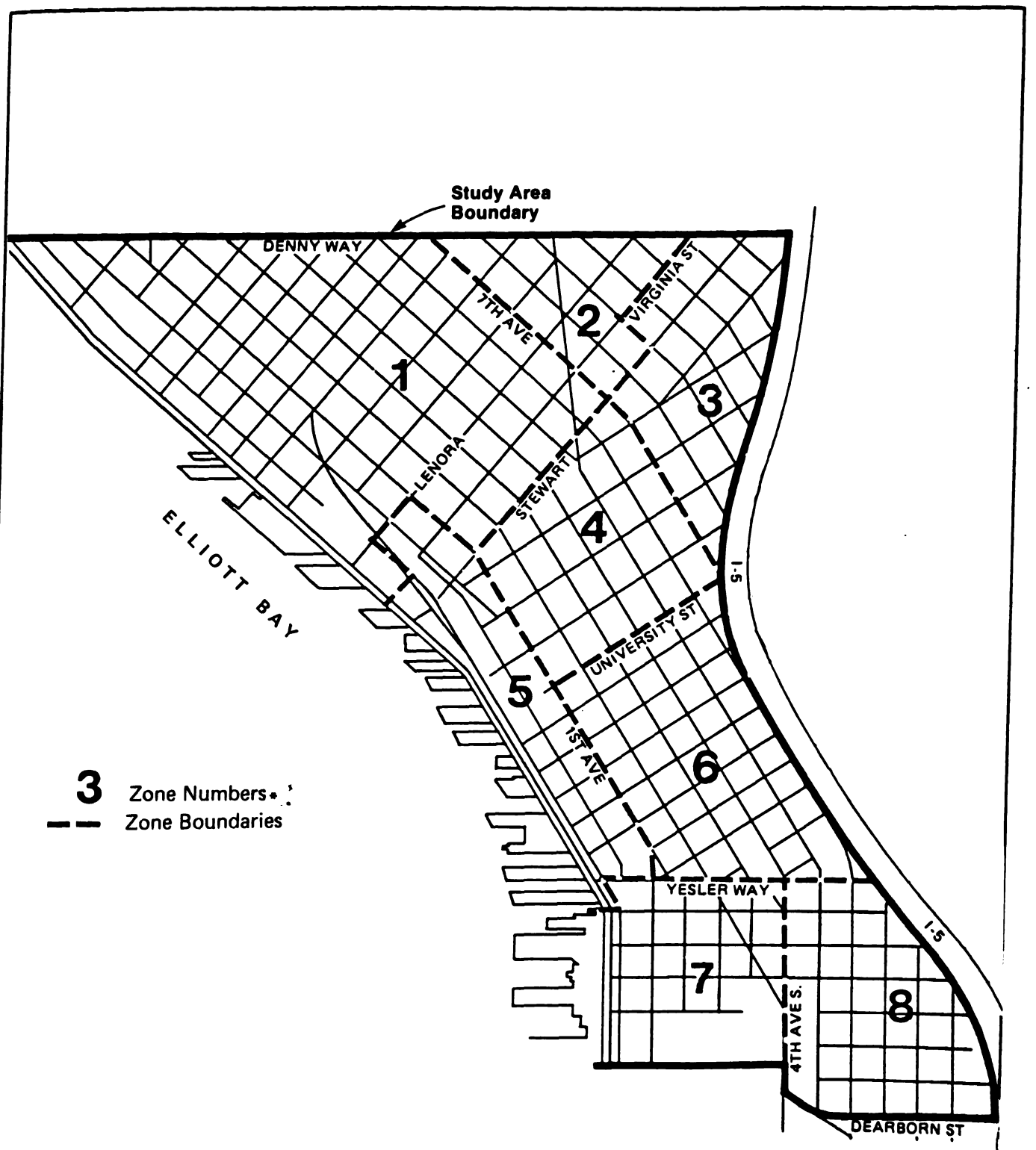

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FIGURE 3-9

Parking zones

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TABLE 3-9

MIDDAY PARKING SPACE OCCUPANCY RATES (PERCENT)

Zone	1978	1980	Change
1 Regrade	77	83	+6
2 Westlake	78	81	+3
3 Northest Office Area	68	91	+23
4 Retail Core	93	86	-7
5 Waterfront	82	66	16
6 Financial District	94	85	-9
7 Pioneer Square	44	60	+16
8 International District	75	83	+8

Traffic Accidents

Figure 3-10 illustrates CBD locations where high accident rates occur. The intersection of Fourth Avenue and James Street and that of Pine Street and Eighth Avenue have the highest rates within the study area (Seattle Engineering Department, 1983).

Emergency Vehicles

Third Avenue is a primary response route for fire department vehicles. The street has provisions for traffic signal preemption. First Avenue also has emergency signal preemption.

Bicycles

Bicycle travel in downtown Seattle is relatively low compared to total CBD travel. Bicycles are permitted on all downtown Seattle streets.

Other modes of transportation would not be significantly affected by this project.

3.3.2 1990 Conditions: No Action

The future capacity and LOS of the regional transportation system would be affected by the completion of improvements recommended in the 2000 Regional Transportation Plan and the Metro 1990 Transit Plan. Congestion within the CBD may deter its planned growth as the regional hub.

The No Action alternative assumes that there would be little physical change to transportation facilities in the downtown in 1990, although the State DOT's I-5/I-90 Seattle access connections are assumed to be in place.

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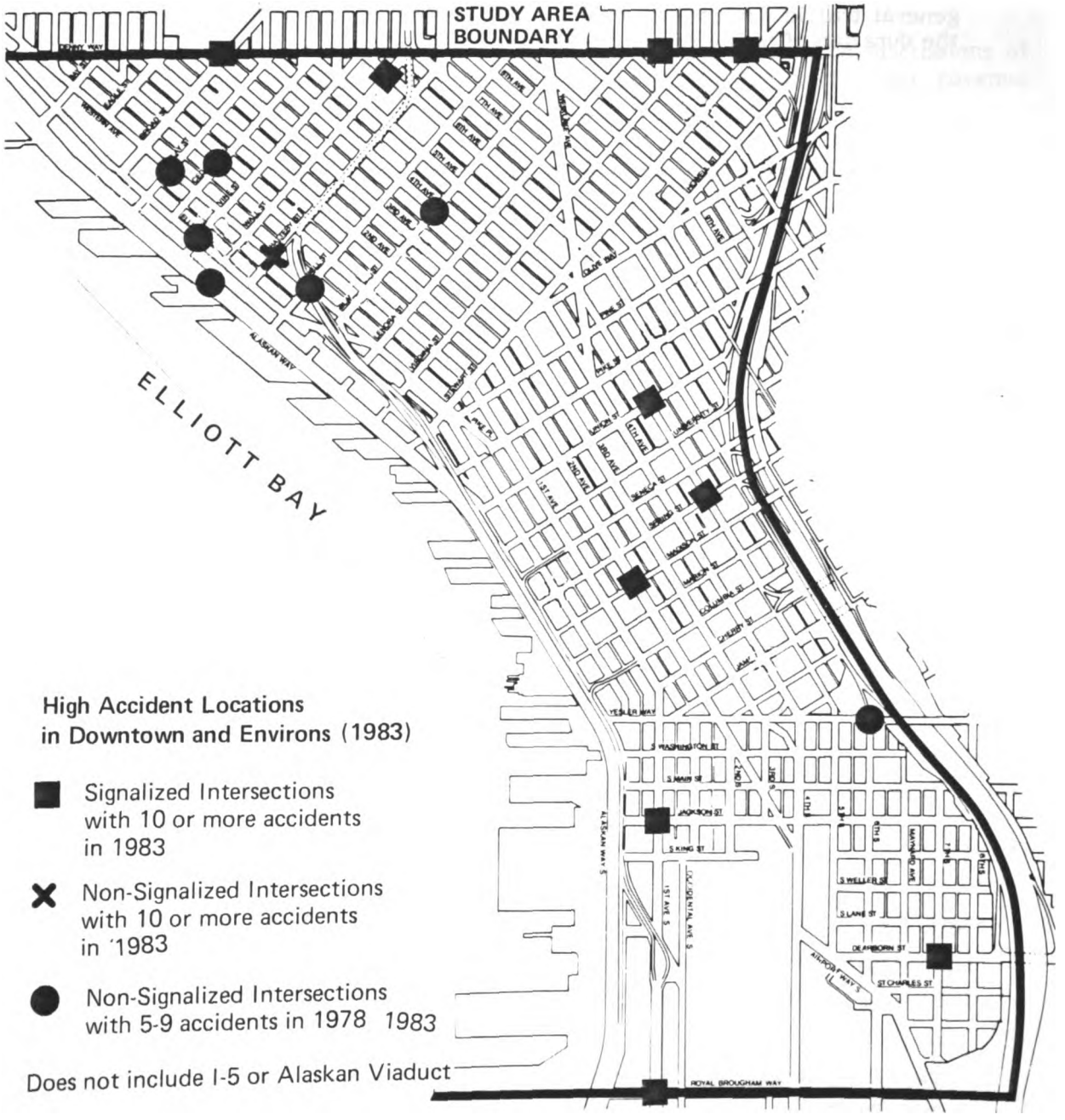

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FIGURE 3-10

High accident rate locations

Source: Seattle Engineering Department, January 1985

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PSCOG forecasts that regional travel demand will continue to grow at a rate exceeding the growth (see Table 3-10). The forecast relies upon an increase in the transit mode-split and in ridesharing to accommodate travel growth at an acceptable Level-of-Service. Transit ridership is expected to increase by 68 percent while vehicle trips would increase by only 17 percent. Growth in the peak-period general traffic demand, however, would reduce the Level-of-Service and increase the duration of peak-period congestion.

TABLE 3-10

AVERAGE DAILY TRIP GENERATION AND MODE-SPLIT IN THE DOWNTOWN STUDY AREA (1990 No Action Alternative)

	Total Trips	Transit Riders	Percent Transit	Auto Persons	Average Occupancy	Autos
Productions:						
HBW	7,050	1,330	18.9	5,720	1.35	4,240
HBO	16,060	1,690	10.5	14,370	1.78	8,070
NHB	101,900	8,690	8.5	93,210	1.46	63,840
Total	125,010	11,710	9.4	113,300	1.49	76,150
Attractions:						
HBW	211,700	86,300	40.8	125,400	1.35	92,900
HBO	138,300	34,000	24.6	104,300	1.78	58,600
NHB	101,900	8,690	8.5	93,210	1.46	63,840
Total	451,900	128,990	28.5	322,910	1.50	215,340
Total	576,910	140,700	24.4	437,310	1.50	291,490

HBW = Home-Based Work/College
HBO = Home-Based Other
NHB = Non-Home-Based

The average weighted vehicle speed on Third Avenue would be 7.9 mph during the evening peak as compared to 12.1 mph for existing conditions. The average transit vehicle would travel at 3.5 mph, a decrease from existing conditions. The lower transit speed would reduce transit's attractiveness to potential riders and increase exhaust emissions and energy consumption in the CBD.

In 1990, the CBD is estimated to generate 28,100 peak-hour automobile trips. In addition to vehicular trips, approximately 25,000 transit passengers would leave the CBD during the peak hour.

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The LOS at most intersections studied is expected to deteriorate over 1983 conditions (see Figure 4-8). Seven intersections would have LOS D or E while only three intersections were LOS D or worse under the existing conditions.

3.4 Economic Activity

This section describes economic activity in the service sectors in discussions of office space growth and retail activity. It will also summarize tax revenue generation in the CBD.

3.4.1 Employment

Existing Conditions

Downtown Seattle has the highest employment concentration in the region, containing 13 percent of the region's jobs and 20 percent of King County's jobs. Between 70 and 75 percent of downtown workers are employed in the office sectors. Manufacturing jobs constitute less than 10 percent of downtown employment.

1990 Conditions: No Action

As shown in Table 3-11, the Puget Sound Council of Governments (PSCOG, 1983) forecasts a 1.77 percent per year increase in downtown study area employment between 1982 and 1990, which is lower than the rate of growth between 1975 and 1982. The hotel sector is forecasted to grow at over 3 percent per year through 1990. The office and retail categories are expected to by 2 percent and 1 percent per year, respectively. Employment in the "other" category (which includes manufacturing) is forecasted to decrease.

TABLE 3-11

DISTRIBUTION OF DOWNTOWN STUDY AREA EMPLOYMENT
1975 - 1990

	Actual		Forecast	
Category	1982	Annual % Change 1975-1982	1990	Annual % Change 1982-1990
Office	89,900	2.95	105,850	2.08
Retail	21,150	1.10	23,350	1.22
Hotel	3,450	5.37	4,500	3.39
Other	12,600	0.25	12,500	(0.10)
Totals for Study Area	127,100	2.35	146,200	1.77

Source: PSCOG, 1984.

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In light of known committed projects, the City of Seattle expects these 1990 forecasts to be achieved even if the No Action alternative is selected.

Employment projections beyond 1990 indicate that planned downtown Seattle employment will not be realized if efficient transit service is not provided. Lower CBD employment would reduce the need for office development and probably reduce retail sales compared with an action alternative.

3.4.2 Office Space

Existing Conditions

Downtown Seattle office space has greatly expanded over the past 20 years and particularly over the last several years. The 10 million square feet of office space in Seattle in 1960 increased to 23.6 million square feet in 1982. The increase was due to the construction of new buildings and the renovation of existing buildings.

The new office spaces are being built in response to high demand, particularly from firms looking to expand or consolidate their operations; growing professional and service sectors which include finance, data processing, law, and real estate firms; and established local firms which have been expanding to serve a growing clientele in Alaska and the Pacific Rim countries.

The average growth rate in downtown office space has been 900,000 square feet per year since 1967. The current expansion in new office space peaked in 1981 with the addition of 3,000,000 square feet, more than double the amount added in any single year since 1960. The space already added in 1982 or scheduled to be added in 1983 and 1984 will be substantial (approximately 3,500,000 square feet).

1990 Conditions: No Action

The demand for office space in downtown is expected to remain high for the next 15 years. Business services will continue to grow both nationally and locally. In addition, the city's "livability" and Seattle's position as a center for the growing trade with Pacific Rim countries should attract more outside corporations to locate in this area. Finally, rents in downtown, although expected to rise, are lower than other West Coast cities for comparable space. Although Seattle office vacancy rates were high for the first few years of this decade, rates have recently dropped. After a five-year peak of 9.5 percent in June 1982, the second quarter vacancy rate for 1983 was 8.0 percent, while the national average was 11.7 percent (Source: Coldwell Banker Quarterly Report, September 1982).

3.4.3 Retail Sales

Existing Conditions

Of the nearly 7.6 million square feet of retail space in downtown Seattle, 1.9 million square feet, or nearly 25 percent, are taken up by The Bon, Frederick and Nelson, Nordstrom and I. Magnin. All four stores front on Pine Street between Third and Seventh avenues. These stores form the downtown retail shopping core; together they form the largest shopping center in the region. Downtown has many retail specialty stores and discount and surplus stores selling low-priced goods not found in many other locations in the metropolitan area. The 1980 and 1981 retail

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sales figures for downtown Seattle in 1983 dollars are $839 million and $799 million, respectively; corresponding figures for the city as a whole are $3.56 billion and $4.47 billion.

Neighborhood businesses in all downtown areas have declined. Generally, clothing-related businesses have remained stable; food stores (including delicatessens) and restaurants declined between 1960 and 1970, but experienced growth in 1980; and personal services declined steadily over the past 20 years. An estimated 207 downtown businesses failed between 1960 and 1970 and 146 businesses failed between 1970 and 1980.

According to a 1981 survey of downtown shoppers conducted by the Downtown Seattle Development Association (now the Downtown Seattle Association), nearly 90 percent of CBD workers shop in downtown during or after work. About one-third of CBD workers shop in downtown on their days off. About one-fifth of the King County population consists of people who do not work in downtown Seattle but shop in downtown regularly. General shoppers and workers shopping on their days off have similar profiles. Each spent an average of $37 and between two and three hours shopping on their last trip. Roughly one-half of CBD workers liked the convenience of downtown shopping and almost 40 percent cited quality of downtown shopping. Only about 20 percent of the general shoppers said they liked the convenience while nearly 75 percent cited the quality of shopping in downtown Seattle.

1990 Conditions: No Action

The No Action alternative would result in increased congestion and increases in travel time during peak hours which would not enhance prospects for 1990 retail sales in the CBD.

3.4.4 Government Revenue

Existing Conditions

According to the City Land Use and Transportation Project Final EIS (August 1984), the downtown area contributed a substantial portion to the City's tax revenue. In 1982, the downtown retail sales tax was 20.3 percent of the total taxable sales and services in the city. Downtown business and occupation (B & O) tax receipts were 34.2 percent of total City B & O tax.

1990 Conditions: No Action

Relative to existing tax revenue, there would be no direct loss to the tax base with the No Action alternative. Increases in tax revenue, however, would not be as high as might be expected with improvement to the transit system.

3.5 Visual and Aesthetic Qualities

3.5.1 Existing Conditions

Second, Third and Fourth avenues and Pine Street consist of raised curbs and sidewalks with newspaper and magazine vending machines, traffic signals, light

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posts and support poles for trolley wires, parking meters, bus shelters, street signs, waste receptacles, drinking fountains and some street trees (Figure 3-11). The street level presents myriad signs, window displays and building entrances with some storefronts having overhanging signs and awnings (see Figure 3-12 for pattern of building heights). During the peak hour the pedestrian often views "wall of buses" along the street. Third Avenue and Pine Street differ from Second and Fourth avenues. Second and Fourth avenues have less street-level retail and more open spaces and plazas.

The Union Station site, 22 feet below street level, is an abandoned railroad trackbed devoid of vegetation which sits as a cut between streets and dominated by the Union Station structure (see Chapter 6). The surrounding area contains many buildings with varying styles and sizes, including the Kingdome to the southeast.

The Union Station corridor encompasses the Union Station site (including the area north of Jackson Street abutting and east of the nine-story tan-bricked Downtowner Apartment building). The Union Station corridor is primarily seen from the hillside northeast of the site. The Downtowner Apartment building, the 400 Yesler Building and the six-story red brick Prefontaine Building also have views of most of the corridor and are the predominant buildings abutting the area. Other views of the corridor area occur from passing traffic on Fourth and Fifth avenues and the Yesler Way overpass (see Figure 3-13).

The Ninth and Pine site includes a freeway off-ramp and limited access area and several commercial buildings (see Section 3.1). The site rises 30 feet from north to south. The limited access area provides a green open space against the freeway to the east. West of the site are renovated two-story commercial office buildings and south of the site is the Paramount Theatre (see Figure 3-14).

3.5.2 1990 Conditions: No Action

Except for a growth in the "wall of buses" due to more buses on surface streets, there would be no significant visual and aesthetic changes as a result of this alternative. Changes could occur as the result of other developments.

3.6 Air Quality

3.6.1 Existing Conditions

Motor vehicles are the major source of air pollutants in downtown Seattle. Motor vehicles are a primary source of carbon monoxide (CO) and contribute substantially to the total emissions of volatile organic carbon and nitrogen oxides. Motor vehicles also emit sulfur dioxide and particulate matter, but other sources often dominate. Vehicles can also contribute significantly to local concentrations of total suspended particulate matter (TSP) by resuspending road dust. The relative contribution of highway vehicles to the King County air pollutant emission total, or "burden," has been calculated by the Puget Sound Air Pollution Control Agency (PSAPCA) and is summarized in Table 3-12.

Three agencies have air quality jurisdiction in the project area--the U.S. Environmental Protection Agency, the Washington Department of Ecology and the Puget Sound Air Pollution Control Agency. Although their regulations are similar in stringency, each agency has established its own standards. Unless the state or

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FIGURE 3-11

Special features
(Source: Westlake Mall Environmental Impact Statement)

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Areas Characterized by Building Height

1. Condominium on Second Avenue
2. Tillicum Place Cluster
3. Development on Fourth Avenue
4. Fourth and Blanchard Cluster
5. Sixth Avenue Development
6. New Highrises on First Avenue
7. Retail District
8. Highrise Wedge
9. Old Highrise Cluster on Second Avenue
10. Pioneer Square
11. International District
12. City-County Government Complex

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FIGURE 3-12

Areas characterized by building height
(Source: Westlake Mall Environmental Impact Statement)

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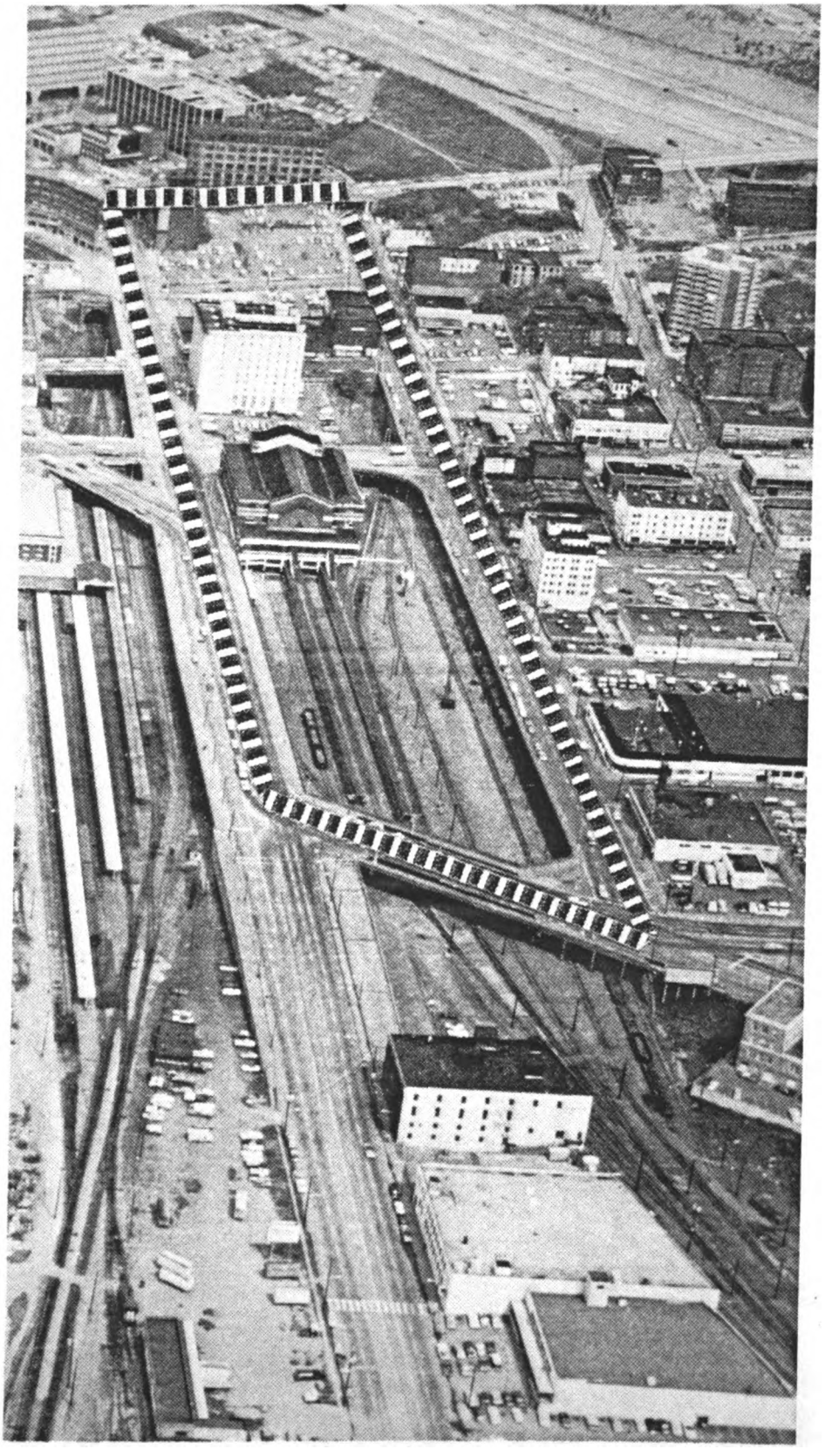

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FIGURE 3-13

Union Station corridor

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DOWNTOWN SEATTLE TRANSIT PROJECT

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FIGURE 3-14

Ninth Avenue and Pine Street tunnel station site

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local agency has adopted a more stringent standard, EPA regulations apply. Some of the criteria pollutants listed in Table 3-13 are subject to both primary and secondary standards. Primary standards are designed to protect health with an adequate margin of safety; secondary standards are established to protect the public welfare from any known or anticipated adverse effects associated with these pollutants.

TABLE 3-12

SUMMARY OF KING COUNTY VEHICLE EMISSIONS[a]

Source	Particulate Matter	Sulfur Oxides	Nitrogen Oxides	Volatile Organic Carbon	Carbon Monoxide
Light duty gasoline vehicle	4158	2005	32710	59506	689304
Heavy duty gasoline vehicle	203	98	1593	2898	33570
Heavy duty diesel vehicle	140	67	1097	1996	23126
Total highway vehicles	4501	2170	35400	64400	746000
All transportation sources[b]	5627	3091	41796	71388	768789
All emission sources	43458	25760	51617	82130	775245

(a) 1979 emissions in tons per year as compiled by the PSAPCA Engineering Division, December 30, 1980.

(b) Includes off-highway, rail, ship and aircraft emissions.

Air quality monitoring data indicate that of the six pollutants in Table 3-13, only the CO standard is exceeded in the CBD. CO problems can be largely attributed to vehicles.

Table 3-14 displays recent data from CBD monitoring sites for CO. Violations of the eight-hour average CO standard (9 ppm) have been recorded at all four sites. Because of these violations, the CBD has been designated a "non-attainment" area for CO concentrations. However, Table 3-13 shows that CO concentrations have been steadily decreasing due to federal vehicle emission standards. One-hour CO standard (35 ppm) have not been violated in recent years.

Although Seattle is still officially in a non-attainment area for ozone, the central Puget Sound region is now eligible to be redesignated as an attainment area. As indicated by monitoring data in Table 3-15, ozone levels have not violated air quality standards for the last three years.

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TABLE 3-13

AIR QUALITY STANDARDS

	NATIONAL			WASHINGTON STATE		PUGET SOUND REGION	
	PRIMARY	SECONDARY					
SULFUR OXIDES	ppm	ppm	*	ppm	*	ppm	*
Annual Average	0.03		a	0.02	a	0.02	a
30 day Average						0.04	a
24 hour Average	0.14		b	0.10	b	0.10	a
3 hour Average		0.50	b				
1 hour Average				0.25	c	0.25	c
1 hour Average				0.40	b	0.40	a
5 min Average						1.00	d
SUSPENDED PARTICULATES	ug/cubic meter	ug/cubic meter		ug/cubic meter		ug/cubic meter	
Annual Geometric Mean	75	60	a	60	a	60	a
24 hour Average	260	150	b	150	b	150	b
CARBON MONOXIDE	ppm	ppm		ppm		ppm	
8 hour Average	9	9	b	9	b	9	b
1 hour Average	35	35	b	35	b	35	b
OZONE	ppm	ppm		ppm		ppm	
1 hour Average	0.12	0.12	e	0.12	e	0.12	e
NITROGEN DIOXIDE	ppm	ppm		ppm		ppm	
Annual Average	0.05	0.05	a	0.05	a	0.05	a
LEAD	ug/cubic meter	ug/cubic meter				ug/cubic meter	
Calendar Quarter Average	1.5	1.5	a			1.5	a

ppm = parts per million

ug/cubic meter = micrograms per cubic meter

*

a Never to be exceeded
b Not to be exceeded more than once per year
c Not to be exceeded more than twice in seven days
d Not to be exceeded more than once in eight hours
e Standard attained when expected number of days per year with maximum hourly average above 0.12 ppm is equal to or less than one

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TABLE 3-14

SUMMARY OF CARBON MONOXIDE MONITORING IN THE SEATTLE CENTRAL BUSINESS DISTRICT (PPM)

	1981	1982	1983	1984
Second and University				
Maximum 8-hour/2nd High	13/11	8/7	10/8	6/5
8-hour Violation Days	4	0	0	0
Fire Station No. 10				
Maximum 8-hour/2nd High	13/11	8/7	5/5	8/8
8-hour Violation Days	5	0	0	0
Fourth and Pike Building				
Maximum 8-hour/2nd High	13/11	13/11	14/12	9/8
8-hour Violation Days	15	7	5	0
James Street				
Maximum 8-hour/2nd High	14/12	10/10	12/9	9/9
8-hour Violation Days	14	2	1	0

TABLE 3-15

SUMMARY OF OZONE MONITORING IN THE SEATTLE REGION (PPM)

	1980	1981	1982	1983	1984
Lake Sammamish State Park					
Maximum 1-hour/2nd High	.10/.09	.15/.14	.12/.12	.10/.10	.09/.09
Number of Violations	0	3	0	0	0
Number of Violation Days	0	1	0	0	0
Kent-22916 86th Ave. So.					
Maximum 1-hour/2nd High	.08/.08	.11/.10	.10/.10	.08/.07	.08/.08
Number of Violations	0	0	0	0	0
Number of Violation Days	0	0	0	0	0

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Table 3-16 summarizes total suspended particulate matter (TSP) monitoring in the CBD. The latest violation of the annual geometric mean occurred in 1980 at Fire Station No. 10. The 24-hour average secondary (nuisance) standard was also exceeded at Fire Station No. 10 in 1982. The primary source of TSP in the region is the industrialized Duwamish River Valley immediately south of the CBD. This area is a nonattainment area for TSP, and suspended particulate matter is carried into the CBD by southerly winds.

TABLE 3-16

SUMMARY OF TOTAL SUSPENDED PARTICULATE MATTER MONITORING IN THE SEATTLE CENTRAL BUSINESS DISTRICT

	Micrograms per Cubic Meter				
	1980	1981	1982	1983	1984
Seattle Public Safety Building					
Maximum 24-hour Average	139	136	332	120	131
2nd High 24-hour Average	137	115	145	99	125
Number of Violations	0	0	0	0	0
Annual Geometric Mean	60	56	53	47	49
Fire Station No. 10					
Maximum 24-hour Average	172	224	175	133	132
2nd High 24-hour Average	147	140	157	127	131
Number of Violations	0	0	0	1	0
Annual Geometric Mean	63*	58	51	51	48

*Violation of secondary (nuisance) standard of 60 ug/m^3

Source: Washington State DOE, Washington State Air Monitoring Data, Olympia, Washington. 1978-1982.

As required by the Clean Air Act, DOE and PSAPCA prepared a State Implementation Plan (SIP) which describes measures to meet air quality standards by 1987. The 1979 SIP included more stringent controls on hydrocarbon emissions from stationary sources, continued reliance on the federal emission control program for new cars, a vehicle inspection and maintenance program (I/M) and implementing certain transportation control measures (TCM). The TCM were outlined in the 1982 SIP revision and included TCM commitments from 13 agencies. Based on these commitments, the SIP indicates that the region will meet both CO and ozone standards by 1987.

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As part of the SIP strategy to improve CBD air quality, Metro and the City of Seattle committed to a downtown transit facility to increase transit and pedestrian capacity. In addition, Metro and/or the City of Seattle commitments included employer transit incentives, park-and-ride lots with downtown service, electric trolley buses, flexible work schedules, carpool and vanpool programs, high occupancy vehicle lanes and an increase in on-street parking rates.

All these commitments have either been implemented or are in the planning process. One of the most important transportation control measures, the downtown transit facility, is the subject of this EIS. Although the results are not conclusive, monitoring data from recent years have shown a general decrease in CO and Ox concentrations.

The most sensitive receptors are patients in hospitals located to the east of the CBD. The most sensitive receptor within the CBD is probably the general public. The ambient air quality standards are designed to protect the general public and are, therefore, used in this document to evaluate air quality impacts in the area. Although exhaust odor is not regulated by air quality standards, odor is a common complaint in the CBD.

3.6.2 1990 Conditions: No Action

As noted above, decreases in vehicle emission rates and local transportation control measures are expected to enable regional and CBD air quality to meet ambient standards by 1987. To provide a basis of comparison for the action alternatives, probable air quality for 1990 was estimated using three approaches:

- CO concentrations were estimated for specific sidewalk locations to determine compliance with standards.
- A CBD-wide pollutant burden (a measure of total pollutant emissions) was estimated to determine the relative change in vehicle-related pollutants compared with today.
- A screening modeling analysis was performed near the Union Station corridor to estimate the vehicle exhaust contribution to particle concentrations in the International District.

The numerical results of these analyses are in the comparison tables included in Sections 2.2 and 5.6. These estimates indicate that 1990 CO concentrations in the CBD with No Action would be approximately half those measured in 1981. These concentrations would also be about half the ambient standard for CO.

The burden analysis indicates that CBD hydrocarbons and CO emissions would be less than one-half the 1981 burden. The nitrogen oxide and exhaust particle emissions would be approximately 60 percent and 73 percent, respectively, of existing emission levels.

The exhaust particle modeling analysis indicates that future exhaust particle concentrations would be about one-third higher than exist today. The increase in the 24-hour concentration from nine to 12 micrograms per cubic meter (ug/m^3) would be due to increases in the number of diesel buses and general traffic in the

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area and in the percentage of automobiles using diesel. These concentrations still would be quite small compared with the nuisance (secondary) standard of 150 ug/m^3 and the health (primary) standard of 260 ug/m^3.

Existing CBD air quality is generally good except for occasional CO problems. By 1990, the CBD should meet all air quality standards because overall emissions will be substantially less than today's emissions. Small increases in exhaust particle emissions may still occur in localized areas. With the increased use of diesel-fueled buses and automobiles, odor associated with diesel-engine exhaust may be more prevalent than it is today.

3.7 Noise

3.7.1 Existing Conditions

Environmental noise usually refers to the total acoustic environment as measured or heard by humans. This acoustic environment is made up of background noise caused by distant traffic, airplanes, etc., and higher-level noise dominated by nearby sources such as vehicles, airplanes flying overhead or construction activity.

The human ear responds differently to sounds at different frequencies or pitch. We hear higher-pitched sounds easier than lower ones of the same magnitude. A standard weighting curve is applied to measured levels to compensate for the different apparent "loudness" levels at different pitches. The weighting curve that represents the human ear's sensitivity to different frequencies of sound is labeled "A" weighting; the units of magnitude of the sound are written as dBA. Each increase of 10 dBA is judged as a doubling of the perceived loudness of the noise level.

Annoyance caused by environmental noise is affected by the maximum (peak) levels and by the amount of noise fluctuation.

The Equivalent Sound Level (Leq) is the dBA level of a constant sound which has the same acoustical energy as the time-varying noise. The EPA describes it as follows: "The Equivalent Sound Level is a single value of sound level for any desired duration, which includes all of the time-varying sound energy in the measurement period." Therefore, a sound that is 60 dBA for 10 minutes and 70 dBA for 10 minutes would have an Leq for the total time period of 67 dBA (sound levels are added logarithmically). Higher level sounds are weighted heavier in the calculation because they have more energy.

Sound levels usually will vary considerably with time. There are several methods to describe the sound over a given time period. The percentage of time that a sound level is equalled or exceeded is frequently used as a descriptor. For example, an L10 of 65 dBA means that 65 dBA is equalled or exceeded 10 percent of the time. Since people are usually more sensitive to noise at night, the day-night sound level (Ldn) is frequently used in regulations. This is equivalent to an Leq for 24 hours except that 10 dBA is added to the actual nighttime (10 p.m. - 7 a.m.) sound levels to reflect this time period.

The guidelines used to assess both measured and predicted sound levels of the alternatives are the Seattle Municipal Code, Federal Interagency Committee on

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Urban Noise, "Guidelines for Considering Noise in Land Use Planning and Control" and Federal Highway Administration Design Noise Levels. Although the municipal code is not strictly applicable to the project, it can be used as a guideline to evaluate sound levels. All of the environmental standards and guidelines mentioned are about equal when converted to similar units. The primary criteria used in this report are an Ldn of 55 to 65 dBA for residential receptors and an Ldn of 65 to 71 dBA for commercial receptors.

A change in sound levels can have a serious impact even if the resulting levels do not exceed guidelines. The minimum change in sound levels that can be detected by most people is about 3 dBA. A 5 dBA increase is significant according to EPA guidelines and a 10 dBA change is perceived as a doubling of loudness. The criteria and guidelines used in the project are summarized in Table 3-17.

TABLE 3-17

SUMMARY OF NOISE CRITERIA

CRITERIA	COMMENTS	SOURCE
Ldn = 55-65 dBA	Acceptable range for residential receptors	Federal Interagency Committee Seattle Municipal Code
Ldn = 65-71 dBA	Acceptable range for commercial receptors	Federal Interagency Committee
3 dBA change	Barely perceptible	
5 dBA increase	Significant impact	EPA Region 10 Guidelines
10 dBA increase	Serious impact Perceived doubling/halving of loudness	EPA Region 10 Guidelines

A noise monitoring program was conducted to assess the existing sound levels in downtown Seattle. The program obtained field data to:

- Establish existing environmental sound levels at 12 sites.
- Validate the procedure for predicting sound levels.
- Determine individual vehicle sound levels for cars, trucks, diesel buses and electric trolleybuses.
- Establish typical diesel-bus sound levels in an enclosed space.

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The locations of the 12 environmental noise monitoring sites are shown in Figure 3-16 and described in Table 3-18. They were selected to represent the three different receptor categories pertinent to this project: (1) sites along the alignment, (2) sites on streets close to the mall alignment that are affected by the alternatives, and (3) sites close to the portal stations.

TABLE 3-18

ENVIRONMENTAL NOISE MONITORING SITES

Site No.	Location	Area	Receptors
1	9th Avenue, between Stewart and Howell streets	9th and Pine Station and general traffic	Church, commercial and pedestrian
2	9th Avenue, between Pine Street and Olive Way	9th and Pine Station	Hotel, commercial, theatre, pedestrian and historic
3	Pine Street, between 3rd and 4th Avenues	Tunnel alignment	Commercial and pedestrian
4	2nd Avenue, between Union and University streets	General traffic	Commercial, pedestrian and hotel
5	Main Street, between 4th and 5th Avenues	Union Station	Commercial, pedestrian and hotel
6	4th Avenue, between Spring and Madison	General traffic	Historic, hotel, library commercial and pedestrian
7	3rd Avenue, between Columbia and Cherry streets, street level	Tunnel alignment	Historic, commercial and pedestrian
8	4th Avenue, between Jefferson Street and Dilling Way	General traffic	Park and pedestrian
9	3rd Avenue, between James and Jefferson streets	Tunnel alignment	Park, hotel and pedestrian
10	3rd Avenue, between Columbia and Cherry streets, 3rd Floor	Tunnel alignment	Historic, commercial and pedestrian
11	5th Avenue, between King and Weller streets	Transit center Union Station	Historic, commercial and pedestrian
12	Maynard Avenue, between Jackson and King streets	Union Station and general traffic	Theatre, park, hotel, commercial and pedestrian

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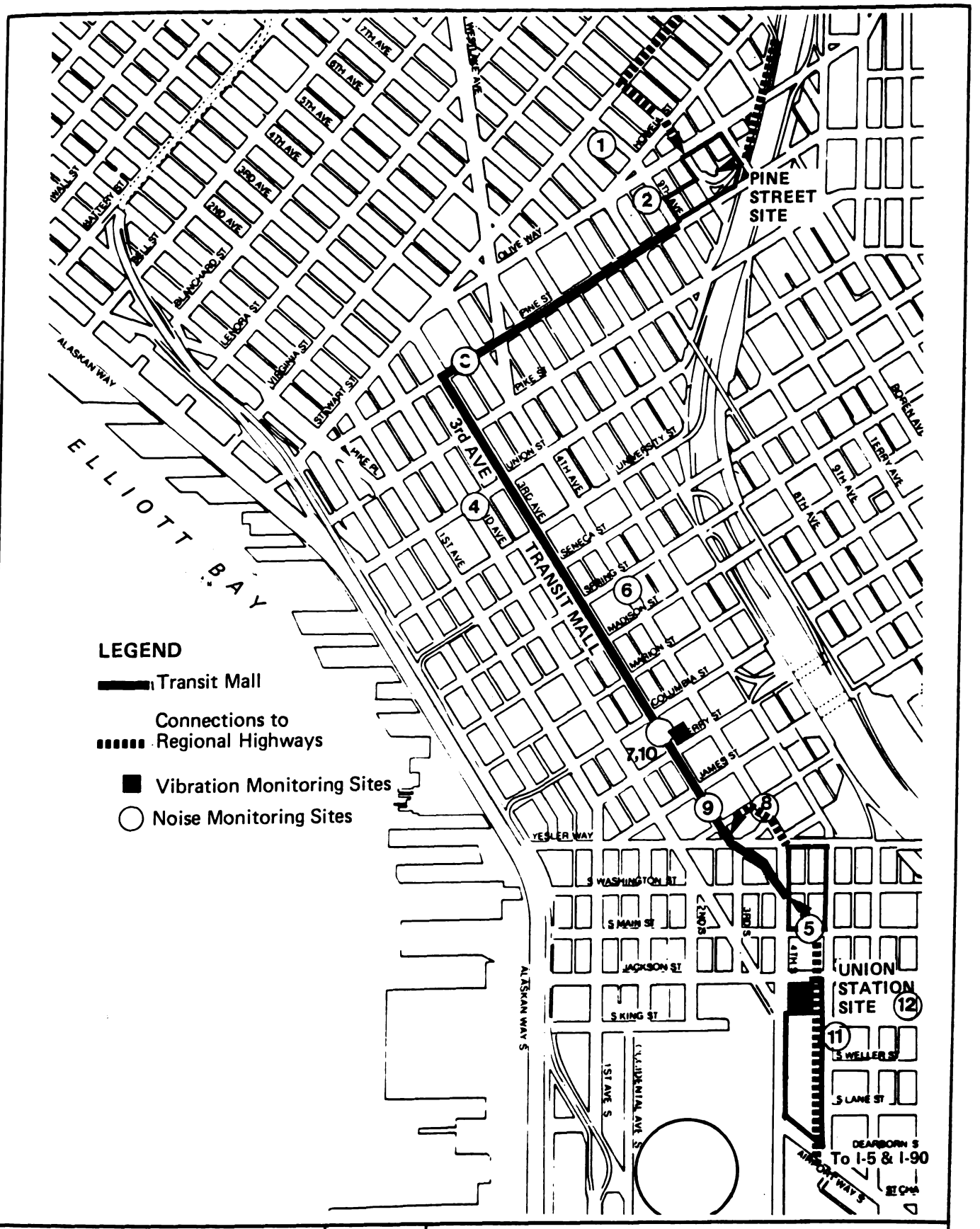

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FIGURE 3-15

Noise and vibration monitoring sites

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Noise was monitored extensively at site 7 (the Arctic Building), and less extensively at the remaining 11 sites. The data from the Arctic Building were used to test the methodologies of noise analysis. The extensive monitoring at the Arctic Building included measuring individual vehicle noise which can be used to calculate sound exposure levels in downtown for cars, trucks, trolleybuses and diesel buses. These individual sound exposure levels are displayed in Table 3-19 and were used in combination with projected traffic volumes to predict future sound levels.

TABLE 3-19

INDIVIDUAL VEHICLE NOISE MEASUREMENTS

Vehicle Category	Number of Vehicles Measured	Average Sound Exposure Level*
Cars	355	75.4
Trucks	14	87.3
Diesel buses	105	88.9
Electric trolleybuses	21	78.9

* At 30 feet from the centerline of the street.

As the table shows, trucks and diesel buses have similar individual sound exposure levels which are greater than electric trolleybuses and cars. This ranking of individual sound exposure levels does not necessarily hold true when applied to a downtown street. The combination of this level and the number of vehicles produce the total noise contribution of that type of vehicle. For example, fewer trucks than automobiles travel on Third Avenue during the noon hour. Therefore, the total noise contribution of trucks may be less than automobiles for that time period.

Noise is perceived to be a problem in downtown Seattle. One objective of this project is to mitigate adverse effects of noise caused by the high volume of diesel buses. Motor vehicle traffic, which includes buses, trucks and automobiles, is the primary source of noise in the study area. In addition to this, construction projects contribute to sound levels at specific locations.

Tables 5-10 and 5-11 in Section 5.7 display the sound levels measured at the monitoring locations in dBA. The tables display both a peak-hour level and a 24-hour Ldn. Existing sound levels throughout downtown currently exceed the Ldn criteria for residential properties and all of the sites measured except five (sites 1, 2, 5, 11 and 12) exceed the commercial/retail criteria. All the peak-hour and Ldn values range in the high 60s to 70s. The lower values are found in the CBD's peripheral areas such as the International District and near the Ninth and Pine site. The sound levels on Second, Third and Fourth avenues and Pine Street are very similar with only a couple of locations showing any perceptible difference in levels. On Third Avenue, the evening peak-hour level is 75 dBA and the Ldn is 76 dBA.

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3.7.2 1990 Conditions: No Action

As shown in tables 5-10 and 5-11, the greatest difference between 1990 No Action sound levels and existing conditions would be a two dBA increase near Fifth Avenue and King Street (Site 11). This means no noticeable difference in evening peak or Ldn sound levels for the No Action alternative. The change in sound level would be slight because the change in general traffic and bus operations would be relatively small. The commercial and residential criteria would be exceeded at the same sites as under existing conditions.

3.8 Vibration

3.8.1 Existing Conditions

Vibration occurs when vehicles such as cars, buses and trucks move over irregular street surfaces. The pavement moves and vibration is transmitted through the ground, with some attenuation, to nearby building foundations. The amplitude of the resulting vibration depends on the pavement and earth and the structures of nearby buildings.

Several terms are used in describing vibration. Displacement is the distance that a vibrating object moves from equilibrium. Velocity is the speed of movement in the direction of the displacement. Acceleration is the rate of change of the velocity. Frequency is the rate at which an object vibrates through a full cycle and returns to its original position.

Acceleration is used to determine if human annoyance is likely to occur. Velocity is used if structural damage is to be evaluated. The likelihood of structural damage and human annoyance, for a constant acceleration, increases as the frequency of vibration decreases.

Several guidelines were reviewed to establish vibration criteria for this analysis. Federal Highway Administration guidelines which analyzed traffic-induced vibration suggest -66 dB as the most restrictive nighttime residential criterion and -34 dB as the threshhold for structural damage. On this scale an acceleration level of 0 indicates maximum vibration and larger negative numbers indicate less vibration.

A program was conducted to monitor the present vibration levels at two sensitive structures and compare this with future predicted levels. Acceleration measurements were taken at two historic structures, the Arctic Building and Union Station. Measurements at the Arctic Building are representative of buildings throughout the CBD that are near streets used by transit, including hotels and apartments which are sensitive in terms of human perception to vibration. Impacts can be considered insignificant if all observed values are not greater than -66 dB, the most restrictive nighttime residential criterion.

Most vibration levels at the Arctic Building were between -74 to -67 dB. The maximum value at Union Station was -68 dB. The maximum value due to traffic was -66 dB.

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3.8.2 1990 Conditions: No Action

The maximum vibration of -65 dB due to traffic would not increase in 1990 with the No Action alternative. The incidence of this vibration level would increase with increases in traffic volume.

3.9 Ecosystems and Natural Resources

3.9.1 Existing Conditions

There are no major issues related to wetlands, coastal zones, agriculture, flood plains, fish and wildlife or wild and scenic rivers in the area of analysis.

3.9.2 1990 Conditions: No Action

The ecosystems would not significantly change.

3.10 Water Quality

3.10.1 Existing Conditions

Storm Drains and Sanitary Sewers

The City of Seattle uses a combined sewer system in the CBD which handles both sewage flows and storm-water runoff. Storm-water runoff is collected in street catch basins before passing into the combined sewer system. There are currently no large (24 inches or larger) separated storm drains discharging into Elliott Bay. Trunk lines flow south on First Avenue and Post Avenue and west on University Street, where they combine with flows from Western Avenue and Third Avenue and Pine Street sewers. The sewage is normally discharged into Metro's interceptor and ultimately treated at the West Point wastewater treatment facilities.

During periods of high runoff, regulators divert some combined flow into Elliott Bay to prevent sewage from backing up and overflowing into the basements of downtown buildings.

The City of Seattle's Ordinance 108080 as amended by Ordinance 111043 requires control of storm-water runoff from new development to public and natural drainage systems. New requirements were also instituted to control drainage and pollutants, primarily sediments, from construction sites.

The allowable rate of storm-water runoff from new construction is now 0.20 cubic feet/second/acre. Any new development that involves 5,000 square feet of additional reconstruction or resurfacing must meet the requirements of the drainage ordinance. Detention on the surface or underground in structured detention chambers or constructing new discharge lines to Elliott Bay can be used to meet the requirements.

Elliott Bay Water Quality

Elliott Bay lies on the western boundary of the project area. The study area is covered with impervious surfaces—buildings and pavement. Approximately

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90 percent of the precipitation runs off into the sewer system while the remaining evaporates is absorbed or percolates.

During light rainfall conditions storm water discharged to the local collection system is combined with sanitary sewage and carried to the West Point Treatment Plant for processing. However, during medium to intense storms the collection system's capacity is exceeded and combined sewer overflows (CSO) enter Elliott Bay and Lake Union.

Several recent studies have documented greatly elevated levels of metals and organics in Elliott Bay sediments which may partly be attributed to CSO. Metro through its Toxicant Pretreatment Planning Study (TPPS) has explored this issue and found that CSOs do contribute to localized water quality problems in their immediate vicinity. However, no data are available at this time to show the relative contributions of CSOs to elevated levels of pollutants in Elliott Bay sediments, compared to the contributions from other sources, such as urban and industrial runoff and aerial fallout.

3.10.2 1990 Conditions: No Action

No significant difference is expected in Elliott Bay water quality.

3.11 Utilities

3.11.1 Existing Conditions

Utilities services in the project area are provided by several public and private companies. The utilities are located in the public right-of-way and are granted by franchise.

There are underground and above-grade utilities within the project site. Underground utilities consist of sewer, water, steam, gas, electricity and telephone and telegraph wires. Above-grade utilities are street-lighting fixtures, trolley wires and fire hydrants. There are also electrical transformer vaults, old trolley lines, manholes, catch basins and areaways.

The present storm-water drainage system is a combined sewer system (see Section 3.10, Water Quality). Because this combined system cannot handle all the flow during periods of high runoff, untreated sewage frequently enters Elliott Bay and Lake Union. To minimize the frequency of these occurrences, the Seattle Grading and Drainage Control Ordinance (Seattle Municipal Code Sec. 22.800.080) was enacted. The ordinance requires that reconstruction, resurfacing or replacement of any system by a public or private agency involving more than 2,000 square feet must comply with the provisions for storm-water discharge.

Utilities are generally 3 to 15 feet below the surface. Service connections to adjacent buildings and street-light conduits are 2 to 3 feet below the surface. Transformer vaults are at least 2 feet below the surface.

Catch basins and manholes are located along Third Avenue and Pine Street. Manholes are generally in the street or sidewalk while storm drains and catch basins are generally curbside inlets.

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There are an estimated 2,000 to 4,000 lineal feet of areaway in use on Third Avenue between Prefontaine Place on the south and Pine Street on the north. There are 1,500 to 1,600 lineal feet from Third Avenue to Ninth Avenue on Pine Street. The areaways are used as light wells, window wells, Seattle City Light transformer vaults, storage space and other uses. The areaways are generally used by the abutting property owners although they are under the jurisdiction of the City.

3.11.2 1990 Conditions: No Action

The utilities in 1990 would not be affected if the No Action alternative is selected.

3.12 Public and Social Services

3.1.2 Existing Conditions

Downtown has a variety of public facilities and social services. Public facilities include parks and recreation facilities, the main library, post office, fire, police and emergency medical services, and the headquarter of government agencies.

There are 38 social service agencies in downtown offering a variety of programs. Social service agencies in the downtown area serve both local residents and services on a citywide basis or are administrative offices for outreach programs. They serve the elderly, low-income, ethnic groups, women, youth and the physically and socially disadvantaged. The agencies provide food, shelter, medical, employment, legal, transportation, social, educational, counseling, recreation, daycare and advocacy services.

Social service agencies in the International District serve an average of 1,300 clients living in and outside the district. There are also 18 social/cultural/fraternal organizations and associations in the International District that serve the Chinese, Filipino and Japanese communities.

Pioneer Square contains the basic emergency programs that serve the entire downtown. The services are shelter, food, medical care and clothing. There are five missions and the city-run Downtown Emergency Shelter in this area. It is estimated that about 800 individuals per night are served.

Denny Regrade social services are low-income and welfare-related programs. The Millionairs Club and the Indian Center are also located in this area. There are many union halls and organization headquarters in the Regrade offering services to members.

The Columbia Club, Pike Market Senior Community Club, the Pike Market food bank, the YWCA and YMCA are located in the CBD core.

3.12.2 1990 Conditions: No Action

No significant change in public services is expected except a reduction in the quality of public transit service.

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3.13 Energy

3.13.1 Existing Conditions

In Seattle, transportation (including Metro) accounts for 33.8 percent of all energy demands and about 63 percent of all oil consumed.

Metro's transit system uses both diesel fuel to operate the buses and electricity to power the trolleybuses. Gasoline is used to fuel the fleet of non-revenue trucks, service vehicles and automobiles necessary to maintain and operate the system maintenance bases, park-and-ride lots, storage and administration offices and treatment facilities.

3.13.2 1990 Conditions: No Action

Oil demands by all sectors is projected to increase 4 percent between 1978 and 2000. Planned or proposed capacity additions to the refineries will increase by approximately 15 percent the domestic crude (Alaskan) which can be processed by Puget Sound refineries. Metro's supply of diesel fuel is subject to events at the national and international levels.

Unlike natural gas and oil, demand for electricity (firm load) is expected to increase from a forecasted growth of 958 average MWs in 1985 to 1212 average MWs in 2005 due to a variety of factors as increases in population and employment, rising real incomes and increased space heating saturation. (Draft Forecast 83/84, page 10.) For 1983, City Light's average firm electric load for its service area totaled 942 averages MWs of which 81 percent was generated from its own facilities, mainly Skagit hydroelectric dams. The remaining 19 percent was covered by power purchases from the Bonneville Power Administration and other utilities.

City Light currently estimates that its annual rate of electrical load growth will average 0.6 percent for the residential and industrial sectors between 1985 - 2005 (Draft Forecast 1983-1984). The average annual growth rate for the commercial sector may reach 1.6 percent due to the expansion of employment opportunities in the office and retail subsectors and the saturation of electrical heating, ventilating and air conditioning equipment in these new establishments.

Increased electrical demand has resulted in City policies to seek energy alternatives looking first to conservation measures as updating the City's Energy Code and City Light conservation programs for the residential, commercial and industrial sectors. City Light is also considering acquiring other resources as congeneration and small hydro in order to meet new loads.[1] In addition, the cost of supplying energy for peak consumption periods is significantly higher than for off-peak demand and peak load growth is expected to grow disproportionately during the next 20 years. Under current rate setting policies, the cost of meeting additional demand in any one class (residential, commercial, industrial) would be borne by that class as a whole, having the effect of raising rates generally within that class.[2]

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1 Memorandum to Ron Borowski, April 1985, Seattle City Light (Timothy C. Croll).

2 Draft EIS for the LUTP, October 1983, p. 468.

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3.14 Soils

3.14.1 Existing Conditions

This section summarizes subsurface soil conditions expected along the route of the transit tunnel and stations along Third Avenue and Pine Street. For more detailed information see the Draft Geotechnical Report, Preliminary Engineering, Downtown Seattle Transit Project, vols. 1 and 2, Shannon and Wilson, Inc., November 1984. Excavation of the tunnel and stations would be through glacial and non-glacial sediments laid down over thousands of years and several episodes of glaciation.

Twenty-five exploratory soil borings were taken along the tunnel route and the resulting samples analyzed. In addition, engineers reviewed records and interviewed engineers and technicians involved with construction of previous deep excavations for office buildings along the proposed tunnel route. Historical and construction records were reviewed for three tunneling projects under downtown: the Burlington Northern Railroad Tunnel (completed in 1905), the Metro Second Avenue sewer tunnel (completed in 1968) and the abandoned Oregon and Washington Railroad Company tunnel under Fifth Avenue.

Based on geotechnical analysis done for the project, soils along the tunnel route may be broken down into three distinct groupings:

- Third Avenue south of Cherry Street -- Fine sandy silt and clay, fine to coarse sand with fill in some locations near Union Station.

- Third Avenue between Cherry and Pine streets -- Lacustrine (lake) deposits of what is believed to be Lawton Clay and glacio-marine drift consisting of hard, gravelly clay with some sand. Occasional cobbles and boulders and water-bearing sand seams may be encountered.

- Pine Street from Third Avenue to I-5 -- Lodgement till overlain by outwash sand. Till is very dense, silty, clayey, gravelly sand. Outwash sand consists of very dense, clean to silty, fine to coarse sand with varying amounts of gravel and cobbles. A perched water table may be located on top of the till and may result in potentially large water flows.

Experience gained from exploratory borings and other deep excavations in downtown Seattle shows that tunnel and station excavation must deal with a variety of situations including groundwater flows, obstructions such as occasional large boulders and tie-backs left in place from previous office building excavations and digging conditions ranging from very hard, dense clays and tills to soft, wet, ravelling sand. Near Union Station, fill over old tidelands creates conditions prone to liquefaction during an earthquake.

Subsurface soil conditions would likely influence the choice of excavation method. Excavation methods evaluated include cut-and-cover excavation and mechanized shield (digger shield or full-face excavator, i.e mechanical mole). Although a mechanical mole may offer speed advantages under good tunneling conditions, a digger shield is more flexible in handling obstructions and different soil conditions along the length of the tunnel.

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3.14.2 1990 Conditions: No Action

No significant change in soil conditions along the alignment is expected with No Action.

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CHAPTER FOUR

TRANSPORTATION/CIRCULATION IMPACTS AND MITIGATING MEASURES

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4.1 Construction Impacts

4.1.1 Description of Impacts

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Utilities
Parking
Canopies and Marquees
Traffic Accidents
Pedestrian Level-of-Service (LOS)
Elderly and Handicapped
Emergency Vehicles
Bicycles
Goods Movement and Loading Zones
Railroad
Business Access

4.1.2 Comparison of Impacts of Traffic/Transit Options

4.2 Long-Term Impacts

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4.2.11 Parking

4.2.12 Bicycles

4.2.13 Movement of Goods

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CHAPTER 4

TRANSPORTATION/CIRCULATION

This chapter discusses the impacts on transportation and circulation of the preferred alternative and compares the impacts with existing conditions and the No Action alternative.

Where appropriate, each section discusses the construction and long-term impacts and potential mitigating measures. Many mitigating measures have already been incorporated into the project description, but additional measures are also listed in this chapter. Mitigating measures for beneficial or insignificant impacts are not discussed.

4.1 Construction Impacts

Construction activities would have both major and minor transportation/circulation impacts. One of the key concerns of downtown businesses, pedestrians and motorists is to limit construction impacts as much as possible, while constructing the tunnel and surface improvements as quickly as possible. This would involve efforts to retain as much access as possible to stores, buildings, parking and the transit system. The impact analysis therefore focuses on these impacts and mitigation measures. Because disruption would be minimized, implementation of the preferred alternative and appropriate mitigation measures would substantially avoid signficant adverse physical and economic impacts along the alignment.

4.1.1 Description of Impacts

Based on a review of potential construction methods for the Tunnel alternative, the inverted and standard cut-and-cover methods described in Chapter 2 have the same following groups of impacts.

I-5 Connection

The freeway ramps from the I-5 reversible roadway to Pike and Pine streets would be closed to traffic during their reconstruction. The Pine Street ramp would be closed as soon as construction of the Ninth and Pine station begins, but the Pike Street ramp would remain open to general traffic until it undergoes reconstruction. The Pike Street ramp would be closed for one year while it is rebuilt. After reconstruction, the Pike/Pine ramps would be reopened in their final form as a bus-only ramp to the Ninth and Pine station and a carpool-vanpool ramp to Pike Street.

During the spring of 1985 construction would begin on the Washington State Convention and Trade Center. This work could require temporary closure of ramps near the convention site. Ramp reconstruction associated with the Downtown Seattle Transit Project would be coordinated with work on the convention center to minimize traffic disruption.

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Mitigating Measures

The Cherry/Columbia ramp from the I-5 reversible lanes could be opened to general traffic to help compensate for closing the Pike/Pine ramps during construction.

Utilities

Utilities would be rearranged in two phases. The rearrangement could include supporting existing utilities in place, moving existing utilities to new locations in the same street or relocating them entirely to other streets in the area if conflicts exist between utilities and proposed structures. This process could take up to two street lanes in each work location where utilities must be relocated. More than one utility could be rearranged in the same area at the same time.

Parking

Two hundred ninety-one off-street parking spaces would be lost at the Ninth and Pine site. No parking would be displaced in the International District.These parking losses would occur at the beginning of construction at the Ninth and Pine site and bored tunnels. Additional parking may be occupied by construction worker's vehicles near construction sites.

Table 4-1 summarizes on-street parking impacts on Third Avenue and Pine Street. A total of 145 on-street spaces would be affected by the construction of stations, Pine Street tunnel segments and surface street improvements. One hundred twenty-three of these spaces are presently available for off-peak parking only.

TABLE 4-1

ON-STREET PARKING LOSS DURING TUNNEL CONSTRUCTION
THIRD AVENUE AND PINE STREET
(Same for all traffic options)

LOCATION OF SPACES	NUMBER OF SPACES REMOVED
Line and Station Construction	
Pine St. between Boren and Sixth	38
Westlake Station between Sixth and Fourth	4
Third Avenue between Seneca and Union and between Cherry and Jefferson	31
Surface Street Improvements (Third Avenue)	
Pine to Pike	8
Pike to Union	11
Seneca to Spring	13
Spring to Madison	3
Madison to Marion	16
Marion to Columbia	11
Columbia to Cherry	10
TOTAL SPACES	145

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Additional police and parking enforcement officers could be needed to direct traffic and enforce parking regulations during construction in downtown. More people could violate parking restrictions in existing spaces and in no-parking areas with the reduced supply of on-street spaces. An increase in traffic police could be needed to alleviate the increase in congestion near some construction areas.

If a contraflow bus lane is implemented on Pike Street during construction (traffic reroute schemes A, B, D, E), 29 additional parking spaces between First Avenue and Ninth Avenue, on the north side of Pike Street, would be lost during construction. These parking spaces would be restored after construction is complete. When construction begins on the north staging area, the 18 spaces on Terry Avenue between Olive and Boren would be permanently lost (same as permanent long-term loss). At the beginning of construction on the Third Avenue South station, eight spaces would be permanently lost on Jefferson Street west of Third Avenue (same as permanent long-term loss).

Traffic schemes with contraflow bus lanes on Second and Fourth avenues (schemes B and D) would require removal of parking and loading zones on the west side of Fourth Avenue and east side of Second Avenue for the entire day.

Mitigating Measures

Although some loss of parking is a long-term impact, measures could be taken to reduce this impact during construction.

Metro would discuss and coordinate with downtown building managers and other property owners the possibility of opening up existing or new carpool spaces.

The south parking lot at the Kingdome, in conjunction with CBD shuttle service, would be investigated for carpool/vanpool parking during project construction.

Additional parking spaces could be provided through the use of more leased commuter parking lots outside downtown. This would encourage people not to take their cars into downtown.

Additional parking could be provided at the Seattle Center with the possibility of free monorail service into downtown.

Metro would discuss and coordinate with the City in designating additional on-street parking for carpools and vanpools. This would be predominantly on the fringes of the CBD, mostly to the south.

Additional police and traffic enforcement officers could be hired to provide better enforcement of traffic and parking regulations in downtown during construction.

Metro would work with the city to identify potential means of reducing the effects of construction worker parking.

Canopies and Marquees

Canopies, marquees and signs along the project route would be temporarily removed during construction of the tunnel alternative to allow heavy equipment to work close to building faces to place pilings for the support of station and tunnel excavation. These appurtenances would be replaced as soon as construction is completed.

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Traffic Accidents

Accidents in the construction area could increase slightly as a result of the added congestion, movement of construction equipment and reduced maneuvering room and visibility. No difference in the number of accidents between the two construction methods would be expected.

Mitigating Measures

The project would meet all applicable city, state and federal safety requirements to ensure the safety of the general public.

Pedestrian Level of Service (LOS)

Table 4-2 summarizes impacts to pedestrian access in downtown during the noon hour. Pedestrian Level-of-Service (LOS) is defined in Table 3-7. Where differences in pedestrian LOS between each side of the street exist, the worst case is shown in the table. In cases where one side of the street is closed, the table shows the pedestrian LOS for the open side. During the excavation and installation of the deck in the inverted construction method, both sidewalks would have to be closed for up to one week at a given location. Temporary access from Third Avenue and Pine Street would be maintained at all times during business hours for those businesses without alternate street access.

The inverted construction method would have more impact because the construction area would be closed to through traffic during initial excavation and placement of the deck beams. After installation of the permanent deck, the inverted construction method would provide better pedestrian LOS than the standard cut-and-cover method.

Elderly and Handicapped

Impacts to the elderly and handicapped during construction would be more severe than on pedestrians in general. Pedestrian detours, temporary walkways of reduced width, movement of construction equipment and other disruptions could make it more difficult for the elderly and handicapped to get around downtown during construction. The visually-impaired could find it difficult in moving about as sidewalks would be closed and detour routes changed during construction. The inverted construction method would impose slightly worse impacts for a shorter period of time compared to the cut-and-cover method. Although the impacts of the standard cut-and-cover method would be somewhat less, the duration would be longer than for inverted construction.

Mitigating Measures

All walkways within the construction area would conform to the pedestrian control and protection section of the City of Seattle's "Traffic Control Manual for In-Street Work."

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TABLE 4-2

DOWNTOWN SEATTLE TRANSIT PROJECT
PEDESTRIAN LEVEL-OF-SERVICE (LOS) DURING TUNNEL CONSTRUCTION

AREA/ CONSTRUCTION PHASES	INVERTED CONSTRUCTION	STANDARD CUT-AND-COVER CONSTRUCTION
Pine Street		
Line Segments		
Existing Condition	A	A
Phase I (cut-and-cover only)	-	B
Phase Ia (inverted only)	B	-
Phase II	B	B
Phase III	-	B
Westlake Station		
Existing Condition	C	C
Phase I (cut-and-cover only)	-	D
Phase Ia (inverted only)	NA	-
Phase II	C	C
Phase III	-	D
Third Avenue Stations		
Third Avenue		
Existing Condition	B	B
Phase I (cut-and-cover only)	-	C
Phase Ia (inverted only)	NA	-
Phase Ib	B	C
Phase II	B	B
Phase III	-	C
Second/Fourth Avenues		
Existing Condition	B	B
Phase I (cut-and-cover only)	-	B
Phase Ia (inverted only)	B	-
Phase Ib	B	B
Phase II	B	B
Phase III	-	B

NOTES:

Phase I Final utilities, building underpinning, support of excavation, soldier piles, excavation.
Phase Ia Initial excavation, permanent decking, street restoration.
Phase Ib Soldier piles, excavation.
Phase II Work below permanent deck (inverted cut-and-cover Method) or temporary deck (standard cut-and-cover method).
Phase III Backfill, street restoration.
- = Not applicable to this construction method.
NA = Not applicable because sidewalk is closed to through traffic.

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Emergency Vehicles

Both construction methods for the Tunnel alternative would require closure of the construction area on Pine Street to through traffic. Emergency access on Pine Street would be provided from both ends of the construction zone. The construction zone itself would be approximately 100 feet long and would shift along the street as successive segments of deck are completed.

Through emergency access would be maintained on Third Avenue during all phases of construction for the alternative using the standard cut-and-cover method. Through emergency access on Third Avenue would not be possible during initial excavation and placement of the permanent deck in Phase I of the alternative using the inverted method. Through emergency access on Third Avenue would be restored upon completion of the permanent deck. During Phase I, an alternate emergency routing plan would have to be established through downtown. First Avenue also currently serves as an emergency route.

Local emergency access on Third Avenue during Phase I of the inverted construction alternative would be maintained in a manner similar to Pine Street.

Bicycles

Impacts to bicyclists would be much the same as to pedestrians and traffic in general. The inverted construction method would impose slightly worse impacts for a shorter period of time, compared to the cut-and-cover method. Although the impacts of the cut-and-cover method would be somewhat less, the duration would be longer than for inverted construction.

Increased traffic and pedestrian congestion during construction under both alternative methods would increase the inconvenience to riders. Temporary deck materials used in the cut-and-cover alternative could be rough and slippery. In the inverted method, no temporary decking would be used.

Movement of Goods and Loading Zones

Table 4-3 summarizes the number of loading zones that would be affected during construction of stations and the cut-and-cover line segment on Pine Street. The same number of loading zones would be affected for both construction methods.

Construction would affect 55 loading zones. If a contraflow bus lane is implemented on Pike Street, loading zones would be eliminated during construction. These zones would be restored after construction. Table 4-4 summarizes load zone availability during the various construction phases. If contraflow bus lanes are implemented on Second and Fourth avenues during construction, load zones would be lost on the west side of Fourth Avenue and east side of Second Avenue.

Railroad

Construction of the transit tunnel would affect railroad traffic in the Burlington Northern tunnel (see Chapter 6). During the final design phase, surveying and concrete core sampling could require one track be closed intermittently. Closure of one track intermittently up to eight weeks could be required during the construction

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phase. During exploration and construction activities, it is anticipated that at least one track would always be available for railroad traffic. There would be no long-term impacts.

TABLE 4-3

LOADING ZONE IMPACTS DURING TUNNEL CONSTRUCTION

No. of Spaces Affected	Type of Space
Pine Street	
9	Passenger load zones
8	Truck load zones
2	Taxi zones
Third Avenue Stations	
4	Passenger load zones
9	Truck load zones
1	Taxi zones
Third Avenue Surface Street Improvements	
9	Passenger load zones
11	Truck load zones
2	Taxi zones
55	TOTAL SPACES

Source: Parsons, Brinkerhoff, Quade and Douglas, 1985

Business Access

For both Tunnel construction alternatives and traffic options A-E, access to businesses on Third Avenue and Pine Street would be maintained in construction areas during business hours. Temporary access from Third Avenue or Pine Street would be maintained at all times during business hours for those businesses without alternative street access. Sidewalks would have to be closed temporarily to support excavation and the initial excavation. Delivery service and trash removal could be restricted to limited hours in the construction area. Certain store windows would be covered for safety during this time. After the permanent lid or temporary deck is installed, full access would be maintained during business hours. Similar requirements would apply to historic buildings in the construction area.

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TABLE 4-4

LOADING ZONE AVAILABILITY FOR EACH CONSTRUCTION ALTERNATIVE

	INVERTED CONSTRUCTION		STANDARD CUT-AND-COVER CONSTRUCTION		
Location	Phase I	Phase II	Phase I	Phase II	Phase III
Pine Street	-Permitted except in construction areas	-Same as long-term impacts	-Permitted except in construction areas	-Permitted at restricted times and locations	-Permitted except in construction areas
Third Avenue Stations	-None in station construction areas	-Permitted at restricted times	-None in station construction areas	-Permitted at restricted times	-None in station construction areas
Third Avenue Line Segments (Surface Improvements)	-Restricted times -One side of street in construction areas	-Restricted times -One side of street in construction areas	-Restricted times -One side of street in construction areas	-Restricted times -One side of street in construction areas	-Restricted times -One side of street in construction areas

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Mitigating Measures

- o Whenever possible, entrances would be maintained from at least one direction.
- o Alternate access points would be developed where feasible.
- o Portable ramps and footbridge sections could be used to maintain pedestrian access to businesses during the initial excavation period.
- o Access to parking garages and automobile service centers would be maintained from at least one direction.
- o Local street access would be maintained between stations to blocks otherwise closed to through traffic during station construction.

4.1.2 Comparison of Impacts of Traffic/Transit Options

Traffic/Transit Schemes During Construction

A detailed Maintenance-of-Traffic Plan would be prepared for the construction period with a set of transit and general traffic rerouting schemes for each tunnel construction phase as appropriate. In order to analyze and present the range of impacts likely to occur during construction, five alternative traffic schemes, shown in Tables 4-5 through 4-9, have been developed — two for the inverted construction alternative and three for the standard cut-and-cover alternative. This section describes the schemes and their impacts. Although these schemes are being considered for evaluation of impacts, they do not necessarily represent the final scheme which would be selected. Elements of several schemes could be combined to create a new one.

Three elements common to all schemes are:

1) Trolley wires on Third Avenue and Pine Street would be removed for the duration of construction. Trolley coaches, therefore, would not be routed on either street until the tunnel begins operation or surface street improvements are completed.

2) Once a transit route has been temporarily rerouted, every effort would be made to maintain that routing until it could begin its tunnel operating route or return to its original route during the remainder of the construction period. However, there could be times when a route could be moved more than once. This would be done to minimize the disruption to transit riders.

3) The operating hours of transit-only lanes on Second and Fourth avenues would be expanded from 4 to 6 p.m. to 3 to 6 p.m.

In addition to the traffic/transit scheme impacts identified in this section, each scheme could require other temporary traffic improvements to facilitate operations during the construction period. These could include items such as temporary removal of on-street parking, extension or addition of contraflow or with flow bus lanes, street closures, turning movement restrictions, and additional trolley wire to improve reroutes. Once a construction option and traffic/transit scheme is selected, specific temporary improvements will be coordinated between Metro and the City.

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TABLE 4-5

INVERTED CONSTRUCTION ALTERNATIAVE

Scheme A - Distributed Bus

Phase I

Pine Street

- Closed to through traffic, local access to blocks except for immediate construction area.
- Pine Street trolleys run in contraflow lane on Pike Street or westbound on Union Street. Pine Street diesel buses run on Union Street and Stewart Street.

Third Avenue

- No through traffic in station areas.
- Traffic on half the width of the street between stations in one block segments at a time.
- Trolleys moved to First Avenue.
- Third Avenue diesel buses moved primarily to First Avenue northbound and Fifth Avenue southbound. On First Avenue northbound and Fifth Avenue southbound, extend and add loading zones, add skip stops, and establish peak-hour, transit-only lanes or increase parking enforcement.

Phase II

Pine Street

- Open to general through traffic with some disruption.
- Transit reroutes remain as in Phase I.

Third Avenue

- Traffic through station areas with some disruption.
- Between stations - same as Phase I.
- Transit - same as Phase I.

TABLE 4-6

INVERTED CONSTRUCTION ALTERNATIVE

Scheme B - Contraflow lanes on Second and Fourth Avenues

Phase I

Pine Street

- Same as Scheme A.

Third Avenue

- For general traffic - same as Scheme A.
- For transit - trolleys to First Avenue. Third Avenue diesels to contraflow lanes on Second and Fourth avenues.

Phase II

Pine Street

- Same as Scheme A.

Third Avenue

- For general traffic - same as Scheme A.
- For transit - same as Phase I.

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TABLE 4-7

STANDARD CUT-AND-COVER CONSTRUCTION ALTERNATIVE

Scheme C - Diesels on Third Avenue

Phase I

Pine Street

- o Closed to through traffic, access to all blocks but one.
- o Existing trolley routes converted to use diesel buses, eastbound on Pike and westbound on Union Street. (Trolley wire and supports could be placed on Union Street and trolley routes could then maintain electric operation on Pike, Union and First Avenue.)
- o Diesels moved to Stewart and Union streets.

Third Avenue

- o No through general traffic at or between station areas during peak hours.
- o Diesels remain on Third Avenue, Queen Anne trolleys run as trolleys on First Avenue, Capitol Hill trolleys run as diesels on Third. This would require use of leased coaches (non-lift-equipped), if feasible, or postponement of additional lift-equipped service elsewhere by diverting new lift-equipped diesels to this service.

Phase II

Pine Street

- o Open to general through traffic with some disruption.
- o Transit - Same as Phase I.

Third Avenue

- o General traffic through station areas with some disruption.
- o Between stations, general traffic allowed on half the width of the street, through one-block-long construction areas.
- o Transit - same as Phase I.

Phase III

Pine Street

- o General traffic - same as Phase I.
- o Transit - same as Phase I.

Third Avenue

- o General traffic - no through traffic at station areas.
- o Third Avenue diesel buses moved primarily to First Avenue northbound and Fifth Avenue southbound. On First Avenue northbound and Fifth Avenue southbound, extend and add loading zones, add skip stops and establish peak-hour, transit-only lanes or increase parking enforcement.

TABLE 4-8

STANDARD CUT-AND-COVER CONSTRUCTION ALTERNATIVE

Scheme D - General traffic on Third Avenue

Phase I

Pine Street

- o Closed to through traffic, access to all blocks but one.
- o Trolleys run on contraflow lane on Pike Street.

Third Avenue

- o General traffic at and between stations, with half of the street open.
- o Diesels run on contraflow lanes on Second and Fourth avenues; trolleys run on First Avenue.

Phase II

Pine Street

- o Open to general through traffic with some disruption.
- o Transit - same as Phase I.

Third Avenue

- o General traffic - same as Phase I.
- o Transit - same as Phase I.

Phase III

Pine Street

- o General traffic - same as Phase I.
- o Transit - same as Phase I.

Third Avenue

- o General traffic - no through traffic at station areas.
- o Transit - same as Phase I.

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TABLE 4-9

STANDARD CUT-AND-COVER CONSTRUCTION ALTERNATIVE

Scheme E - Emergency access on Third, two-way operation on Second and Fourth Avenues

Phase I

Pine Street

- o General traffic - same as Scheme A.
- o Transit - same as Scheme A.

Third Avenue

- o No through traffic, except emergency vehicles. Access between stations same as Scheme A.
- o Second and Fourth avenues become two-way streets for general traffic and transit. Trolleys run on First Avenue. Diesels move to Second and Fourth avenues.

Phase II

Pine Street

- o General traffic - same as Phase I.
- o Transit - same as Phase I.

Third Avenue

- o General traffic through station areas with some disruption.
- o Between stations, same as Scheme A.
- o Transit - same as Phase I.

Phase III

Pine Street

- o General traffic - same as Phase I.
- o Transit - same as Phase I.

Third Avenue

- o General traffic - same as Phase I (no general traffic, emergency access only).
- o Transit - same as Phase I.

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Rerouting trolleys to First Avenue would require the addition of wire on Seneca and Spring streets between First and Third avenues. Traffic/transit schemes using Union Street for westbound trolleys would require installation of wire along Union Street. Overhead wire along Union Street would connect back to Pike Street via Union Place or 8th Avenue.

Comparative Discussion of Traffic/Transit Reroute Schemes

The rerouting of transit and general traffic would cause varying degrees of congestion in downtown depending on the reroute scheme chosen. Congestion impacts would be worst during the construction phases when some or all traffic is excluded from construction areas: Phase I for the inverted construction method and both Phases I and III for the standard cut-and-cover construction.

The primary difference between the two construction methods lies in how traffic would be maintained or prohibited in the station construction areas on Third Avenue.

For the inverted construction alternative, all traffic in these areas would be prohibited during the first phase (9-14 months), but permitted on the permanent deck in the second (last) phase (13 months).

In contrast, the standard cut-and-cover construction alternative would permit some traffic through these areas in Phases I and II, but would prohibit through traffic in Phase III (5 months).

The prohibition of traffic in the station areas would be for a much shorter period of time in the standard cut-and-cover construction alternative.

Impacts on transit service also differ between the two alternatives, with two sets of reroutes required for the standard cut-and-cover alternative: one for Phases I and II when two lanes can be maintained through Third Avenue station areas, and one for Phase III when all transit service must be removed from Third Avenue. For this last phase, the same transit reroute schemes would be used as with the first phase of the inverted construction alternative.

The following discussion compares the worst phases of construction. Impacts would be significantly less for the other construction phases. Table 4-10 shows congestion at selected intersections, as measured by Level-of-Service, LOS A for least congested to LOS F for most congested. See Table 3-5 for the definition of traffic Level-of-Service. Table 4-10 compares the five traffic schemes with the pre-construction levels, with impacts grouped by area of the CBD. The intersections listed show the approximate location of each LOS analysis area.

I-5 Freeway Access Area - There is little difference among schemes in this section of downtown.

Retail Area - Of the two schemes associated with the inverted construction alternative, Scheme A produces slightly less congestion, while for the standard cut-and-cover alternative, Scheme C appears least congested.

Financial Area - There is little difference among schemes in this section of downtown.

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TABLE 4-10

TRAFFIC LEVEL-OF-SERVICE (LOS) DURING TUNNEL CONSTRUCTION
(PM Peak)

Intersection	Before Const.		Inverted Construction Scheme A		Inverted Construction Scheme B		Standard Cut-and-Cover Construction Scheme C Phase I		Scheme C Phase III		Scheme D Phase I		Scheme D Phase III		Scheme E	
I-5 Freeway Access Areas																
Stewart/Terry	A	A	-	-	-	-	-	-	-	-	NA	NA	-	-	-	-
5th/University	A	C	B	-	B	-	B	-	B	-	B	-	B	-	B	-
5th/Columbia	A		-		-		-		-		-		-		-	
5th/Cherry	C		-		-		-		-		-		-		-	
Stewart/Eastlake	A		-		-		-		-		-		-		-	
9th/Olive	A	A	-	-	-	-	-	-	-	-	-	-	-	-	-	
7th/Olive	A	A	-	-	-	-	-	-	-	-	-	-	-	-	-	
8th/Pike	A	A	-	C	-	C	-	-	-	C	-	C	-	C	-	C
Retail Area																
6th/Pike*	A	A	E	E	E	E	-	-	E	E	E	E	E	E	E	E
4th/Pike	A	A	C	D	E	D	-	-	C	D	C	D	E	D	F	D
3rd/Pike	A	A	-	C	-	C	-	-	-	C	-	C	-	C	-	-
2nd/Pike	A	A	D	F	D	F	D	-	D	F	D	F	D	F	F	F
5th/Union	A	C	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Financial Area																
2nd/Union	B	A	E	-	F	-	E	-	E	-	F	-	F	-	F	-
3rd/Madison	A	B	-	A	-	A	-	A	-	A	-	-	-	A	-	A
2nd/Madison	B	A	E	-	F	-	D	-	E	-	E	-	F	-	F	-
1st (NB) Marion	A	A	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1st (SB) Marion	A	A	D	-	C	-	C	-	D	-	-	D	C	-	D	-
Government Area																
2nd/Cherry	A	A	B	-	B	-	-	-	B	-	-	-	B	-	E	-
3rd/Cherry	A	A	-	-	-	-	-	-	B	-	-	-	-	-	-	-
4th/James	A	A	E	-	E	-	-	-	E	-	C	-	E	-	E	-

NOTES:

Each pair of symbols above refers to the traffic LOS for each of the two intersecting streets at a given intersection. For example, the LOS for the 5th/University intersection before construction is LOS A on 5th Avenue and LOS C on University Street.

NA = Not available
- = No change from before construction
* = The 6th/Pike intersection LOS is shown for the worst case, i.e. when the Pike-to-I-5 ramp remains open. When the ramp is closed, the LOS at 6th/Pike is A-A.

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Government Area - Again, there are only small differences among schemes, with Schemes A, B and C among the best and E the worst.

Comparing construction alternatives, the table indicates that the worst phases, I and II, of standard cut-and-cover construction produce less congestion than the worst phase (Phase I) of the inverted construction alternative. It should be noted that Phase III of cut-and-cover construction would have the same effects on circulation as Phase I of the inverted construction method since no through traffic would be permitted at the station areas. The duration of the worst phases, however, would be longer with the standard cut-and-cover alternative. Also, there would be more construction phases requiring shifting traffic reroutes with the standard cut-and-cover alternative.

Mitigating Measures

Bus stops currently within the construction area would be relocated during construction. The locations of the temporary bus stops would depend on the bus routing option chosen.

Metro would implement an aggressive public information program to alert motorists, commuters and downtown travelers about congestion and delays in downtown Seattle during tunnel construction. People would be given the information and time needed to adjust their personal travel habits.

Metro would implement an aggressive employer-marketing program in the CBD to promote the use of carpools and vanpools and to increase average vehicle occupancy in existing high-occupancy vehicles (HOVs).

Carpool/vanpool pickup and drop-off spaces could be included as part of the project to provide convenient loading space for HOVs in downtown.

An aggressive Flex-Time promotion program could be implemented to encourage people to shift their travel times to avoid high peak loads on transit and city streets. This would be coupled with a program to assure schedule reliability and provide appropriate levels of service shifted to match a Flex-Time program.

Preferential treatment could be provided for HOVs on Third Avenue if the street is to be closed to buses during construction.

Metro and the City could consider the possibility of vanpool access to existing or bus only contraflow lanes in the CBD that may be in place during construction and also vanpool access to these lanes that are in place after construction is completed.

During special events, construction activity could be modified if needed to minimize the effect on the event.

4.2 Long-Term Impacts

This section discusses transportation issues and long-term impacts for the preferred alternative. Refer to the draft EIS for analysis of other alternatives, which have not changed.

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4.2.1 Trip Generation and Mode-Split

Table 4-11 summarizes trip generation in downtown Seattle and the percent of those trips using transit (mode-split). Population growth in the region, coupled with employment growth in downtown Seattle, would increase transit ridership in downtown. The transit share of work trips is projected to increase to 46 percent daily and the transit share of all CBD trips would increase to over 28 percent by 1990.

TABLE 4-11

TRIP GENERATION AND MODE-SPLIT
DOWNTOWN STUDY AREA
Average Daily 1990 Action Alternatives

	Total Trips	Transit Riders	Percent Transit	Auto Persons	Average Occupancy	Autos
Productions:						
HBW	7,050	1,550	22.0	5,500	1.35	4,070
HBO	16,060	1,970	12.7	14,090	1.78	7,920
NHB	101,900	10,100	9.9	91,800	1.46	62,880
Total	125,010	13,620	10.9	111,390	1.49	74,870
Attractions:						
HBW	211,700	98,100	46.3	113,600	1.35	84,150
HBO	138,300	36,500	26.4	101,800	1.78	57,200
NHB	101,900	10,100	9.9	91,800	1.46	62,880
Total	451,900	144,700	32.0	307,200	1.50	204,230
Total	576,910	158,320	27.4	418,590	1.50	279,100

HBW = Home-based work
HBO = Home-based other
NHB = Non-homebased

Households	6,957
Population	12,098
Employment	146,218

Source: PSCOG, 1983, 12/26/84.

The large increase in trips to and from downtown, coupled with the large percentage of trips made by transit, would severely overload transit system capacity by 1990 in the No Action alternative.

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4.2.2 Ridership Assumptions

The Downtown Seattle Transit Project began with the assumption that the action alternatives would attract the same level of ridership in 1990. Analysis has since indicated projected transfers and travel times could result in ridership differences among the alternatives. The City and Metro jointly decided to evaluate all the environmental impacts assuming a constant, systemwide ridership for all the action alternatives for 1990. This was reasonable because the percentage change would not be great and unlikely to alter impacts.

In most cases, a small ridership change (no alterations to the physical structures that would be built) would not change the impacts identified in the EIS. The exceptions would be economic activity, air quality, noise, vibration and energy. The change, however, would be insignificant.

The impacts of the No Action and Tunnel alternatives are reflected in the section describing transit impacts and ridership level. In general, the Tunnel options would have the highest ridership due to the relatively fast travel times and few transfers.

4.2.3 Transit

This section describes the anticipated impacts that the No Action and Tunnel alternatives would have on the downtown transit system and its riders. Where possible, quantitative measures have been developed to compare options. In some cases, however, impacts are described in narrative or qualitative form.

The Tunnel alternative would change existing transit patterns by putting several routes underneath downtown in a grade-separated transit tunnel. Some transit riders would enter underground stations instead of waiting on the sidewalks to catch their bus. This alternative would also provide improvements to bus stops as part of surface improvements along the Third and Pine alignment.

Bus Volumes

The preferred alternative has been designed to maximize the opportunities to reduce bus volumes, particularly diesel-bus volumes, on downtown streets. Analysis shows that the tunnel would have the greatest impact of any alternative studied in reducing surface bus volumes through the CBD. Table 4-12 identifies the expected peak-hour and midday electric and diesel-bus volumes for the No Action and Tunnel Alternatives for 1990 (operation begins) and 2000 (full dual-powered bus fleet).

The 1990 Tunnel alternative would result in approximately 72 percent of the peak-hour surface bus volumes associated with the 1990 No Action alternative. This is because the entire fleet of larger dual-power buses would not be available by 1990. Diesel buses would have to carry the projected load on surface routes until additional dual-power buses are delivered. When the full fleet of dual-power buses becomes operational in 1995, the number of surface buses would decrease to less than half the volumes associated with the No Action alternative. In 1990 there would be an 18 percent increase in surface buses during midday for the Tunnel alternative. Here again, phased deliveries of dual-power buses would result in larger numbers of diesel buses to carry the projected load. By 1995, when the full dual-power fleet is acquired, midday surface bus volumes for the Tunnel alternative would be approximately 30 percent lower than with the No Action alternative.

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TABLE 4-12

HOURLY SURFACE BUS VOLUMES — 1990, 2000[1]

	Peak			Midday		
	Electric	Diesel	Total	Electric	Diesel	Total
No Action 1990	121	535	656	83	130	213
Tunnel 1990	124	338	462	115	113	228
No Action 2000	165	511	676	--	--	--
Tunnel 2000	151	235	386	125	118	243

[1] North-South volume at Union-University cordon.

Draft EIS data were based on the trolley expansion program as shown in the trolley expansion program final EIS. This table reflects Metro Council's decision to convert fewer routes to trolley operation and shows a lower proportion of electric vehicles than in the draft EIS for the Downtown Seattle Transit Project.

Source: Metro, 1983, 1985.

1990 bus volumes on Second and Fourth avenues would be similar to or slightly less than today except under the No Action alternative (a slight increase). Volumes on First and Fifth avenues would not be substantially different. Figures 4-1 and 4-2 summarize the projected peak-hour and midday bus volumes on Third Avenue and Pine Street. By 1995, bus volumes on Second and Fourth would be 35 percent lower than today.

The most noticeable difference between the Tunnel and the No Action alternative would be the reduction in diesel buses operating on the surface on Third Avenue.

Transfers

Table 4-13 summarizes changes in peak-hour transfers for the No Action and Tunnel alternatives. The Tunnel alternative would require riders to make additional transfers. Because tunnel stations would be located farther apart than bus stops in the No Action alternative, a transit rider using the tunnel would be more likely to have to transfer to a surface route to reach a given destination. Also, more bus routes would be concentrated in the tunnel, an alignment that does not reach all areas in the CBD.

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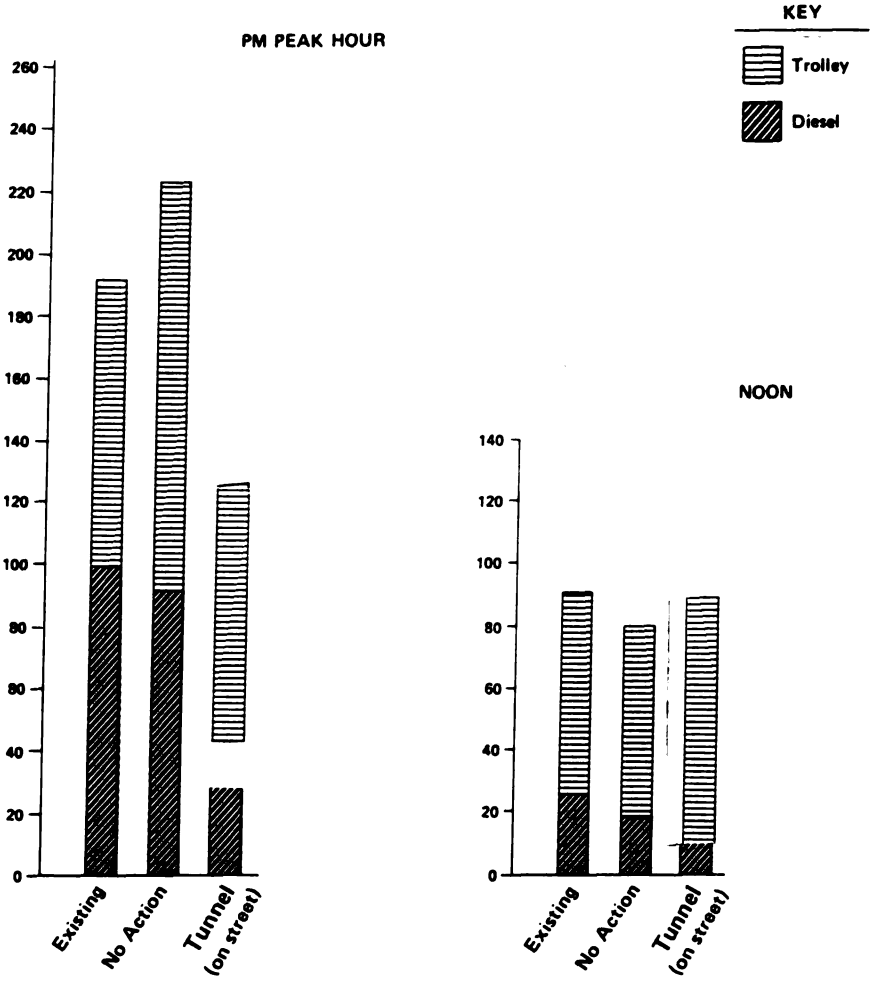

DOWNTOWN SEATTLE TRANSIT PROJECT

METRO City of Seattle

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FIGURE 4-1

1990 surface bus volumes on Third Avenue

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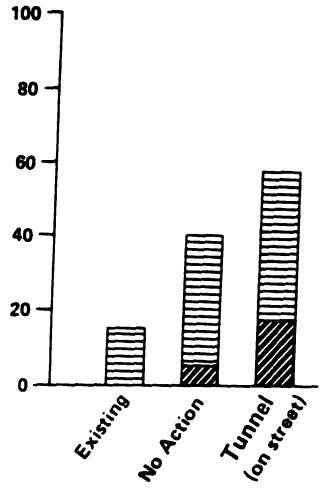
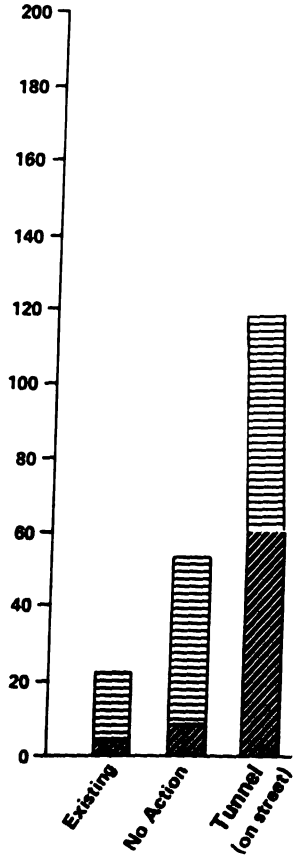
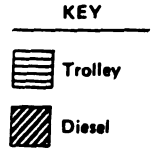


PM PEAK HOUR





DOWNTOWN SEATTLE TRANSIT PROJECT

METRO City of Seattle

FIGURE 4-2

1990 Surface bus volumes on Pine Street

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TABLE 4-13

PEAK-HOUR TRANSFERS IN CBD — 1990

Alternative	Number of Transfers	Change From No Action	
		Number	%
No Action	7,380	0	-
Tunnel	8,050	673	+9

Source: Metro, 1983, 1984.

Travel Times

The time a person would take to travel to his or her destination by transit would have a direct impact on his or her decision to take the bus. The expected speeds for bus travel have been identified for the preferred alternative. Generally, transit vehicles are expected to travel approximately 5 mph in mixed traffic (slightly slower than today). Buses in the tunnel are expected to operate at an average of 11 to 12 mph.

Based on the predicted speeds, bus volumes and passenger travel patterns in downtown, the average travel time for transit riders during peak hours has been summarized in Table 4-14.

TABLE 4-14

CBD TRAVEL TIME — 1990

	Number of Minutes	Average Time Savings Compared to No Action
No Action	25.3	--
With Tunnel (average of all CBD trips)	18.3	7.0

Source: Metro, 1983, 1984.

The Tunnel alternative would save approximately 28 percent of the anticipated CBD travel time associated with the No Action alternative.

Ridership

The estimated ridership projected for each alternative was based on the expected number of transfers and the travel times. These ridership estimates are adjustments to the projected overall ridership identified earlier in the chapter. Table 4-15 summarizes the projected peak-hour and annual ridership for the preferred alternative.

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TABLE 4-15

PROJECTED RIDERSHIP -- 1990

	CBD Peak Hour	Annual Systemwide (millions)
No Action	25,000	85.5
Tunnel	29,300	86.7

Source: Metro, 1984.

The Tunnel alternative would attract the largest ridership because it would generate the fastest bus travel speed with only a small increase in transfers. The No Action alternative would attract the smallest ridership. The range between the lowest (No Action) and the highest (Tunnel) annual ridership is 6 percent.

Capacity

The capacity of a given alternative is a function of the passenger-carrying capacity of each vehicle and the number of vehicles capable of operating over a given route segment per hour.

The capacity of the preferred alternative was estimated based on traffic and bus circulation, pedestrian crowding on sidewalks, bus volumes and loading congestion at bus stops. The tunnel would provide the largest transit capacity by creating an additional subsurface transit street through the CBD. Existing street area would be reallocated to separate pedestrian, transit and auto circulation. Table 4-16 identifies the CBD peak-hour capacity and the year that capacity is expected to be reached.

The No Action alternative would reach capacity in the mid-1980s. The Tunnel alternative, with the additional subsurface street, would provide enough capacity to handle downtown transit demands beyond 2000.

TABLE 4-16

CAPACITY

	CBD Peak Hour Rider Capacity	Year Expected To Reach Capacity*
No Action	25,000	1985
Tunnel	43,000	2003

Source: Metro, 1984.

* Subject to actual growth in regional population and employment.

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The capacity of the tunnel operation, as reviewed in the draft EIS, was based on a mix of standard and articulated buses operating with an estimated capacity of 180 vehicles per hour in each direction in the tunnel. Instead of a mix of vehicle sizes, the vehicles operating in the tunnel would be dual-power, articulated buses with passenger-carrying capacity larger than the average passenger-carrying capacity assumed in earlier studies.

In order to determine the tunnel's operational capacity, several factors were taken into consideration. These included the rate at which passengers arrive at bus zones and the corresponding scheduled arrival of buses. Currently, Metro's schedule coincides with the passengers' demand to use the bus. The highest uses during the p.m. peak hours are typically the 15-minute periods following the hour and the half hour.

In order to accommodate these intense 15-minute periods, 4 bus platoons would have to be scheduled every 77 seconds. This operational plan would allow the greatest number of buses to run through the tunnel during each peak hour, and still provide enough operational flexibility to recover from minor delays and maintain schedules. When these intense periods are combined with less intense periods during the peak hour, the average number of buses during the peak hour is 145.

Although the number of vehicles per hour has been reduced to 145 each direction, the larger passenger capacity per bus would mean that the total passenger-carrying capacity of the tunnel (9,000 per hour in each direction) would not change.

Other Transit Impacts

The Tunnel alternative would also affect other important transit service elements including comfort, service reliability and transit system safety. The surface improvements would improve crowded sidewalk conditions and protect riders from the weather. The tunnel which includes indoor waiting areas (tunnel stations), would improve comfort for waiting riders. The tunnel and its grade-separated transit lanes would improve service reliability compared to the No Action alternative because there would be no cross-street interference. The Tunnel alternative could have problems providing reliable service if buses bunch up or while delays occur because of vehicle malfunction. Because buses would be staged at the beginning of their Seattle outbound tunnel routes, delays associated with a bus traveling to begin a route would be eliminated. Adherence to scheduled arrivals would therefore be better.

The Tunnel alternative would provide improvements to waiting areas and would also improve safety for transit riders. Because of the indoor waiting areas, special security measures would be included for the Tunnel alternative to maintain a safe environment for riders.

Regional Transit System

Coordination with other elements of the regional transit system would be important. These would include park-and-ride lots, HOV facilities and community and regional transit centers. All the action alternatives would connect the I-90 transit lanes and downtown (via the Union Station area) and provide quick and easy access to downtown from the major regional HOV facilities planned or under construction in

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the south and east corridors. From the north, HOV lanes on I-5 would be connected directly to the Tunnel alternative via the Pine Street ramp from I-5.

4.2.4 General Traffic

By 1990, the CBD-generated, noon-hour automobile trips for all action alternatives are expected to increase 6.5 percent from the current 9,200 to 9,800. The p.m. peak-hour CBD-generated automobile trips would increase 6 percent from 25,200 to 26,700 (SED, 1983). Due to the increased attractiveness and capacity of the transit system, some automobile users would be drawn to transit, reducing the expected increase in CBD-generated automobile trips. CBD-generated automobile trips would be 5 percent lower both during the noon hour (9,800 vs. 10,350) and the p.m. peak hours (26,700 vs. 28,100) with the Tunnel or other action alternative when compared with the No Action alternative (see Table 4-17).

TABLE 4-17

1990: GENERAL AUTOMOBILE VOLUMES

	Noon	PM Peak
Existing	9,200	25,200
No Action	10,350	28,100
Tunnel	9,800	26,700

Source: SED, 1983

Level-of-Service (LOS) for 20 key intersections was calculated as a measure of traffic congestion in downtown. See Table 3-5 for the definition of traffic Level-of-Service (LOS). Table 4-18 summarizes Level-of-Service impacts. Table 4-19 summarizes the average travel speeds and the percentage of change when compared with the No Action.

In Table 4-18 the Tunnel options show the greatest improvements in LOS and the least deteriorations as compared to other alternatives studied in the draft EIS. Traffic speeds show the least reduction with the Tunnel option.

4.2.5 HOV Ramps

Three general traffic ramps to downtown Seattle would be needed to handle existing non-HOV traffic and allow HOV/transit vehicles to travel, enter or exit the I-5 reversible lanes at a desirable Level-of-Service. If the Pine Street/Pike Street ramp is converted to an exclusive HOV/transit facility, the Cherry/Columbia street ramp could be reopened to general traffic. At the Fifth Avenue-Cherry Street and Fifth Avenue-Columbia Street intersections, pavement marking features would have to be revised if the Cherry/Columbia reversible ramp is converted to general traffic operation. Specific mitigating measures would not be required since these critical intersections would operate at LOS C or better during a.m. and p.m. peak periods.

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TABLE 4-18

SUMMARY OF SELECTED INTERSECTION LEVEL-OF-SERVICE IMPACTS P.M. PEAK HOUR (Year 1990)

Ref. No.	Intersection	Existing	No Action	Tunnel
1.	Stewart/Denny[a]	E	E	E
2.	Howell/Yale	E	E	D
3.	7th/Stewart	A	B	A
6.	Pine/5th	C	D	A
7.	Pine/3rd	A	B	A
11.	Union/5th	C	E	E
12.	Union/2nd	B	E	D
14.	University/3rd	A	B	A
15.	Madison/2nd	B	C	B
17.	Marion/1st	A	A	A
21.	James/4th	A	B	B
23.	2nd Ext/4th	A	A	A
25.	Jackson/2nd	C	D	B
26.	Jackson/4th	A	B	A
27.	Stewart/3rd	A	C	A
28.	Westlake/Stewart	A	A	A
29.	Stewart/2nd	A	A	A
30.	Stewart/4th/Olive	A	C	A
31.	Pike/3rd	A	A	A
32.	James/6th	E	E	E

[a] a.m. peak hour calculation.

4.2.6 Street Closures and Changes

Construction of the Tunnel alternative would require closure of part of Jefferson Street between Yesler Way and Third Avenue and just east of Third Avenue near the King County Courthouse. Terry Avenue between Olive Way and Pine Street would also be closed. The alley between Terry Avenue and Ninth Avenue and Pine Street and Olive Way would be closed. All of these street segments would be permanently

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TABLE 4-19

1990: GENERAL TRAFFIC SPEEDS (mph)

	Noon	PM Peak	Peak Hour Difference As Compared To No Action	Percent
Existing	13.2	12.1	1.7	16.4
No Action	11.5	10.4		
Tunnel	11.6	10.6	0.2	+1.9

Source: SED, 1983.

closed. Access to the garage in the Morrison Hotel would be maintained in the case of the closure of the short segment of Jefferson Street. Access to the Courthouse loading dock would be via fourth Avenue. The closure of Terry Avenue between Olive and Pine is necessary for the construction of the north staging area. The City of Seattle has expressed interest in the future construction of a street park over the staging area, possibly along the old Terry Avenue right-of-way. A segment of Jefferson Street between Second and Third avenues would be closed or vacated to construct one of the entrances to the Third Avenue South station. Closing of Jefferson Street on the east side of its intersection with Third Avenue will prohibit vehicular access from Third Avenue to the County Court House south entrance.

Ninth Avenue from Pike Street to Olive Way (two blocks) could be changed from a one-way southbound street to a two-way street to allow carpools to exit from the I-5 reversible roadway to Pike Street and reach Pine Street and Olive Way via Ninth Avenue; and also to allow transit to travel northbound on Ninth Avenue between Pine and Olive.

Mitigating Measure

Access will be maintained from the Fourth Avenue and Jefferson Street intersection.

4.2.7 Accidents

Table 4-20 compares the projected number of accidents for each alternative with existing conditions. The No Action alternative showed an estimated 23 percent increase in the annual number of accidents. The Tunnel option showed a decrease of 15 percent compared to the No Action.

4.2.8 Emergency Vehicles

Third Avenue would continue to serve downtown as a primary response route under the Tunnel alternative. The existing signal preemption system on Third Avenue would help reduce cross-traffic conflicts.

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TABLE 4-20

1990: POTENTIAL NUMBER OF ACCIDENTS
COMPARISON OF PROJECTED ACCIDENT RATES

	Annual Number of Accidents	Percent Change
Existing	1,866	
No Action	2,292	+ 23% Over Existing
Tunnel	1,944	- 15% Compared to No Action

Source: SED, 1983.

Under the Tunnel option, the number of buses would be reduced on surface streets when the full fleet of dual-power buses becomes operational in 1995. This could improve the response time for emergency vehicles. Design, installation and operation of overhead wire would be coordinated with the city fire department.

4.2.9 Pedestrians

Surface street improvements would be included as part of the Tunnel alternative. Sidewalks would be widened to allow better pedestrian access. Consultant analysis of pedestrian flows indicates that average pedestrian Level-of-Service (LOS) would be LOS B or better, with peak periods not exceeding LOS C or D.

The Tunnel option would concentrate pedestrians around the station entrances and exits and reduce them in other CBD areas. Pedestrians would reach the surface at each end of the three stations in the CBD core rather than be dispersed at several transit stops along streets. The Tunnel alternative would increase pedestrian crossings of streets at signalized intersections by those walking to the tunnel station access points. The heaviest pedestrian volumes would occur at Third Avenue and Pine Street, the office core and the three underground stations.

Figure 2-6 shows the general location of planned station entrances. The number of station entrances was influenced by several factors including City employment projections, planned developments, the number of patrons expected to use each station and the distance CBD workers and shoppers would walk to access the tunnel. An effort was made to balance the use of entrances and provide convenient street crossings at the mezzanine levels. At Third Avenue South three entrances are planned, two at the south end and one at the north end. At Third Avenue North three entrances are planned. The platforms and mezzanines connecting these entrances would provide patrons convenient access to the east and west sides of Third Avenue. At Westlake, at least four entrances are planned. One entrance is planned at each end station, with the expectation of additional entrances as the surrounding area develops and/or if air rights development occurs.

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4.2.10 Elderly and Handicapped

Impacts of the preferred alternative on the elderly and handicapped include accessibility to tunnel stations and changes in travel patterns brought about by the concentration of bus routes along the tunnel alignment.

All tunnel stations would be equipped with elevators to bring elderly and handicapped riders from street level down into the stations. All dual-power buses running in the tunnel would be equipped with wheelchair lifts to load passengers directly from the platform. Wheelchair lift operations at tunnel stations and at surface bus stops would be much the same as lift operations today.

The Tunnel alternative would offer greater weather protection than No Action because underground station waiting areas would be enclosed. Direct underground connections may be possible from existing and proposed department stores and office buildings. Such connections would improve accessibility for all riders. Surface street improvements proposed as part of the Tunnel alternative would reduce crowding at surface bus stops, making it easier for the elderly and handicapped to maneuver.

On the negative side, gaining access to a tunnel station would mean that an elderly or handicapped user would likely have to travel farther and take more time to reach a station than before. Under the No Action alternative, bus stops would continue to be located on nearly every block. The walk to a given stop is relatively short. With only five stations in downtown, the average access distance would be more. An elderly or handicapped rider would likely have to ride one of the surface buses to a tunnel station if his or her destination were more than a short distance away.

Transit routes that were once spread over several north-south streets would be concentrated in the tunnel. An elderly or handicapped rider whose existing route runs on a street other than Third Avenue could be faced with a steep climb up or down the east-west streets to reach a destination off Third Avenue.

Mitigating Measures

Where opportunities exist at station access points, building owners would be encouraged to provide elevator access for through-block pedestrian movements. Such connections could provide a convenient route for elderly and handicapped users to get to Second or Fourth avenues without having to negotiate the steep east-west streets.

4.2.11 Parking

The Tunnel Alternative would have both positive and negative impacts on parking in downtown Seattle. On the positive side, construction of the Tunnel would help reduce the need for parking in downtown by providing a convenient alternative to bringing private autos into the CBD. Table 4-17 shows that general auto volumes during the peak hour in downtown would be 28,100 trips in 1990 for the No Action alternative compared to 26,700 trips for the preferred action alternative. At least part of the reduction in peak-hour auto trips in downtown, associated with construction of the project, can be translated into fewer downtown parking spaces needed to serve auto trips.

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Off-street Parking

Off-street parking impacts would be associated with the construction of the station and staging area near the intersection of Ninth Avenue and Pine Street. No parking in the International District would be displaced.

Some long-term, off-street parking for persons working and shopping downtown would be eliminated. For analysis, the number of off-street spaces that would be eliminated in the northeast area of the CBD have been identified based on proposed right-of-way purchases. These parking figures were compared with existing and projected parking supply and demand. The anticipated impacts of the loss of these spaces were identified. The primary sources of parking data were two City of Seattle reports: International District Parking Study, April 1981 and Alternatives to Low Occupancy Vehicle Parking, June 1981. The total number of off-street parking spaces in the entire CBD study area in 1980 was 36,223. Table 4-21 summarizes impacts.

TABLE 4-21

LONG-TERM OFF-STREET PARKING

	No Action	Tunnel
Total spaces eliminated	0	315
Northeast CBD	0	291
Overall International District	0	0

The station and staging area near Ninth and Pine would eliminate 291 off-street spaces. Because of the large number of parking spaces within this downtown zone, even eliminating almost 300 parking spaces would only increase expected parking occupancy rates by 5 to 6 percent in 1995. It is possible that parking could eventually be restored on the site if a structural lid is built over the transit facility.

The DEIS showed a total of 237 off-street parking spaces that would be displaced by the Tunnel alternative in the International District. Since that time preliminary engineering work has identified a new alignment for a bored tunnel instead of a cut-and-cover tunnel in the International District. The revised alignment would mean that no loss of parking would occur as a direct result of construction of the Tunnel alternative in the International District.

On-street parking

Impacts on on-street parking would be different for the peak hour and daily total numbers. The impact on on-street parking would be less during the peak periods 7 to 9 a.m. and 4 to 6 p.m. than the noon hour since peak parking would be already prohibited in many cases. (Tables 4-22 and 4-23)

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TABLE 4-22

LONG-TERM LOSSES
ON-STREET PARKING AND PASSENGER LOAD ZONE

	3rd Avenue both sides Yesler to Pine	Pine Street both sides 3rd to Boren	Pine Street south side 1st to 3rd	9th Avenue east side Pine to Olive	Terry Avenue both sides Pine to Olive	Jefferson St. west of 3rd to alley both sides	Totals
Peak hours	0	22	5	12	18	8	65
Midday	103	42	5	12	18	8	188
Taxi and passenger load zones (net loss)	3	8	4	0	0	0	15

TABLE 4-23

EFFECT OF LONG-TERM ON-STREET PARKING LOSS

	Existing Number of Spaces*	Preferred Alternative Tunnel	
		No. Spaces Lost	Percent Loss
Peak	1140	65	5.7
Midday	1621	188	11.6

*Area bounded by First Avenue, Stewart Street, I-5 and Yesler Way
Total number of on-street spaces in entire CBD study area = 6,325 (1980).

The preferred alternative would remove metered parking on both sides of Third Avenue from Yesler to Pine and on Pine from Third to Boren. The eastbound bus lane on Pine from First Avenue to Third Avenue would remove parking on the south side of Pine in this area. The closing of Terry Avenue between Pine and Olive would remove parking in that one block area. The northbound bus lane on Ninth Avenue between Pine and Olive would remove parking on the east side of Ninth for that block. The pedestrian entrance into the Third Avenue South station would remove eight parking spaces on Jefferson between Third Avenue and the alley to the west.

While no data are currently available on parking use during the noon hour, a 1981 parking meter rate increase study conducted by the Seattle Engineering Department shows that between 3:00 p.m. and 3:30 p.m., approximately 90 percent of on-street parking in downtown is used. This is very close to the practical capacity of the on-street parking system since, as parked vehicles depart, there is a short delay while circulating motorists find and occupy the spaces. As a result, although parking use

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would not significantly increase, there would be a greater tendency for motorists to violate curbspace restrictions as the parking supply/demand ratio decreases.

Table 4-22 also shows the effect of taxi/passenger-load-zone changes. The design for the street improvements on Third Avenue and Pine Street would include combination truck and passenger-load zones. The changes shown in Table 4-22 are the net changes.

4.2.12 Bicycles

Reduced vehicular capacity of surface streets would increase the potential for conflict between bicycles and autos. The Tunnel alternative would reduce the impacts to bicyclists the most because more buses would be removed from surface streets, improving traffic flow.

The width of the curb lane may affect the ease and safety of bicyclists. Consideration would be given to use of Third Avenue by bicycles in the design of the surface improvements. If ventilation gratings were included in the curb lane they would pose potential inconvenience to bicyclists.

4.2.13 Movement of Goods

Eliminating or relocating some truck-loading zones on Third Avenue and Pine Street would affect movement of goods and restrict truck traffic. The use of truck-loading zones on Third Avenue is now prohibited between 4 p.m. and 6 p.m. In some cases some of the delivery zones would be moved further away from where the deliveries are made.

The design for the surface street improvements on Third Avenue and Pine Street would include combination truck/passenger load zones. Table 4-24 shows the net change in the number of zones.

TABLE 4-24

LONG-TERM EFFECT ON TRUCK/PASSENGER-LOAD ZONES

	3rd Yesler/Pine	Pine 3rd/Boren	Pine 1st/3rd	9th Pine/Olive	Terry Pine/Olive	Totals
Truck-Load Zones Lost	-20	-8	-3	-2	-1	34
Combination Truck/Psgr-Load Zones Added	+10	+3	0	0	0	13
Net Loss	10	5	3	2	1	21

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The preferred alternative would have no long-term impact on railroad traffic in the Burlington Northern tunnel (see Chapter 6). For construction impacts on the railroad tunnel, see Section 4.1.2.

Mitigating Measures

Combination loading zones would be established in alternating blocks to reduce the impact of the loss of truck and passenger-loading zones.

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CHAPTER FIVE

ENVIRONMENTAL CONSEQUENCES

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ENVIRONMENTAL CONSEQUENCES

5.1 Land Use

5.2 Economic Activity

5.3 Displacement and Relocation

5.4 Neighborhoods

5.5 Visual and Aesthetic Qualities

5.6 Air Quality

5.7 Noise

5.8 Vibration

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5.10 Water Quality

5.11 Utilities

5.12 Public and Social Services

5.13 Energy

5.14 Soils

5.15 Unavoidable Adverse Impacts

5.16 Relationship between Local Short-Term Uses Of The Environment and the Maintenance of Long-Term Productivity

5.17 Irreversible and Irretrievable Commitments of Resources

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CHAPTER 5

ENVIRONMENTAL CONSEQUENCES

This chapter discusses the environmental impacts of the Third Avenue and Pine Street Tunnel with surface improvements and compares the impacts with existing conditions, the No Action alternative and applicable regulations and policies. The impacts on transportation and circulation are discussed in Chapter 4. Impacts to historic property and parks are discussed in Chapter 6. Except in the few places where the analysis has changed, refer to the draft EIS for analyses of the other alternatives.

Where appropriate, each section discusses the construction and long-term impacts and potential mitigating measures. Many mitigating measures have already been incorporated into the project description, but additional measures are also listed in this chapter. Mitigating measures for beneficial or insignificant impacts are not discussed.

5.1 Land Use

Several land-use plans and policies address transportation issues. This section briefly discusses the consistency between the Downtown Seattle Transit Project and relevant elements of these plans and policies. The section also addresses probable land-use changes if the preferred alternative were selected and, more specifically, components of the alternative which may affect land use.

5.1.1 Consistency with Land-Use Plans and Policies

REGIONAL PLANS

King Subregional Plan, Puget Sound Council of Governments, 1978

This plan guides countywide growth management decisions. The plan points to activity centers as a desirable pattern of growth and identifies transit as helping to ensure their viability. The policies in this document relevant to the Downtown Seattle Transit Project address costs and priorities of transportation improvements.

The Downtown Seattle Transit Project would support the King Subregional Plan by easing traffic congestion in and around one activity center--Seattle's downtown. The Third Avenue tunnel alternative in the Downtown Seattle Transit Project would aid in increasing downtown's employment and residential population and would reinforce the activity center concept. The No Action alternative, by leaving downtown more congested, would not be as compatible with the development pattern in this plan.

King Subregional Transportation Plan, Puget Sound Council of Governments, 1981

This 20-year transportation plan reaffirms the goals and policies of the 1978 general King Subregional Plan. The plan confirms the activity center approach to land-use planning and emphasizes the need to have transit reinforce desired patterns and achieve certain peak-hour levels of service to serve commuter needs.

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The Third Avenue Tunnel with surface improvements would be consistent with this plan. By orienting transit service to activity centers, the preferred alternative would reinforce a desired pattern of growth for Seattle's downtown.

COUNTY PLANS

Both the existing and proposed comprehensive plans for King County provide policy guidance for the Downtown Seattle Transit Project. The existing plan has guided development since its adoption in 1964, but a new plan is currently under consideration by the County Council. It is likely that a new comprehensive plan would be in effect by the time construction of the preferred alternative could begin.

Existing Comprehensive Plan for King County, 1964. 1975 Supplement

This is the first comprehensive plan for King County, and it is being updated (see King County General Development Guide). The plan's general transportation policies call for coordinating the transportation system with federal, state, regional and local agencies and scaling all parts of the system to their designated function in conformance with density, total population and land-use requirements.

The action alternatives in the Downtown Seattle Transit Project would be consistent with this plan. The alternatives would be aimed at serving future downtown employment growth and responding to local and regional land-use planning.

Proposed King County Comprehensive Plan - 1985, October, 1984

The comprehensive plan states that transportation facilities and services should be provided at levels to support growth and development planned for urban, growth reserve and rural areas. Facilities and service should be designed to minimize air, water and noise pollution, and disruption of natural surface water drainage.

Transit stations should include safe, convenient pedestrian and bicycle access that would minimize conflicts with motor vehicles. The plan calls for developing local or internal circulator services to serve riders within the downtown. Transit routes should minimize the number of transfers needed by most riders.

The preferred alternative in the Downtown Seattle Transit Project would be consistent with this plan. It would improve or maintain air and water quality and natural surface water drainage and reduce noise compared with existing conditions. Circulation within downtown would be supported by local routes and by an independent circulator system.

METRO PLANS

Metro Transit: More Mobility for the Eighties, Metro Transition Phase IV Technical Report, Draft Final Report, 1980

This 10-year plan provides Metro with flexible guidelines by laying out transit objectives for it to pursue. MetroTRANSITion identified the Seattle CBD congestion as a primary regional transit problem.

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The preferred alternative would be consistent with the plan's objectives. The Downtown Seattle Transit Project implements the 1990 Plan.

The Mid-Range Program: Establishing Priorities Within the 1990 Plan, 1982

This 10-year plan establishes priorities for the service expansion proposals identified in the 1990 Plan. The plan delays construction of a tunnel and incorporates it into a longer-term CBD solution.

The Downtown Seattle Transit Project alternatives would be compatible with the objectives for the Mid-Range Program. While the Mid-Range Program proposes enhancing the "metropolitan environment" and "passenger amenities," the Downtown Seattle Transit Project objectives would be more specific regarding urban design appealing to pedestrians and riders.

CITY OF SEATTLE PLANS

Seattle 2000 Commission Report, 1973

The Seattle 2000 Commission Report defines citizen goals for the city by the year 2000. The report was adopted by the City Council and the Mayor. Concerning the Downtown Seattle Land Use and Transportation Project, the main goal was to retain downtown as the preeminent regional activity center and to have transit support this goal by becoming the principal transportation mode. This would, in turn, encourage more pedestrian and bicycle travel and make downtown a more attractive place to live.

The preferred alternative would be consistent with the Seattle 2000 Commission goal, providing sufficient transit capacity for a larger downtown population.

Land Use and Transportation Plan for Downtown Seattle, 1984

The plan builds on the ideas expressed in the Seattle 2000 Commission Report to formulate a new downtown land-use and transportation plan for Seattle and on Seattle City Council Resolution 27027, adopted October 1983. Resolution 27027 notes city approval of an electric-only tunnel, a Third Avenue tunnel alignment, an adequate electric internal circulation system and confirmation of dual-power or other electric technology operation in the tunnel. The framework elements of the land-use and transportation plan incorporating these improvements was adopted by City Council September 1984. Plan objectives include expansion and intensification of the office core and a larger resident population in the downtown, and an expanded transit capacity both to, from and within downtown to accommodate the need created by these groups. The plan contains specific policies and guidelines on the development of an electric-only transit circulation system and associated regional transit connections as contained in the preferred alternative. The transit project preferred alternative would be both consistent with the downtown plan and supportive of its implementation.

The preferred alternative shares objectives set forth in the downtown plan, and includes the electric-only tunnel with surface improvements and a circulation system as one of its alternatives. The Metro and City Councils have endorsed the electric bus tunnel as the preferred alternative. This preferred alternative includes

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a package of surface improvements to facilitate access to transit stations and surface transit service. Although some expansion to the downtown surface circulation system would be a part of all the alternatives under consideration, a base circulation system has been recommended as an element of the preferred alternative.

5.1.2 Land Use Impacts

Direct land-use impacts resulting from implementation of the action alternatives would be street closures, removal of property from the tax rolls and possible preemption of future development according to plans at transit station sites and along the tunnel alignment. Indirect land-use impacts could take place in areas surrounding transit stations. Possible indirect impacts could be changes in the rate, type, scale and timing of future (planned) commercial and housing development.

In a separate process the City of Seattle has prepared a land-use and transportation plan for downtown and a final EIS. Future development scenarios were modeled with and without the transit tunnel. This analysis is presented in the LUTP final EIS. The major difference without the tunnel was reduced employment in the year 2000. No major overall difference in employment is forecasted for 1990.

City of Seattle plans and zoning have identified the area within the International District bounded by Yesler Way, Main Street and Fourth and Fifth avenues for housing, small retail shops or office space. A subterranean easement would be required on a portion of the block south of Washington Street between Fourth and Fifth avenues. The above action would not preempt the development of housing and small retail or office space for this property, but location of the tunnel under this property would be something future developers would have to take into consideration. The area within the Union Station corridor not required for project right-of-way could be developed as planned or zoned. Areas east and west of the Union Station corridor could experience pressures for development.

A transit station and staging area would be built at the Union Station site bounded by Jackson Street, Airport Way South, Fourth and Fifth Avenues South. The project would improve a currently inactive railroad yard. During construction, the above section would result in at least temporarily preempting the development of office, commercial and other uses for this property. The area on the site not required for project right-of-way and transit station operations could be developed as planned and zoned.

Metro would consider development requirements in the design of the transit stations and alignments to the extend it is compatible with future transportation purposes.

Construction on the site could increase development costs because of the increased complexity of construction above the active transit operation.

Metro would provide a lid above the Union Station transit site from Fourth Avenue South to Fifth Avenue South and from Airport Way to approximately 60 feet from the Union Station building. At a minimum it would be capable of supporting parking, but it is Metro's and the City's intent that working with private property owners the lid would be developed to accommodate more intensive development. Uses above the lid would conform with City of Seattle land use and zoning policies.

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A transit roadway would be built north of Union Station east of the Downtowner Apartments in the block bounded by Main Street, Jackson Street, Fourth Avenue South and Fifth Avenue South. The project would improve a currently inactive railroad track right-of-way. During construction the above action would result in at least temporarily preempting the development of office, commercial and other uses at this property. Future development costs could be higher because of the increased complexity of construction above an active transit roadway. Possible increased costs could affect the rate, type, scale and timing of future developments.

Metro and the City would work with property owners and/or developers during the property acquisition and project design phases to allow for foundations and/or lids to facilitate future development next to the Downtowner Apartments and Ninth and Pine consistent with official transit operations.

The City is considering a comprehensive process to produce a development plan and implementation strategy for the Union Station corridor. This proposal for a community development program in the Union Station corridor is contained in the Mayor's Recommended Land Use and Transportation Plan for Downtown Seattle, May 1984. The proposal is scheduled for adoption by the City Council by mid-1985.

The Ninth and Pine station would be located in the northeast portion of downtown bounded by Pine Street, Olive Way, Boren and Ninth avenues. The station would displace existing commercial, residential, office and parking uses and reconfigure the I-5 Pine Street ramp. The action would temporarily preempt the development of office, commercial and other uses until the project is complete. Future development of other uses above the site could face increased development costs because of the increased complexity of construction above the transit station and staging areas. Possible increased costs could affect the rate, type, scale and timing of future development.

All acquisitions would result in at least temporarily removing property from the tax rolls (see Section 5.3: Displacement and Relocation). Indirect impacts in areas adjacent to stations could include a change in the rate, type, scale and timing of commercial and housing development.

All alternatives would require right-of-way space through the Union Station corridor and the area east of the Downtowner Apartments.

The Third and Pine Tunnel option would widen sidewalks on Third Avenue and Pine Street. Overall land-use and development patterns would not change based on the findings of the City's final EIS for the downtown plan. However, the magnitude of development is likely to be larger with the removal of the transportation constraint.

The tunnel is within the draft LUTP's High Capacity Transit Corridor and would add road capacity in downtown for all surface transportation modes, facilitating urban growth.

Land acquired for the Ninth and Pine station would also require the closure of Terry Avenue between Pine and Olive streets. Easements under a portion of the Vance parking lot along Pine street as well as the parking lot at the northeast corner of Eighth and Pine would also be acquired. The area at Ninth and Pine would have a small increase in street-level retail facilities.

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Construction staging areas would be located in the Westlake Street right-of-way south of Pine Street, Union Station and the Ninth and Pine site for a bored tunnel. Construction staging at these sites could be as long as three years.

5.1.3 Mitigating Measures

Metro and the City would coordinate with the International District Special Review Board and the Pioneer Square Preservation Board, community residents and special interest groups on the design of the transit roadway through the Union Station corridor and along the project alignment.

Metro and the City would work with property owners and tenants to mitigate impacts during construction and long-term operation of the transit system.

It is Metro's intention to purchase property sufficient to satisfy the needs of the transit system, however, any land or air rights not necessary for transit could be leased or sold for development. Metro and the City would encourage joint use above transit facilities to return the properties to the tax rolls, optimize use of the land, and complement surrounding area development consistent with City planning and zoning policies. Should a joint use plan arise, the specific project could be addressed in a separate environmental process.

In addition to these approaches to mitigate land-use impacts, impacts and mitigating measures are described in other sections of this EIS for other environmental elements which would affect land use (air quality, noise, vehicle and pedestrian circulation, historic preservation, recreation, aethetics, housing, etc.).

5.2 Economic Activity

This section addresses the impacts to the CBD businesses during the construction and operation of the action alternatives. The discussion of impacts is based on the Cost Effectiveness and Economics Technical Report. Capital costs and operating and maintenance costs are addressed in Chapter 7.

5.2.1 Construction Impacts

In a survey of street-level businesses along Third Avenue and Pine Street, adverse effects during the project's construction were a primary concern. Although the construction impacts to street-level businesses would be similar for all action alternatives, the duration of construction-induced disruption would vary. Proposed alternatives for constructing the Metro Council's preferred alternative are described in Chapter 2.

Surface improvements would include widening sidewalks, resurfacing of Third Avenue and Pine Street and substantial landscaping. While these improvements would greatly enhance their form and function, the construction would take approximately 23 weeks per block. Total construction would take between 74 and 94 weeks.

Alternative traffic reroutes, impacts and mitigating measures are described in Chapter 4. One of the routing schemes would only permit construction and emergency vehicles on the affected street during construction. Pedestrian and

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vehicle travel and shopping would be disrupted in affected blocks. Merchandise delivery and pickup would also be less convenient due to the temporary disruption and relocation of loading zones. These impacts would be reduced by committing to several construction approaches: (1) pedestrian access would be maintained via temporary sidewalks except perhaps during sidewalk paving; and (2) construction would begin in the retail core in January and February to minimize impacts during the holiday shopping season.

Construction would disrupt small convenience stores more than large department stores. Small convenience stores rely on walk-in customers and small specialty shops rely on window sales and impulse customers. Also, businesses that depend heavily on pickup and delivery of large, bulky merchandise would be at least temporarily affected. Least affected businesses include specialty shops with unique merchandise that do not require pickup and delivery. Businesses located in the same building but not at street level could have similar impacts.

Studies of transit mall projects indicate that construction impacts are not always adverse. Although a survey revealed that about half the businesses along the mall in Vancouver, British Columbia, suffered some decline in business during construction, the construction of a mall in Portland, Oregon, did not significantly lower sales or cause business failures. The Portland retail community was concerned that the construction period would be detrimental to retail sales and would close some businesses in the CBD. In fact, the zone containing the transit mall had a net increase of five firms during the construction period. While the increase cannot be attributed to the mall, the figures indicate that the mall construction did not reduce the number of firms in the CBD. Consultants associated with the Portland project confirmed that the construction-period impacts were not significant.

Although the tunnel alternative does not include a surface transit mall, the construction required for the proposed surface improvements would be similar to that required for a mall or any other major street reconstruction for the bored segments of the tunnel, the most significant construction impacts would probably occur while the surface improvements were being made, so impacts to retail activity would be expected. Cut-and-cover construction of the stations and the Pine Street tunnel segment would produce similar impacts to mall or surface improvement construction but for a longer period.

5.2.2 Mitigating Measures

The impacts on retail sales would depend on the specific construction techniques used and the length of the construction period. Utility interruptions and change-overs could be scheduled during non-business hours. Specific construction practices that would reduce the impact on businesses include:

- Reducing noise and dust near convenience stores, specialty shops and service stores.
- Adhering rigorously to scheduling so that merchants could plan sales and other retail events around the construction.
- Using information programs to highlight alternate street approaches and parking locations.

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- o Use access ramps and bridges to keep business entrances open during construction.

- o Coordinate the temporary relocation of loading zones during construction to help ensure that all business delivery entrances are less than one block away from the relocated loading zones.

- o Minimize impacts on the retail core during the Christmas holiday shopping season.

- o Provide attractive, well-lighted walkways, barriers and other temporary construction in downtown to minimize confusion on the part of shoppers trying to get around during construction.

5.2.3 Long-Term Impacts

The analysis of the project's economic impacts presumes that inaccessibility to the CBD would limit employment and retail sales growth. As noted in chapters 1 and 3, transit service would have to be improved to serve the planned employment growth. Although each action alternative would provide the transit capacity to meet the potential 1990 ridership, the quality of the transit service may affect the number of riders attracted.

The greatest difference in economic impacts would be between the No Action and the action alternatives. All the tunnel alternatives would provide sufficient transit capacity to meet PSCOG 1990 employment forecasts. The action options differ in their potential for joint use, the perception of public commitment to enhancing the downtown area and the locations of transit access facilities.

Third Avenue and Pine Street traverse an area rated as highly susceptible to redevelopment for office, retail and hotel uses. Surface improvements would support City of Seattle's policies to encourage office and retail development by providing more efficient transit service on an attractive street for employees and clients.

The potentially adverse effects on businesses would be reduced curbside access for delivery and pickup of merchandise and the loss of street parking.

There could be underground connections to buildings abutting the stations. Such connections would also provide convenient access and protection from inclement weather. This would benefit office- and retail-oriented buildings.

A station at the Ninth and Pine site could support both office and retail development. In addition to the convenient auto access to the area, land values are currently somewhat lower than in other areas of the downtown core and City plans favor development in this area. The Union Station area is presently rated medium to low susceptibility to office, hotel and retail development. A station in this area may stimulate development. According to the City's proposed downtown Land Use and Transportation Plan, development would be guided by the special use districts in the area: Pioneer Square, the International District and the Union Station corridor.

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Pedestrians using the Westlake Station would further enhance a retail area that is already well-established.

Significant established office uses exist near the Third Avenue stations. Providing easy access for office workers and customers would strengthen the value of the surrounding area.

Joint Use

In the context of this project, joint use refers to the location of transit station access in existing or proposed developments or the provision for construction of private development above the transit facility. Joint use of property on which transit facilities are located would be permitted only after construction and operational needs of the project are met. Possible benefits include improved pedestrian access, relief of sidewalk congestion, increased ridership and rider amenities and return of the sites to the tax rolls. Although joint use is not considered part of this project, it could eventually occur at any of the station locations.

Detailed analysis of the joint use at each site would take place once specific station sites have been approved and an implementation plan adopted. Should a joint use plan arise, resulting in additional development, the specific project would be addressed in a separate environmental process.

Tax Revenue

Tax revenue would increase to the extent that improved access would enhance CBD employment and retail growth. Property tax revenue due to higher land value and more development would increase and business and occupation (B&O) tax revenue would be generated by a growth in economic activity.

All the alternatives would displace a few businesses due to the transit connection to the I-5/I-90 ramps. The Tunnel alternative would also displace businesses and residences for the stations and alignment resulting in decreased property and B&O tax revenue during construction and possibly over the long term. (See Section 5.3 for a more extensive discussion of displacement and relocation.)

5.3 Displacement and Relocation

The preferred alternative could displace as many as 36 businesses and 18 residents, depending on the construction approach and amount of surface disruption.

The following discussion of impacts is based on the Downtown Seattle Transit Project Technical Report Displacement, Relocation and Neighborhood Impact and the Metro Relocation Program Plan. Displacement of on-street parking is discussed in Chapter 4. Off-street parking is discussed in this section as a business. A warehouse at Terry Avenue and Olive Street contains 15 fine arts and crafts enterprises and four of the artists live there. The housing displacement of the four artists is considered as directly related to their business displacement.

Table 5-1 identifies the number of housing units displaced by the Tunnel alternative at the Best Apartments; Table 5-2 identifies probable housing unit replacement

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requirements for the Third Avenue Tunnel alternative at the Best Apartments; and Tables 5-3 and 5-4 summarize business displacement.

TABLE 5-1

CHARACTERISTICS OF UNITS IN BEST APARTMENTS (1603 Terry Street)[1]

Item	Number
Total Units	16
Type of Unit	
1 Bedroom	4
Studio	12
Occupied Units Number	
Total	10
1 Bedroom	4
Studio	6

[1] Represents estimate of housing unit replacement requirements for current residents.

Source: Metro Relocation Program Plan, Patricia Chemnick, 1984.

TABLE 5-2

PROBABLE HOUSING UNIT RELOCATION REQUIREMENTS FOR PREFERRED TUNNEL ALTERNATIVE AT THE BEST APARTMENTS

Income Level	Studio	1 Bedroom	Total
Under $5,000/year	4	4	8
$5,000 - $9,999/year	2	2	4
$10,000 - $15,000/year	0	2	2
Total Population	6	8	14
Total Units Occupied	6	4	10
Total Units Needed	10	2	12

Source: Metro Relocation Program Plan, Patricia Chemnick, 1984.

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TABLE 5-3

INVENTORY OF BUSINESS
CURRENTLY ON SITES

Northern Site

Business		Type	Size[1]	Employees	Minority/ Women Owned
1.	Brocklinds, Inc.**	Retail/mfg.	Medium	12	
2.	Bruce Kaplan Parking	Parking Lot	Small	0	
3.	E&E Meats**	Wholesale Meats	Large	38	
4.	Group Health Cooperative Health Promotion & Fitness Center)**	Service	Large	222[2]	
5.	Group Health Cooperative Community Health Services[2]	Service	Large	80	
6.	912 Pine Street	Steambath Club	Small		
7.	Spags Tavern*	Tavern	Small	4	
8.	System Parking, Inc.	Parking	Small	1/4	
9.	The Clock Restaurant	Restaurant	Medium	28	
10.	Vance Car Parks**	Parking	Small	1/6	
11.	Warehouse Artists (15)[3]	Fine Arts	Small	22	6 (of 15)
12.	Yuen Lui[4]	Photography	Medium		X
13.	Gerald Kumata & Assoc.	Architects	Small	5	X
14.	Ange's French Cleaners	Dry Cleaning	Small	4	

Westlake Station:

15.	Shelly's Tall Fashions	Retail	Small	5	
16.	B. Dalton Booksellers	Retail	Medium	16	
17.	The Workout**	Aerobics Studio	Small	4	X
18.	Salon Cardeau**	Hair & Suntan Salon	Small	4	
19.	Allen's 5th Ave. Jewelers	Retail	Small	4	
20.	La Petite Boulangerie**	Retail Bakery	Medium	12	
21.	Lindy's Shoes	Retail	Medium	12	

Source: On-site survey, September, 1984 - March, 1985; Survey of Business and Telephone interviews September, 1984 - March, 1985

* Indicates businesses with some significance to downtown community.

** Indicates: (1) potential difficulty in finding suitable alternate site, or (2) special moving needs.

1 Small business are defined as having less than 10 employees and medium businesses have 10-20 employees. SBA only defines small as not dominant in its field; has a net worth of less than $6 million; and average income after taxes of two years of less than $2 million.

2 Many employees are part-time teachers, some with only one class.

3 See Table 5-4 for details on these businesses.

4 This business was contacted several times by mail and telephone, but refused to provide information.

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TABLE 5-4

SUMMARY OF POSSIBLE
BUSINESS DISPLACEMENT
CHARACTERISTICS

Characteristic	Northern Site	Westlake Site	Total
Business Type			
Parking	3	0	3
Retail	2	5	7
Restaurant	2	0	2
Service	6	2	8
Artists	15	--	15
Total	28	7	35
Parking spaces	232	0	232
Business Size			
Small	23	4	27
Medium	3	3	6
Large	2	0	2
Number of Employees	416	57	473
Minority/Woman-owned Enterprise	8	1	9
Cost/Square Foot (range)	$2.50 - 15.00	$10.00 - 30.00	$2.50 - 30.00
Gross Annual Sales (total for site - est.)	$13,902,000	$2,450,000	$16,352,000
Years in Business	1-78 years	1-18 years	
Years at Present Site (range)	1-53 years	1-18 years	

Source: Survey of Businesses, September, 1984 - March, 1985.

5.3.1 Resident Displacement and Relocation Requirements

The preferred alternative would require the relocation of 14 individuals now residing in 10 units at the Best Apartments.

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There would be enough available housing units to meet the needs of displaced residents. According to recent studies conducted by the City of Seattle (LUTP, 1983), however, the existing shortage of low- and moderate-income housing is likely to worsen given downtown economic trends. These individuals could be relocated to existing housing supply without significantly diminishing the supply of units for other low-income persons (see technical report: Displacement Relocation, and Neighborhood Impacts). The City of Seattle recently completed a survey of 110 downtown buildings. The results indicated a low vacancy rate in subsidized housing and in units with one or more bedroom. Vacancy rates were 8.8 percent for SRO hotels.

These apartment buildings house individuals who tend to be temporary residents. Attempts were made through census information to determine the characteristics of the residents.

Census information in the census blocks which included the Best Apartments indicates that 16 percent of the 340 census block residents are 65 years of age or older. Six percent of this population are Black and 44 percent are defined as "all other." Twelve percent of the block population are classified as below the poverty level; the larger census tract indicates that $8,314 is the median income of these residents. While the percentage of handicapped individuals and the percentage of autoless households are not available at the block level, the percentage of handicapped persons at the larger tract level is 17.2 percent and the tract level percentage of autoless households is 62.9 percent.

While low-income housing opportunities are shrinking in downtown Seattle, there would be sufficient housing to meet the needs of the individuals displaced by the project alternatives (see project technical report, Draft Relocation Plan and Displacement Impacts Assessment). This study found that at the end of 1984, approximately 275 units would be available in the downtown. Of these 56 were a part of a program to subsidize low-income residents. There also appears to be ample units for each category of housing need, i.e. by number of bedrooms needed although there may be a possible need for a two-bedroom unit. No information exists on the availability of two-bedroom units in the downtown.

Some of the people displaced in the preferred alternative would not qualify for public housing. While there would be an adequate supply of privately-owned buildings, individuals may need added assistance in locating comparable units and overcoming possible discrimination. Such assistance would be offered by qualified relocation personnel sensitive to the needs of these individuals.

5.3.2 Other Property Acquisition

In assessing the relocation and displacement impact of the preferred alternative, all businesses that could possibly be affected have been identified (Table 5-3). Further engineering would be required to define the specific impact of tunnel construction on surface properties. Some businesses identified may not need to be displaced. Other displaced businesses may not be permanently displaced but could return once construction was completed.

Property on Fourth Avenue South and Fifth Avenue South would have to be acquired between Jackson Street South and Main Street South. The railroad tracks would be removed. Easements under properties on the block bounded by South Main Street,

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South Washington Street, Fourth Avenue South and Fifth Avenue South and under the Tashiro and Kaplan buildings are required.

At Westlake a subsurface easement through the northwest corner of the block between Third and Fourth avenues and Pine and Pike streets would be necessary.

At Ninth and Pine, the I-5 off-ramp would be converted to transit-only and HOV use and the I-5 limited access area would be acquired. Terry Avenue between Pine Street and Olive Way would be closed to traffic. A station would be constructed at Ninth and Pine. This requires acquisition of property on the two blocks bounded by Ninth Avenue, Pine Street, Boren Avenue and Olive Way and under the two parking lots on the northside of Pine Street between Eighth and Ninth avenues. This would have the direct impact of removing, in addition to the Best Apartments, 28 businesses including off-street parking at the Vance Car Parks and System Parking, Inc.

For the Tunnel option, pedestrian access to the surface would be required. Access could be in building setbacks or as an easement through abutting buildings. Stations would be located between Cherry and Jefferson streets, Union and Seneca streets, and Fourth and Sixth avenues on Pine Street. A partial street closure or vacation would be required on Jefferson, west of Third Avenue. At the Westlake station, pedestrian access could be through existing retail stores or through station entrances in buildings acquired for this purpose.

In summary, the total residential caseload for this project includes 14 low-income apartment residents and 4 artists living in their studios. Ten of the 14 low-income residents are over 60 years of age. Given the unique characteristics of residents and housing stock in downtown Seattle, the residential relocation assistance offered by this project would be more extensive than usual, requiring personnel skilled in carrying out sensitive relocations.

The total potential business caseload is 35 businesses (28 at the northern site and 7 at the Westlake site). Nine of the 35 businesses are minority or women owned and, therefore, could have unusual replacment needs, requiring extra technical assistance and/or expense.

In some cases station access is being planned in conjunction with property owner redevelopment or development of the site.

5.3.3 Mitigating Measures

A relocation assistance program would be implemented to assist displaced businesses and residents. Sufficient relocation personnel, experienced in both residential and business relocations, would be assigned to this project. These relocation agents would explain and identify all relocation alternatives to the people being displaced from residences and businesses. This would be done under guidelines set forth in Public Law 91-646, The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended, and the regulations of the Urban Mass Transportation Administration as defined in the circular, UMTA CA4530.1, dated March 21, 1978. These duties may also include assisting displaced persons to complete forms required by lending institutions, the Small Business Administration and others in connection with the lease and purchase of new premises. Assistance

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would also be rendered in preparing and filing reimbursement claims after relocation has been completed. Metro would purchase all acquisitions at fair market value. Appendix M outlines the relocation procedures.

Metro would contribute to the City housing funds in an amount approximating the costs of replacing 16 low income housing units lost at the Best Apartments.

A public information and notification system would also be developed and implemented to keep the public informed.

5.4 Neighborhoods

This section addresses the concerns, issues and perceptions of the Downtown Seattle Transit Project on the three most affected neighborhoods. Construction and operational impacts on neighborhoods are also discussed in other EIS sections. Neighborhoods other than those specified here may also be affected to some degree by construction and operation of the project. This section is organized according to community or neighborhoods rather than project alternatives and designed to inform the reader of interests and apprehensions of the communities affected by the project. Section 5.3 provides specific information on property and businesses which would be acquired. Other specific environmental impacts and mitigating measures are discussed throughout ths EIS.

This discussion is based on Metro and City of Seattle public meetings with community groups, businesses, service providers and individuals. Metro, the City of Seattle and their consultants also conducted the following surveys: The Third Avenue and Pine Street Tenant Questionnaire, The International District Survey, the Service Provider Survey and the Community Questionnaire.

The main communities or neighborhoods affected by the project would be the southeastern portion of the Cascade community, the downtown business community on Third Avenue and Pine Street, businesses and residential tenants near those streets and the International District. The project's impacts would include displacement from job or residence, disruption of normal activity patterns, business loss, economic gain, construction noise and dust, safety, traffic revisions and congestion.

5.4.1 Third Avenue and Pine Street Business Community

One hundred and thirty-six of 181 ground-floor business tenants along Third Avenue and Pine Street completed Metro's survey. At the time of the survey, 69 percent of the participants were aware of the project.

Businesses were concerned about delivery and loading restrictions during construction and operation of a transit mall. Also, access and visibility to customers was identified as an issue. Some businesses indicated that the project would benefit downtown business.

The survey indicated that currently parking, goods delivery and street appearance were the greatest problems. The survey also indicated that, at present, sidewalk congestion, noise and passenger drop-off were minor problems. Businesses noted that 57 percent of their customers were transit-oriented and 38 percent were pedestrians (ref. Third Avenue and Pine Street Tenant Questionnaire and Responses,

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January - April 1983, Metro). Businesses also complained about loiterers and street people.

Several persons surveyed indicated they had seen similar projects in other cities and some felt that the projects enhanced business while others felt the projects were detrimental.

5.4.2 Cascade Community

This area is located northeast of downtown (see Figure 3.2). The community is in slow transition. Several large new office buildings have been constructed in the area's southern and western sections, and the Washington State Convention and Trade Center is proposed for the southeast corner of the community.

The preferred alternative would displace some residents, housing or businesses from the area as indicated in Section 5.3, Displacement and Relocation. There would be traffic revisions, and Pine Street at I-5 would serve as the tunnel entry and exit. The station at Pine Street would require the area bounded by Olive Way, Boren Avenue, I-5, Pine Street and Ninth Avenue.

The community generally perceives the project as a threat to the area's livability. Some individuals felt the project would force more people to leave the area. Residents also felt that the project would increase the number of suburbanites driving into and through the community, and the transit center environs would introduce drifters into the neighborhood, which would affect the community's mobility and sense of security. The major concern is that the project would attract large scale private development, displacing residents and requiring them to move to areas which they cannot afford, which lack services or where they may feel unwelcome.

5.4.3 International District

This area is located southeast of downtown (see Figure 3.2). The area is a blend of Asian cultures and provides a market place for commercial and business activities while it maintains and enhances a residential community. The International District residents, businesses and neighborhood services exhibit a cohesive bond which help preserve and enhance this regional resource.

The transit-only link to I-90 through the Union Station corridor would require construction along the western boundary of the International District. Use of this area would not require removing businesses, except there could be an impact to the loading dock of a distribution center.

The community perceives that an increase in crime, security problems, parking shortage, land speculation and expansion of the CBD into the International District would occur. The community cited potential economic opportunities as the project's only positive impact.

The community is very concerned about parking. The community is also concerned that a station would encourage people to use the International District as a park-and-ride lot. This could affect some businesses and result in further congestion and security problems.

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The Tunnel alternative would require staging areas in the Union Station site for buses. Presently, International District streets near both locations are used for this purpose. Residents are aware of exhaust emissions, noise and odor generated by the existing situation and do not want diesel buses on International District streets. Electric buses entering a tunnel would stage below street level. Local routes would continue to stage at street level.

Another concern is the visual impact of the proposed facility on the International District. The district has worked at promoting good urban design in defining its neighborhood character and maintaining its diverse cultural heritage. The development of transit stations and the transit corridor are intended to promote and enhance the district.

A major concern is land speculation within the district. The district could lose its character resulting in unmet community goals and possibly displacing neighborhood businesses and residents.

The community has not identified a preferred alternative nor objected to the project. The International District Review Board and Inter-Im have commented on the draft EIS (Chapter 7).

5.4.4 Mitigating Measures

A public information and notification program would inform area residents and tenants about traffic revisions. Temporary travel corridors to facilitate pedestrian movements to and through the area would be maintained and temporary traffic signals and signs introduced to maintain travel patterns.

Security features would be incorporated into station design including closed circuit television to alleviate concerns about safety at transit centers and tunnel stations. If necessary increased security provided by adding security personnel by Metro and the Seattle Police Department could also alleviate concerns about safety at transit centers and tunnel stations.

5.5 Visual and Aesthetic Qualities

5.5.1 Construction Impacts

The visual and aesthetic disruption resulting from construction would be short-term for all alternatives. The potential impacts would include more dust and mud on streets and temporary pedestrian walkways and street signs. Construction vehicles and increased congestion would aggravate the problem.

5.5.2 Mitigating Measures

Construction impacts would be unavoidable and temporary. The mitigation of airborne dust is discussed in Section 5.6: Air Quality.

5.5.3 Long-term Impacts

The Third Avenue Tunnel alternative would include surface improvements along Third Avenue from Yesler Way to Pine Street and along Pine Street from Third

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Avenue to Boren Avenue. The surface improvements include a comprehensive program of street treatments including locating street furniture, bus shelters, vending equipment, trees, planters, alarm boxes, hydrants, rebuilding streets and sidewalks, widening sidewalks, improving pedestrian movement and upgrading utilities.

The Project would unify the existing streetscape and clearly identify a transit focus integrated with a pedestrian space. The sidewalks would be widened which would reduce the feeling of pedestrian congestion. The specific street amenities selected for the final design, such as street-paving bricks, bus shelters, signage and vegetation would remain consistent in scale throughout the project. Movement patterns would not change although fewer buses on the street could allow smoother traffic flow.

The addition of the transit station and staging area at the Union Station site would replace the inactive rail yard below the surrounding streets with active transit operations and covered platforms. a street level covered entrance would be provided at Jackson Street east of the Union Station building. The existing depressed site would be maintained with the exception of the station entrance and the lid which would cover the majority of the site. This lid would be located at or near street level.

A transit roadway would be built north of Union Station east of the Downtowner Apartments in the block bounded by Main Street, Jackson Street, Fourth Avenue South and Fifth Avenue South. The busway would replace the inactive rail tracks and the abandoned rail portal located below the surrounding streets and uses with an active transit operation. The existing depressed below street level floor of the site and open cut would be maintained. Unlike the transit station to the south, the bus alignment would not be lidded.

The Ninth and Pine station would be located in the northeast portion of downtown bounded by Pine Street, Olive Way, Boren and Ninth Avenues. The station and staging area would displace existing commercial, residential, office and parking uses and reconfigure the I-5 Pine Street ramp. The site would be lowered several feet below surrounding streets and an active transit operation would be developed. Covered platforms, staging lanes for 30 or more buses and ingress/egress ramps would be constructed. An entrance would be provided at Ninth and Pine street level with a mezzanine providing connectors to platforms.

Materials to be used, location of transit facility and sidewalk elements and selection of construction methods would be chosen to contribute to building and street settings and guidelines with designs compatible with the character and mood of the surrounding settings.

There would be fewer buses on the streets and smoother vehicle traffic patterns.

As with all elements, the scale of the project would not significantly alter or reduce views of the city or the existing skyline or increase the overall light and glare.

Metro would provide a lid above a majority of the Union Station transit site. Landscaping of the Union Station transit facilities and the lid would be considered by Metro during the design of the station.

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The Ninth and Pine Station area could be open or lidded. If not lidded, extensive site landscaping, screening and buffering treatments would be provided during station development to improve the appearance of the site to surrounding residential and other uses.

The busway alignment adjacent to the Downtowner Apartments between Main and Jackson Streets would be landscaped.

5.5.4 Mitigating Measures

There would be the increased concentration of pedestrians in the immediate vicinity of the station access points. The concentration of pedestrians would be dispersed through clearly identifiable pedestrian entrances and pathways such as escalators.

The surface improvements design would include criteria to enhance the recognition and visibility of the transit system and minimize patron confusion and hazard within it.

Materials to be used, location of various street and sidewalk elements, and selection of construction methods would be chosen to contribute to building and street settings and guided with designs compatible with the character and mood of the setting.

Additional overhead wiring would be required under all action alternatives. Whenever possible, wiring would be attached to buildings or to poles that are also being used for other things like street lighting to reduce unnecessary additional elements. In other cases use would be made of existing wiring.

The ventilation stacks could occur in the street, sidewalk or in buildings as discussed in Section 5.6. Ventilation stacks would be less noticeable when located within existing structures. If this is not possible at all locations, the stacks would be integrated into the existing streetscape.

During the design process, Metro would ensure that the project adheres to the principals set forth in the preliminary design phases and discussed above, i.e. the treatment would be of an appropriate scale and integrated into the existing street patterns.

5.6 Air Quality

This section addresses construction and long-term air quality impacts and mitigating measures. Appropriate regulated pollutants were evaluated quantitatively. The results indicate only minor differences between the action alternatives and No Action. Pollutant standards would not be violated regardless of the alternative selected. Little change would occur primarily because general traffic, not transit, produces most vehicle emissions. The air quality benefit would be small because this project would reduce general traffic only slightly compared with No Action.

The particulate matter analysis focused on diesel exhaust and found a minimal increase in particle concentration compared with the standards. Qualitative evaluation of potential odor impacts indicates that No Action would produce more

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diesel exhaust odors in the CBD than existing conditions; the Tunnel alternative would produce less diesel exhaust odors than today.

5.6.1 Construction Impacts

Construction would produce direct and indirect air quality impacts. The direct impacts would be due to exhaust emissions from heavy-duty construction trucks and construction equipment replacing pavement and excavation that usually generate substantial dust. The exhaust emissions would be insignificant compared with emissions from city traffic. The dust, however, can be a substantial problem, unless mitigating measures are taken. Dust blowing from uncovered trucks, and soil raised by construction vehicle frames and tires would be deposited on adjacent streets. There is relatively little dispersion of dust because of the canyon-like street settings in the CBD. Therefore, the dust may be repeatedly suspended by wind and traffic.

Increases in traffic congestion near the construction site would indirectly affect air quality. Normal traffic patterns would be interrupted and traffic speeds would be reduced because of traffic lane closures. Slower speeds would increase vehicle emissions, but because 1990 emission rates would be much lower than today, air quality standards would probably not be violated.

The bored tunnel would have a lesser dust impact than the cut-and-cover approach because less earth would be excavated and it could be removed through the tunnel rather than on streets. Each of the three intermediate stations, however, would still need to be constructed using the cut-and-cover approach.

5.6.2 Mitigating Measures

During construction, the impact on air quality would be mitigated if slow-moving trucks were kept at a minimum during peak-traffic periods.

Relatively new and well-maintained construction equipment and trucks would reduce emissions. Prolonged periods of vehicle idling would be avoided. Electrical equipment rather than engine-powered equipment could be selected.

Dust emitted from construction would be reduced if:

- Areas of exposed soils such as storage yards and construction sites were sprayed with water, oils or chemical dust suppressants.
- Wheels were washed and dusty truck loads were covered to reduce the amount of soil carried out of the construction site.
- Soil that escapes the construction area were removed with a conscientious street cleaning effort.

5.6.3 Long-Term Impacts

Air quality impacts were evaluated based on the change in carbon monoxide (CO) concentrations, total CBD vehicle emissions and exhaust particulate matter.

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Carbon monoxide (CO): CO is the primary air pollutant of concern with transportation projects. Automobiles are the major source of CO. CO impacts are usually local and can be severe near major intersections and congested roadways. As noted in Section 3.6, the Seattle CBD currently exceeds the eight-hour average CO standard but is expected to meet the standard by 1987.

Dispersion modeling using worst-case meterological assumptions is usually used to evaluate roadway CO impacts. The canyon-like streets in the CBD created by the tall buildings, however, makes this approach unreliable. Instead, CO emissions within a 300-foot radius of six locations (Figure 5-1) were summed and compared with monitoring data. With 1990 traffic projections and vehicle emission rates, these CO concentrations were adjusted to estimate future peak-hour and eight-hour average conditions for each alternative.

The estimated eight-hour average CO concentrations in Table 5-5 indicate that existing concentrations occasionally exceed the 9 ppm standard, but future CO concentrations would be much less than the standard whether or not the Tunnel alternative is selected. This reduction would occur because new vehicles with pollution-controlled devices would replace older vehicles. These lower emission rates would offset the expected increase in CBD traffic.

TABLE 5-5

SUMMARY OF EIGHT-HOUR CARBON MONOXIDE CONCENTRATION*

	Second & Univ.	Fifth & James	Fourth & Pike	Freeway	Stewart	Southern w/o I-90	Southern With I-90
Existing (1981)							
Monitored	11	12	11	--	--	--	--
Adjusted	--	--	--	14.8	10.6	16.2	16.2
1990							
No Action	4.5	5.1	4.4	6.5	4.6	6.6	6.5
Tunnel							
Third Avenue	4.9	5.2	4.7	6.3	4.7	--	5.9

* All concentrations are in parts per million (ppm). A 1.5 ppm background concentration was included in 1981 concentrations and a 1.0 ppm background was added to 1990 concentrations. The standard is 9 ppm.

Peak-hour concentrations were also calculated but only the eight-hour estimates were presented because eight-hour CO standards are more stringent. Evening peak-hour CO concentrations would be less than half the CO standard for the No Action and the Tunnel alternative.

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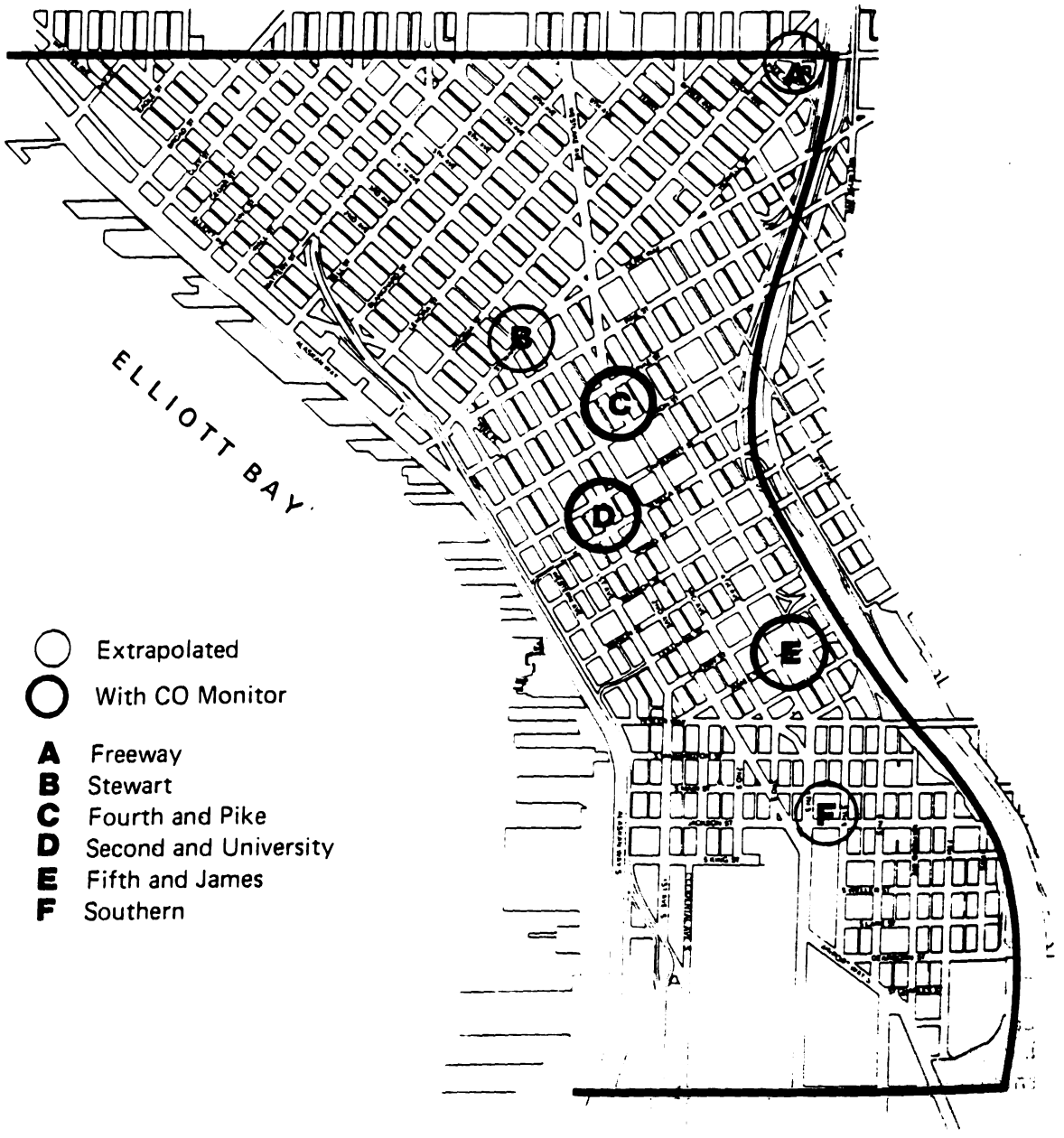

DOWNTOWN SEATTLE TRANSIT PROJECT

METRO City of Seattle

N

FIGURE 5-1
CO hot spot analysis locations

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Total vehicle emissions: Average CBD speeds were used with total vehicle-miles-travelled (vmt) figures to estimate pollutant burdens for existing conditions, the No Action alternative and the action alternatives as a group. Table 5-6 indicates that vehicle emissions would be substantially reduced between 1981 and 1990.

This reduction also would be due to the gradual replacement of older vehicles with cleaner, newer vehicles. If the Tunnel alternative were selected, further reduction would occur because of higher-average traffic speeds, but this incremental improvement would be relatively small.

Vehicle particle emissions: Emissions from Fourth and Fifth avenues and the proposed transit roadway to the I-90 transit ramp at Airport Way South were analyzed because of the existing and anticipated high volume of diesel buses and the proximity to the International District. Emissions from buses in the Union Station staging area were also included when appropriate. The PAL dispersion model was used to predict 24-hour exhaust particle concentrations for comparison with the ambient particle standard. A very conservative estimate assumed that a one meter per second (about 2 mph) wind blew directly toward the International District for 24 continuous hours. Because this meteorological situation would be unlikely, the most appropriate use of these estimates would be to compare the alternatives rather than predict actual concentrations.

TABLE 5-6

EMISSION BURDEN FOR SEATTLE CENTRAL BUSINESS DISTRICT
(Kilograms)

Pollutant		Existing 1981	No Action 1990	Tunnel 1990
Carbon Monoxide	1 hour	2,500	959	911
	8 hour	15,000	6,040	5,680
	24 hour	25,800	10,420	9,790
	annual	6,380,000	2,570,000	2,420,000
Nitrogen Oxides	1 hour	107	65	62
	8 hour	651	412	387
	24 hour	1,120	710	667
	annual	277,000	175,000	165,000
Hydrocarbons	1 hour	227	86	82
	8 hour	1,380	541	509
	24 hour	2,390	933	877
	annual	589,000	230,000	217,000
Exhaust Particulate Matter	1 hour	6	4	4
	8 hour	36	27	26
	24 hour	62	47	44
	annual	15,200	11,640	10,900

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Table 5-7 indicates that 24-hour average vehicle exhaust particle concentrations on the east sidewalk of Fifth Avenue South are about 7 percent of the nuisance standard and about 4 percent of the health-protecting standard. These concentrations would increase slightly in 1990 even with the No Action alternative because of increases in diesel-fueled cars and buses. The Tunnel alternative would further increase particle concentrations.

TABLE 5-7

SUMMARY OF VEHICLE EXHAUST PARTICULATE MATTER IMPACTS ON THE INTERNATIONAL DISTRICT (24-HOUR AVERAGE[1])

Receptor Location[2] (feet)	Existing	No Action	Tunnel
10	10	12	16
100	8	10	13
500	5	6	7
1,000	3	4	5

[1] Concentrations are in micrograms per cubic meter (ug/m^3). The 24-hour nuisance standard for particulate matter is 150 $ug/m.^3$ The 24-hour standard designed to protect human health is 260 $ug/m.^3$

[2] Receptor location indicates number of feet east of Fifth Avenue South.

Although the exhaust particulate matter concentration would increase in 1990, the concentration would still be only a small fraction of the total suspended particulate (TSP) matter concentration and the ambient TSP standards. Worst-case vehicle exhaust particle concentration on the sidewalk would be 12 percent of the nuisance standard and 7 percent of the health-protecting standard. The diesel bus share of the vehicle-related exhaust particulate matter would increase from around 50 percent in 1981 to 70 to 80 percent in 1990. Besides conservative meteorological assumptions, these results also assume that the buses would be operating under diesel power while in Union Station. Although the time and location of the conversion between power modes has not been determined each bus would spend part of its time at Union Station in the electric mode and diesel exhaust impacts would be less than indicated in Table 5-7.

These three analyses indicate CBD air quality would improve, although some local areas (including the area adjacent to the staging areas) would experience slight

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increases in exhaust particulate matter. Ambient standards would not likely be violated with or without selection of the Tunnel alternative. A qualitative discussion of the diesel bus-related air quality follows.

Street-level air quality would be improved if buses were operating in a tunnel. Street-level congestion would then be reduced, reducing emissions from general traffic. Exhaust impacts from transit would be lower than No Action because tunnel buses in the tunnel would operate in the CBD; the No Action alternative would require additional diesel buses to meet transit demand.

A ventilation system would still be needed for an electric bus tunnel to control climate and to clear smoke in an emergency. The proposed system requires two basic forms of ventilation: normal air circulation and emergency ventilation. Both forms of mechanical air changes would be required for underground stations and line tunnel sections and may be needed for circulation beneath the lidded staging areas. The air handling capacities would depend on the design of the respective lids, the extent of diesel operation in the staging area, and fire safety requirements.

The proposed ventilation system for normal air circulation would require four vent ducts per underground station -- two supply and two exhaust ducts. An active ventilation system would probably be used - i.e. fans would be used to supply and exhaust air during normal system operation. The piston action of the vehicles operating in the tunnel would provide the air circulation required to ventilate the line sections.

Emergency exhaust and supply capabilities would be required for all underground portions of the system and the lidded areas in order to evacuate smoke, heat and other toxic materials in the event of a fire. The proposed system for emergency ventilation requires four vent shafts per underground station -- two at each end of the station platform area. Each line section would be served by one vent shaft which would be needed only in an emergency.

The vent shaft terminal location at the surface would be determined by the available space, design requirements and the constraints for effects on historic properties. Three alternatives for vent terminals exist:

Type I: A shaft terminal eight feet or more above the sidewalk would cause the least disturbance to pedestrians as the result of air velocity, noise or fumes from emergency diesel operation. Since the discharge would be above the heads of pedestrians, higher discharge velocities could be used which would result in duct cross-sectional areas and terminal vents of about one-third that required for sidewalk grating.

Type II: A sidewalk grating would require larger cross-sectional areas (sidewalk grates) and shafts in order to reduce air velocities that would be disturbing to pedestrians. An option would be to raise the grated area one-half to two feet above the surface so that pedestrians would not walk over the grates.

Type III: A grating could be located in the street but outside the pedestrian crosswalk. The discharge rate could be increased with a street location and as a result the grating size could be reduced somewhat from that required in the

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sidewalk. There are two potential hazards with street gratings. They tend to be slippery when wet or iced, and may introduce volatile fluids or fumes into the system if an incident should cause fuel spills.

Metro's preferred vent would be above the pedestrian level in building facades. If building locations are not feasible, ventilation grates could be placed in streets or sidewalks. Historic buildings would be used only if there were no other alternatives and would be subject to review by local and state historic preservation officers.

During normal operations the dual-power buses would operate on electricity, and therefore the quality of the discharged air would be comparable to surface air. Tunnel air quality would be degraded by emergency diesel operations. Some minor ozone increase from electric operation and particles from braking and tire wear would be found in the discharge air.

In the staging areas at the portal stations, buses would convert from diesel to electric power before entering the tunnel and vice versa as they leave the tunnel. Passengers at boarding platforms would be protected from diesel exhaust by a ventilation system designed to meet criteria established by the American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE).

5.6.4 Mitigating Measures

Although no significant adverse air quality impacts have been identified with any alternative, decreasing vehicle emissions in the CBD can still be achieved. The improvement in the average speed of general traffic or buses provided by the tunnel would reduce the emissions of most pollutants compared with No Action.

Emissions from diesel buses would be minimized with proper maintenance and by specifying low emission rates when purchasing new transit vehicles. Some studies have shown substantially lower soot and odor emissions from engines burning number one rather than number two diesel fuel. And a ten-fold improvement in curbside exhaust concentration could result using vertical rather than horizontal exhaust pipes.

5.7 Noise

This section addresses construction and long-term noise impacts of the alternatives and measures to mitigate adverse impacts.

5.7.1 Construction Impacts

Construction noise is expected to have a more significant impact on downtown Seattle than noise during tunnel operation. As noted in Chapter 2, construction would last approximately 45 months and may include 24-hour activity in some locations. Noise during construction would be caused by heavy construction equipment use and rerouting traffic to other streets.

However, no specific Federal or State of Washington standards regulate noise originating from construction activities. In fact, Washington noise law specifically exempts construction noise except between the hours of 10 p.m. and 7 a.m. in residential areas.

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The City of Seattle enacted Ordinance 111458 in December 1983 to regulate noise caused by construction and equipment operations. This ordinance would limit the maximum permissible sound levels for bulldozers, large air compressors, and other equipment for steady use to 80 dBA or 82 dBA between 7 a.m. and 10 p.m. during weekdays and 9 a.m. and 10 p.m. on weekends at 50 feet depending on whether the equipment is close to a commercial or residential district. Impact type construction equipment such as jackhammers, pile drivers and similar intermittently-operated equipment would be limited to an hourly Leq of 90 dBA at 50 feet, with a 3 dBA increase for each halving of time and a not-to-exceed maximum of 99 dBA within the hours as specified. In addition, the construction sound levels inside nearby buildings in commercial districts must not exceed the 60 dBA maximum when measured with the doors and windows closed.

To assess the potential impact of construction-related noise and ground vibration impact, specific construction and scheduling information would be required. At this preliminary engineering phase, such detailed information involving individual pieces of equipment and its usage is not available. An alternate approach is to screen the typical construction equipment/activity sound and vibration levels, to identify equipment or activity which would likely exceed impact criteria levels, then to target them for abatement.

Table 5-8 shows some typical sound emission levels for construction equipment. Actual sound levels of field equipment may vary but the information can be used to screen potential candidates for noise control. Comparing these sound levels with Seattle's construction noise ordinance, pile drivers and line drills would probably exceed specified limits or would be severely restricted in hours of operation. To eliminate pile driving noise, Metro would drill holes for piles using an auger. Noise from line drills would be mitigated by using portable noise barriers.

Noise would be highest during street-level construction. The types of equipment and the percentage of time each would be in use would vary with construction progress. Table 5-9 lists typical outdoor sound levels near construction projects in urban areas. Sound levels range from 86 to 97 dBA for the hourly Leq at 25 feet, which would be a typical distance from equipment to the closest building along the project alignment. The levels would be similar to levels produced in constructing downtown buildings except construction would progress along the entire alignment.

Noise generated by the tunnel-boring machine and the trucks used to remove material would be effectively muffled by the ground between the tunnel and the surface. Sound levels produced by boring can be compared to subway operations which can generate sound levels of 30 to 45 dBA in nearby buildings. This is not likely to be heard above normal sound levels.

Cut-and-cover construction techniques would be used on Pine Street between Boren and Fourth avenues and at the two station locations on Third Avenue. For the cut-and-cover approach, construction machinery would typically operate in direct line-of-sight with buildings adjacent to the alignment until the excavation was deep enough that the excavation walls would act as noise barriers.

It may be difficult or impossible to comply with the section of the Seattle construction noise ordinance which protects indoor sound levels. Although most downtown building construction takes place across a street from existing buildings,

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TABLE 5-8

TYPICAL SOUND EMISSION LEVELS FOR CONSTRUCTION EQUIPMENT

Equipment Item	Sound Level at 50 ft. (dBA)
Air Compressor	81
Asphalt Spreader (Paver)	89
Asphalt Truck	88
Backhoe	88
Bulldozer	87
Compactor	80
Concrete Plant	83
Concrete Spreader	89
Concrete Mixer	85
Concrete Vibrator	76
Crane (derrick)	88
Delivery Truck	88
Diamond Saw	90
Dredge	88
Dump Truck	88
Front End Loader	84
Gas-Driven Vibro-compactor	76
Hoist	76
Jackhammer (Paving Breaker)	88
Line Drill	98
Motor Crane	83
Pile Driver/Extractor	101
Pump	76
Roller	80
Shovel	82
Truck	88
Tug	85

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TABLE 5-9

ESTIMATED OUTDOOR CONSTRUCTION
SOUND LEVELS AT 20-25 FEET

	Hourly Leq	
Construction Phase	EPA*	FHWA
Ground Clearing	90	94
Excavation	97	95
Foundations	86	87
Erection	91	90
Finishing	97	95

* EPA levels are adjusted from a 50-foot reference point.

the street-level work for surface improvements and some phases of cut-and-cover construction would directly face building entrances. Metro may need to seek a variance from the ordinance for some construction phases.

Worst-case estimates indicate sound levels would increase by about 2 dBA on adjacent parallel streets due to displaced traffic. Using EPA criteria, this would not be a significant noise impact.

5.7.2 Mitigating Measures

One effective approach Metro would use to minimize construction noise is to specify equipment noise emission limits in contracts. The project engineers would have the authority to check compliance with these contract provisions.

Noise generated by construction equipment would be maintained at acceptable levels by requiring enclosures around loud stationary equipment such as pumps and compressors. Engine-powered equipment would be required to have adequate mufflers and a leak-proof exhaust system.

The increase in sound levels on neighboring streets from displaced traffic would be primarily from diesel buses. The adverse impact could be minimized by dispersing the buses onto as many neighboring streets as practical. In addition, implementing any of the bus mitigating measures described in the operations mitigating measures section could help reduce bus noise.

Noisy construction activity would be restricted during evening hours to avoid disturbing sleeping hotel and apartment residents.

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5.7.3 Long-Term Impacts

The Metro Council's preferred alternative specifies that only electric vehicles would use the bus tunnel. Although both electric and diesel-powered buses were evaluated in the draft EIS, the noise section concentrated on the diesel bus option because it would produce higher sound levels. The electric bus operation in the tunneled sections eliminates many of the design and comfort concerns identified in the draft EIS. Because the electric operation is about 10 dBA quieter than the diesel, concerns of tunnel portal noise, tunnel acoustic treatment, station platform and passenger waiting area, noise exposure dose considerations and bus interior levels inside tunnel should be alleviated.

The locally preferred alternative also specifies transit-related surface improvements rather than a transit mall on Third Avenue and Pine Street. Because general traffic would use these streets, the decrease in noise which the draft EIS discussed would not occur on Third Avenue and Pine Street. Likewise, the small increase in noise on adjacent streets would not occur because general traffic would not be displaced.

In general, little change in CBD sound levels would occur with the bus tunnel in operation (see Tables 5-10 and 5-11). Transit-related noise would be slightly lower because there would be fewer diesel buses compared with No Action. General traffic noise would not change noticeably.

Staging areas are planned at both ends of the tunnel to enable buses to form platoons and to switch from diesel to electric power before entering the tunnel. In the draft EIS, significant noise impacts were predicted adjacent to these staging areas because all the activity was evaluated using diesel buses. With the preferred alternative, however, staging area noise would be lower than with an all diesel tunnel because buses would spend part of the time in an electric mode.

In the draft EIS, Union Station staging noise impacts on the International District were identified. Because a lid is now proposed for this area, staging noise from Union Station would be imperceptible. Noise from on-street staging in the area would continue.

Street-level noise impacts from the Ninth and Pine staging area would also be less than estimated on the draft EIS because buses would convert from diesel to electric power. Peak-hour sound level increases of only 2 to 3 dBA over No Action are expected. This would be barely perceptible. No change in ambient sound levels would be expected during off-peak hours. As noted in Chapter 2, a lid may also be constructed over the Ninth and Pine station. This, of course, would eliminate impacts due to staging activity.

Analysis was specifically conducted on the effects of the bus staging areas on both the Olive Tower and the Downtowner Hotel. The analysis shows exterior noise levels. In general, noise levels inside these buildings would be approximately 12 dBA less than outside. At the Olive Tower, which is approximately one block from the Ninth and Pine staging area, hourly noise levels (LEH) due to the bus staging operations were estimated to be 65 dBA at ground level, 67 dBA at 10 feet above, and 68 dBA at 40 feet above. The Downtowner Hotel, which is adjacent to the busway as it approaches the southern tunnel portal, is predicted to have 59 dBA at

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TABLE 5-10

ESTIMATED PEAK-HOUR
SOUND LEVELS (Leq, dBA)

Site	Location	Existing	No Action	Tunnel
1	9th & Stewart	69	69	69
2	9th & Pine	67	68	67
3	Pine & 4th	73	72	72
4	2nd & Union	77	77	76
5	Main & 4th	65	64	64
6	4th & Spring	76	77	75
7/10	3rd & Columbia	75	76	75
8	4th & Jefferson	76	77	77
9	3rd & James	75	76	75
11	5th & King	70	72	71
12	Maynard & Jackson	68	68	67

Note: All values represent the sound level at 30 feet from the centerline of the street. Peak hour is the hour with the maximum traffic volume. Intersections listed are close to the monitoring site. Actual locations are detailed in Table 3-17.

TABLE 5-11

ESTIMATED DAY-NIGHT
SOUND LEVELS (dBA)

Site	Location	Existing	No Action	Tunnel
1	9th & Stewart	69	69	69
2	9th & Pine	69	70	70
3	Pine & 4th	74	73	73
4	2nd & Union	77	77	77
5	Main & 4th	67	66	66
6	4th & Spring	76	77	76
7/10	3rd & Columbia	76	76	76
8	4th & Jefferson	76	77	77
9	3rd & James	76	76	76
11	5th & King	70	71	71
12	Maynard & Jackson	69	69	69

Note: All values represent the sound level at 30 feet from the centerline of the street. Intersections listed are close to the monitoring site. Actual locations are detailed in Table 3-16.

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ground level, 63 dBA at 10 feet above and 66 dBA at 40 feet above ground level. These are very similar to existing and predicted noise levels at adjacent sites #2 and #5 as noted in Table 23.

The noise contribution from the staging areas at these locations will be masked by the higher noise levels of surface traffic movements. Providing a lid over each of the staging areas will result in additional reduction in staging movement noise. However, sensitive receptors in the vicinity of the north staging area (Site #2) are presently exposed to high noise levels from I-5 and local traffic movements on Pine Street. Similarly, sensitive receptors near the Downtowner (Site #5) are exposed to noise levels due to traffic movements on South Jackson Street, South Main Street, 4th and 5th Avenues. The acoustical benefit of a lid over each staging area would not be noticeable.

Although exhaust pollution would not be a concern, the tunnel and stations would still be ventilated to provide fresh air. Ventilation noise would be reduced to a negligible level by inserting silencers between the air ducts and surface ports.

5.7.4 Mitigating Measures

The minimal noise impacts from staging activities would be mitigated in several ways. Operational measures such as switching from diesel operation to electric as soon as feasible, switching from electric to diesel as late as feasible, and avoiding prolonged idling would significantly reduce the impactof bus staging noise to the level of local street and highway traffic noise. Physical measures such as a barrier wall of limited height would have limited benefit because of the extensive sizes of staging areas, the grade differentials already in place and the openings necessary for buses entering and leaving the staging areas.

5.8 Vibration

5.8.1 Construction Impacts

Vibration resulting from construction depends on the methods used to excavate the tunnel and the stations, and mitigating measures to protect the properties adjacent to the construction sites. Vibration impacts to be mitigated involve settlement as the result of soil densification, air-borne noise which could impart energy into a building's structure and ground-borne vibration transmitted to adjacent buildings during construction.

Air-borne vibration, of intensities high enough to cause any structural damage, is seldom produced by construction equipment. Consequently air-borne vibration is not of concern.

Ground-borne vibration may cause structural damage classed as follows:

Threshold: Loosening of paint; small plaster cracks at points between construction elements; lengthening of old cracks.

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Minor: Loosening and failing of plaster; cracks in masonry around openings near partitions; hairline to 3 mm cracks (0 to 1/8 inch); falling mortar.

Major: Cracks of several mm in walls, rupture of opening vaults; structural weakening; masonry falling, e.g. chimneys; load-support ability affected.

Vibration measurements are expressed in terms of inches of movement per second. These criteria refer to ground velocity; it does not mean structures would move several inches.

Peak ground particle velocity of two inches per second has been widely recommended and adopted by federal, state and municipal governments, e.g. U.S. Bureau of Mines, Pennsylvania State, New York City, and mining and construction industries as a safe limit for structural damage. One inch per second has been recommended by the U.S. National Research Council as an alerting limit above which caution and inspection should be exercised, particularly around residential structures. Both the U.S. Bureau of Mines and the National Research Council recommend 0.5 inches per second as the safe limit for historical monuments and sensitive structures. These limits and would be instituted as part of the construction contracts.

Specific structures and buildings adjacent to construction operations would be monitored with battery-powered velocity alarm modules at alarm levels of 0.5 inches per second for particularly sensitive or weak structures and historical structures. Upon triggering of the preset alarm, the engineer incharge would make a safety determination before resuming operation. In no instance would the vibration velocity exceed two inches per second. This preventive program would be established through contract specification.

Of the usual tunnel boring or cut-and-cover construction activities, the following the potential to affect adjacent structures 10 feet away (radial distance): diesel-power pile driving over 30,000 ft.-lb., vibratory pile driving, pavement breaking (6 feet drop or greater). Active mitigation measures would be adopted such as sawing and cutting instead of breaking; drill and auger instead of pile driving, etc. Changes in work practice would be recommended as "equivalent and acceptable" alternatives to comply with the overall vibration limitation specifications.

Available passive mitigation measures to reduce the risk of possible structural damage consists essentially of modifying the propagation paths of the ground waves. These include the more elaborate bentonite-slurry filled trench to isolate a large building; simple trenching, sheetpiling or screening, and the use of neoprene rubber and urethane foam applications. These methods have been applied with varying degrees of success.

Trenching is not commonly employed because of the great width and depth necessary to effectively intercept the low-frequency waves. Sheetpiling, once installed, can be effective in reducing vibration transmission. The process of installing sheetpiling itself, however, generates considerable vibration. Both neoprene rubber or expandable urethane foam spray have been used as interceptor layers in recent Japanese and U.S. constructions.

People perceive vibration levels which are much lower than those which affect structures. Although it is impossible to accurately quantify the vibration level, it is

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likely that construction vibration would be perceptible to people near the construction area.

5.8.2 Mitigating Measures

To ensure that buildings adjacent to construction areas would be safe, vibration would be monitored at the building line. Alarms would sound if vibration levels exceeded 0.5 inches per second at sensitive or historic structures. Specific mitigating measures and monitoring requirements would be detailed in construction contract specifications.

5.8.3 Long-Term Impacts

Adverse vibration impacts are not expected from buses operating in the tunnel. The maximum vibration level currently caused by traffic is -66 dB. Because this represents the maximum level, it can be assumed that the incidence of this level may increase with greater traffic volumes in the future but it is unlikely this level would increase. Tunnel vibration would be barely perceptible at adjacent buildings.

5.9 Ecosystems

5.9.1 Impacts

Because the project is in a highly developed area, there would not be significant impacts to the ecosystem or to natural resources. Energy is discussed on page 5-37.

5.10 Water Quality

5.10.1 Construction Impacts

Silts from the construction site would not significantly affect water quality because runoff would be intercepted by the combined sewer system or storm drain system after passing through sediment basins.

5.10.2 Mitigating Measures

Runoff from the construction area would be filtered before discharge into the combined sewer system or storm drainage system to minimize silt-laden runoff entering the sewer system, Elliott Bay and Lake Union. This would be handled according to City development standards (Grading and Drainage Control Ordinance). Catch basins would be cleaned regularly to prevent overflowing.

5.10.3 Long-Term Impacts

Motor vehicles are the primary contributors of metals and organic compounds in urban runoffs (Metro, Toxicant Program Report 2, 1982). Street dust and urban soils contain fuel combustion products, lubricant and fuel leakages and particles from tire and mechanical wear. These contaminants can be washed from street surfaces or from soils disturbed during construction and transported to storm drains for eventual discharge to the receiving water body. Atmospheric particulate matter deposited on city streets would also contribute to the pollution found in urban runoff.

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The Final Report of the Nationwide Urban Runoff Program states that although "heavy metals, in particular, are the urban runoff contaminants having the greatest potential for impacts on aquatic life, few significant problems traceable to urban runoff were found in the water column." Metals, organic compounds and other pollutants are now washed from the impervious surfaces and transported to Elliott Bay in urban runoff. Additional pollutants enter the Bay via combined sewer overflows (CSO) during periods of prolonged rainfall. Once in Elliott Bay, these materials can settle out in the nearshore area of the bay where sediment concentrations of some materials are already substantially elevated above background levels. Since impervious surface coverage would not be affected by the project, the quantity of runoff entering Elliott Bay should not increase.

As noted in Section 3.10, a Seattle ordinance calls for separation of sanitary sewer and storm drains. The Seattle Drainage Ordinance would require drainage control because of the scale of development even though the project does not alter the existing conditions and does not add to the problem. One drainage control approach would be to detain storm water in facilities below the street and to release it at an controlled rate to the combined sewer system as capacity is available. This approach might produce a net improvement in Elliott Bay water quality by reducing the frequency and volume of CSOs.

Another approach would require new separated storm drains to divert runoff from the Third Avenue and Pine Street project area to discharge structures along the shoreline of Elliott Bay. Storm water would be transported directly to Elliott Bay in the new separated storm drains. Runoff separation would also reduce the frequency and volume of CSOs, further reducing the quantity of pollutants prone to settle in nearshore areas.

While the number of vehicles expected on Third Avenue and Pine Street would not increase substantially, storm water would add runoff-related pollutants to Elliott Bay. The effect of directly discharging additional storm water into Elliott Bay is not known, but it is not expected to have a significant impact on the nearshore area.

The beneficial effects of reducing the frequency and volume of CSOs are well known, however. Reducing or eliminating CSOs would reduce the total mass of toxicants being discharged to the environment, primarily from organics. Particulate matter from CSOs are larger and tend to settle more directly in front of the discharge pipe than particulate matter from runoff. Particulate matter from runoff is more prone to dispersion than CSO particulate matter. In addition, while runoff can sometimes have high concentrations of total and fecal coliform bacteria, separated sewers do not have as much, if any, sanitary significance as compared to CSOs. Coliform bacteria is the primary indicator of concern, causing direct impacts upon shellfish harvesting.

The storm-water collection system discussed in the draft EIS was examined during preliminary engineering. It has been found possible to provide this collection/outfall system with only one outfall line as contrasted with the four outfalls shown in Figure 5-3 of the draft EIS. The storm water would be collected along the project alignment and discharged via outfall to Elliott Bay at a site in the southern portion of the project, possibly along Yesler Way. No outfalls would be constructed near the Seattle Aquarium or Port of Seattle Terminal 48.

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Construction impacts would be reduced because pipes would be placed in only one east-west street leading to a single outfall. Construction of this outfall connector pipe would take approximately six months. It would be done in single block segments. One traffic lane on James Street and Yesler Way would be out-of-service in the one block segment under construction at any one time. Construction would begin at the shoreline end and proceed uphill to the project alignment on Third Avenue. Railroad service would be maintained on the existing waterfront tracks during construction of the outfall connector pipe.

Collection inlets and pipes would be placed along Pine Street and Third Avenue as part of the other construction elements of the project.

The staging area at the Ninth and Pine station would either detain storm water on site for controlled released into the combined sewer, or would drain into the existing I-5 system which connects to Lake Union. The south staging area at Union Station would detain storm water for controlled discharge into the combined sewer system.

Another storm-water system alternative under consideration would eliminate downtown construction impacts entirely and still meet the City of Seattle's drainage ordinance requirement. The rationale for this alternative is that if an equivalent volume of storm water could be collected in some other location, perhaps outside the downtown, and diverted from the combined sewer system, then the same reduction in load on the sewage transport system and treatment plants could be achieved without the construction impacts on Yesler Way resulting from the installation of the outfall connector. Discussions with the Seattle Engineering Department have been initiated to find a suitable alternative stormwater collection site where construction impacts would be less. If this concept is chosen, separate environmental analysis would be prepared as required.

5.10.4 Mitigating Measures

A detention system to allow sedimentation of particulate matter from Third Avenue and Pine Street could be included during predesign. Detention would remove a substantial amount of pollutants and exceed the development standards required by Ordinance 108080. During construction, appropriate measures such as using filter fabric fencing would be taken to reduce the sediment load in runoff before discharge to the sewer system.

If new separated storm drains are provided for an area outside of the project site, the potential for construction impacts in downtown Seattle would be avoided.

Metro is responsible for water-quality monitoring in Elliott Bay and would continue to monitor water quality near the proposed storm drains.

5.11 Utilities

5.11.1 Impacts

Impacts on utilities would occur during construction. One direct impact would be temporary disruption of service. As discussed in the preceding section, a storm-water collection system would be constructed.

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For tunnel segments using the cut-and-cover construction method, the tunnel would be excavated below existing utilities. These utilities would be hung from a temporary structure while the remainder of the tunnel was excavated. Sewer lines would be temporarily supported from below. New utilities could be installed in corridors above the pedestrian walkway inside the tunnel. Utilities located in streets intersecting the project alignment and at the stations would also be disrupted.

After the installation of the new utilities, the existing utilities would be removed. Major utility service disruptions are not expected since the new utility system would be in place and operating before the existing system was removed. The cut-and-cover technique would have a greater impact on utilities than the boring technique since the existing utilities would be temporarily supported and then replaced with new utility systems. Metro and the City have determined that relocation of utilities would be technically feasible. Metro and the City would cooperate in the preparation of plans and specifications and the relocation method with the affected utilities.

A slight increase in demand from utilities for the tunnel stations would occur. The existing utility system would have adequate capacity to serve new transit facilities.

As with all subsurface construction, there may be instances of unprogrammed breaks in utility service as a result of street demolition and rebuilding activity. Temporary disruption of service connections would inconvenience adjacent businesses.

Construction at the Ninth and Pine site would affect several utilities. At the Ninth and Pine site a 6-inch gas line, 15-inch sewer and 8-inch water line would be removed during construction on Terry Avenue between Pine Street and Olive Way. On Pine Street between Terry Avenue and Boren Avenue, a 6-inch gas line, 21-inch sewer, 12-inch water line, 30-inch water main, 8-inch sewer, 8-inch steam, electrical ducts and telephone ducts would be removed. Also, electrical transformer vaults, utility service connections and areaways could be located in the street segments affected by construction on Pine. The utilities would be relocated or removed.

At Union Station, overhead utility poles and wires would be relocated. Utilities in Main Street between Fourth and Fifth avenues would be relocated. A 20-inch water line, 20-inch gas line, steamline, 10-inch sewer, telephone and electrical ducts would be relocated.

The tunnel construction would result in removing and relocating utility and eliminating some areaways. The bored tunnel segments would not disrupt or require utility removal.

Cut-and-cover sections in Third Avenue would affect water, gas, steam and sewer lines. Electrical, telephone and telegraph facilities would also be affected. Service connections to adjacent buildings, overhead trolley lines and streetlights would be relocated. Catch basins, manholes and storm drains would also be relocated.

Adjustments to utilities could be necessary on streets crossing the project alignment during relocations. In the case of the Westlake station, adjacent sections of Fourth Avenue, Olive Way, Stewart Street and Fifth Avenue would be affected because

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relocated utilities from Pine Street and Westlake Avenue would be placed in these streets.

Areaways would not be directly affected by boring the tunnel. Selected areaways would be temporarily occupied to underpin the building. Some areaways would have their upper decks restored or replaced as part of the surface street improvements. Others would be abandoned and filled. Final design and negotiation with the City of Seattle and building owners would determine whether a given areaway were to be restored or abandoned. Abandonment of areaways would require approval of the City of Seattle. Areaways are used for retail space, storage, freight elevators, as vaults or are vacant. Tenants use areaways through permission granted by the City of Seattle, which requires that upon 30 day notice, tenants must move at their own expense (including any utilities and improvements). (Figure 5-2)

5.11.2 Mitigating Measures

Utility owners and building tenants affected by having to remove or relocate utility would be notified in advance. New utility service systems would be installed and activated before to removing existing systems. Disruption of utility service would occur during non-business hours.

Emergency procedures could be developed for any unprogrammed disruption of utilities.

5.12 Public and Social Services

5.12.1 Impacts

The Downtown Seattle Transit Project is a proposal to improve and enhance public transit and ancillary facilities in and through the Seattle CBD. The project would also improve and enhance access to a variety of social and public services headquartered in downtown. It would also improve access to other parts of the region where social programs would be located.

As noted in Chapter 4, construction activities in downtown would require additional police and parking enforcement officers to direct traffic and enforce parking regulations. The reduced supply of on-street spaces could result in more people stopping and standing in traffic lanes and violating parking restrictions in existing spaces. Increased traffic congestion near some of the construction areas may require increased numbers of police officers to alleviate the problem. Emergency services, fire, police and medical aid response time could increase as a result of construction activities.

During transit operation, an increase in police services at tunnel stations would probably be required. New traffic signals and informational signs would also be required.

Buildings housing city and county public safety and other governmental services, including the Morrison Hotel located across Third Avenue from the King County Courthouse which provides a food bank, emergency shelter and low-income housing, would be subject to noise, dust and disrupted travel patterns during construction. Services, however, would continue to be provided.

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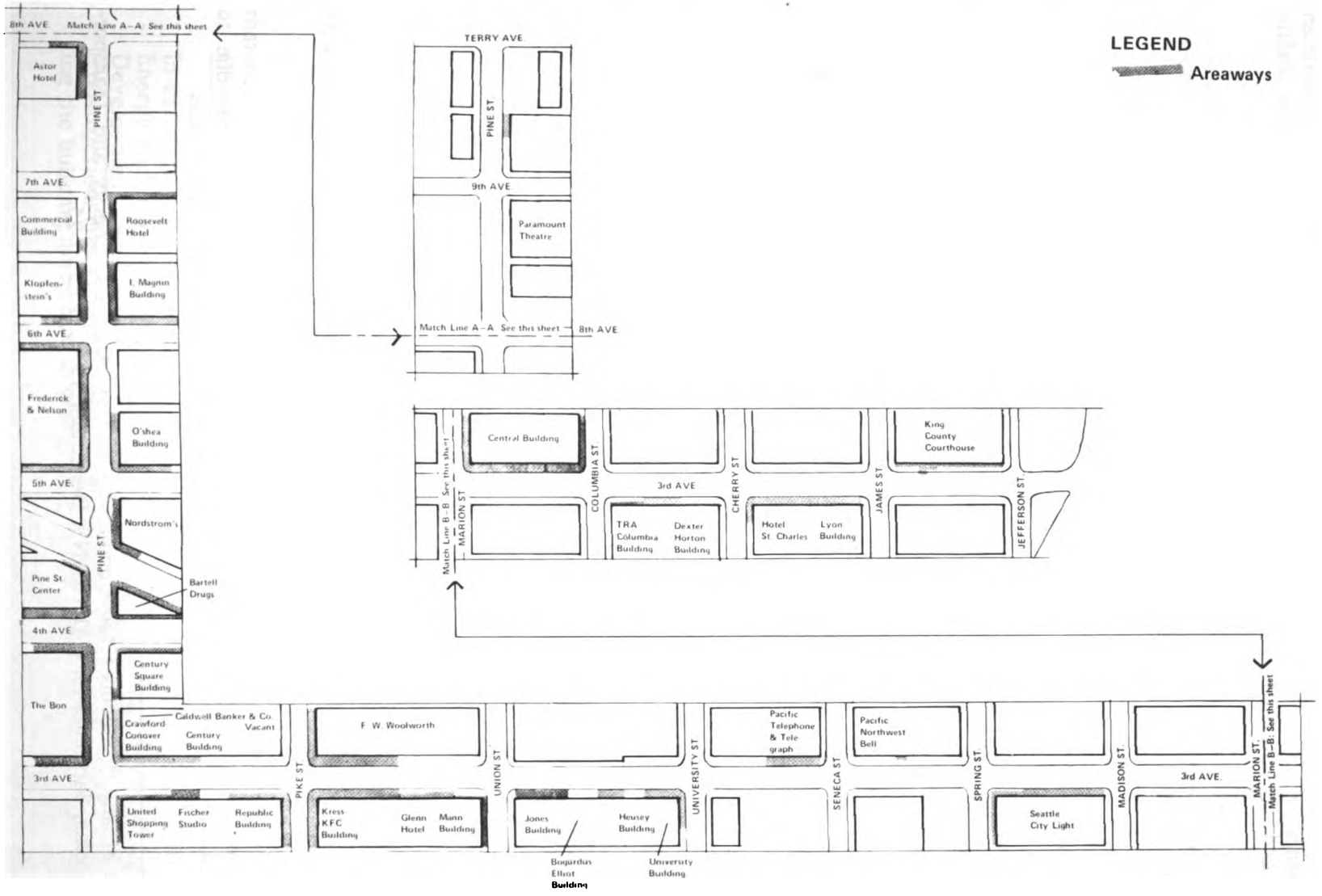

DOWNTOWN SEATTLE TRANSIT PROJECT

METRO

City of Seattle

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FIGURE 5-2

Location of potentially affected areaways

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5.12.2 Mitigating Measures

A public information and notification program would inform area residents and tenants about traffic revisions. Temporary travel corridors to facilitate pedestrian movements to and through the area would be constructed and temporary traffic signals and signs introduced to facilitate travel movements.

Metro and the City of Seattle emergency service departments and utilities would coordinate emergency operations. An action plan to improve and facilitate response time should be developed and demonstrated before construction.

5.13 Energy

5.13.1 Impacts

The energy impacts of the proposed project have been analyzed and documented in the Energy Technical Report using a methodology developed by CALTRANS.[1] Additional studies were also updated. Energy consumption for the Third Avenue Tunnel alternative included both the year 1990 (the design year) and the year 2000 when all anticipated dual-powered buses should be in operation (see Chapter 4). Units used are:

bBtu	=	Billion Btu
KW	=	Kilowatt
MWH	=	Megawatt Hour

Operation Energy

Operation of the Downtown Seattle Transit Project would entail the acquisition and use of a fleet of dual-powered articulated buses and additional trolley service. The buses would operate under diesel power outside the central business district. For a distance of about 1.5 miles in downtown Seattle, they operate through the tunnel under electrical power. Calculations of operating energy below take into account the following factors:

- The use of electric power in the tunnel would reduce diesel fuel consumption for bus trips through the tunnel.
- Operation energy includes the energy needed to operate fixed facilities at stations and staging areas.
- Heavier dual-powered articulated vehicles require additional fuel compared with articulated diesel buses.

Energy requirements for operation of project facilities would be essentially constant over time, but vehicular energy would increase significantly with time, due to projected growth in transit patronage and consequent amounts of bus service.

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1 Apostolos et al., Procedures for Conducting Energy Analysis, Energy and Transportation Systems, Sacramento, CALTRANS, December 1978. PP. 15-25.

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In summary, these energy results are as follows, for the years 1990 and 2000:

	1990	2000
Downtown Bus Operations		
Electrical Energy	+ 18 bBtu	+ 28 bBtu
Diesel Fuel	- 44 bBtu	- 70 bBtu
Net Change	- 26 bBtu	- 42 bBtu
Operation of Line, Stations, Staging Areas		
Electrical Energy (Other energy use negligible)	+ 31 bBtu	+ 31 bBtu
Change in Diesel Fuel Consumption Outside CBD	+ 27 bBtu	+ 43 bBtu
Net Energy for Downtown Seattle Transit Project Operations	+ 32 bBtu	+ 32 bBtu

Energy Required During Seattle City Light Peak Periods

Seattle City Light electric rates are based on three levels of peak and off-peak use:

Peak: 200 hours of maximum hourly energy consumption that occur in the period of 0700 to 2200 hours, Monday through Friday, during the 16 consecutive weeks from mid-November through mid-March.

Intermediate Peak: The next 1,000 hours of high energy consumption during the same mid-winter period.

Off-Peak: The remaining mid-winter hours and all other hours in the rest of the year (7,560 hours per year).

Using these definitions and the projected characteristics of transit operations, the following electrical energy requirements for Downtown Seattle Transit Project operations are estimated:

	1990	2000
200 Peak Hours	520 MWH	684 MWH
1,000 Intermediate Peak Hours	2,005 MWH	2,485 MWH
7,560 Off-Peak Hours	11,648 MWH	14,014 MWH
Total Annual Use	14,173 MWH	17,183 MWH

Construction

In estimating construction energy costs of the alternatives, the U.S. Department of Energy document, Estimating Energy Inputs of Residential and Commercial Building Development, was used. Three factors were involved in computing the initial (construction) energy investment of the project: 1) energy embodied in manufacturing the building materials; 2) energy used to transfer materials to the job site; and 3)

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energy used at the job site during construction (see Energy Technical Report). Energy costs were also updated during preliminary engineering.

Estimates of construction energy range from 3,628 to 4,482 bBtu for the Third Avenue tunnel option. A lid above the staging areas is being considered as an addition to the project. Using approximate energy values for the staging areas and the lid and otherwise applying current line lengths and expected structural type to the energy unit costs, the following estimate of construction energy would result:

	bBtu
9th and Pine Staging Area	600
Union Station Staging Area	700
Cut-and-Cover Line	100
Tunneled Line	490
Three Underground Stations	2,550
Total	4,440

On-site electrical energy use during construction has been estimated separately. Peak on-site electrical demand would be 3,762 KW - roughly equal to the projected peak electrical demand for operations in the year 2000. This construction demand is a 24-hour per day, five days per week load; it would drop to around 2,400 KW on weekends.

This use would continue for about 6½ consecutive months, and that period cannot readily be scheduled to avoid the mid-November to mid-March peak period of Seattle City Light's electrical energy use. It is not yet known, however, during what months of the year this 6½-month period would occur.

For another 16 months, project construction would require electrical energy at a peak demand rate of 540 KW.

The total on-site electrical energy for construction, 12,300 MWH, would be equivalent to 42 bBtu.

5.13.2 Mitigating Measures

Energy-efficient tools and techniques could be used during construction. These tools and techniques would be identified during the project's preliminary engineering phase.

Metro and City Light staff would consider designs to achieve greater energy efficiency during construction.

Metro and the City of Seattle, including City Light staff, would consider designs to achieve greater energy efficiency during operation.

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Design also would consider the incorporation of features to reduce operational energy requirements. About half the operational energy would be for vehicle operation; the other half would be divided roughly equally between ventilation and other uses, mainly vertical circulation and lighting. The tunnel and stations would not require heating or air conditioning.

Design would consider the incorporation of features to reduce operational energy requirements. These features include:

- o Using regenerative braking to reduce propulsion energy use.
- o Refining the mechanical ventilation concepts.
- o Using escalators and elevators in the most effective manner and considering operating strategies for electrical equipment, such as closing selected entrances, mezzanine areas and parts of station platforms during off-peak week-day hours and weekends.
- o Maximizing use of daylight where available.
- o Using energy-efficient lighting (source, placement, appropriate illumination level).

5.14 Soils

5.14.1 Impacts

Settlement and Earth Movement

Settlement on structures adjacent to cut and cover excavations and near bored sections of the tunnel is a potential impact of the project. Settlement may result from voids remaining behind segments of tunnel lining or shoring walls. Settlement also may occur if shoring walls deflect more than design limits allow. Settlement could damage surface pavement, underground utilities and nearby buildings. Historic buildings and buildings with shallow foundations could be affected more seriously than newer buildings with deep foundations.

There is considerable experience with large area, deep excavations for office buildings in downtown Seattle. This experience suggests that settlement problems can be controlled by standard engineering and construction practices and that significant damage to surrounding structures is not likely to occur.

In some areas of downtown Seattle, soils have been over-consolidated by the weight of glacial ice pressing down during past episodes of glaciation. Stresses imposed by the ice have not been entirely relieved since the ice melted. Horizontal earth movement may occur in excavations as these residual stresses are relieved. The geotechnical consultant estimates such movements to be approximately 0.1 inch for a 20-foot bored tunnel and up to several inches for deep excavations 500 to 600 feet long at the station locations. Deep excavations as long as a city block have been done with no significant damage to nearby structures.

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Ground Water Flows

Groundwater flows may affect construction by slowing excavation while dewatering or grouting occurs to control the flows. Flows up to 75 gallons per minute were recorded during construction of the Second Avenue sewer tunnel. Large groundwater flows in softer soils may result in ground loss at the walls of the excavation before shoring or lining materials are installed. Water pumped from excavations would probably be discharged into the combined sewer system. Groundwater control has been an integral and routine part of many deep excavations and tunneling projects in downtown Seattle.

Seismicity

The effect of earthquakes on the tunnel and stations is another soils-related concern. Preliminary seismic analysis was done as part of the geotechnical work to recommend seismic design parameters for future engineering work. Engineers recommend that all tunnel and station construction be designed to withstand a design earthquake having a 500-year recurrence interval. Tunnels and stations in glacially-consolidated soils typical of most of the route should not incur significant damage if designed for such an event. Areas near Union Station would be built on fill that could be subject to liquefaction during an earthquake. Liquefiable soils near Union Station would require special design for structures to withstand a seismic event.

5.14.2 Mitigating Measures

Controlling Settlement and Earth Movement

Settlement around a mined or bored tunnel would be controlled by supporting the tunnel with a continuous lining as the excavation progresses. Additional protection against settlement would be possible if the entire lining would be grouted to fill small voids between the lining and surrounding soil.

Where existing building foundations are located near tunnel or station excavations, several different methods could be employed to minimize the effects of settlement on such structures. Existing shallow building foundations could be underpinned as necessary with pilings or caissons to transfer the building load below the "zone of influence" of the new excavation. Grouting could be used as necessary to consolidate soils under existing foundations and shoring would be designed to minimize settlement adjacent to shoring walls.

Tunneling under the Tashiro-Kaplan Building and the Burlington Northern railroad tunnel could require special measures to minimize disturbance to these structures. Preliminary geotechnical review of the railroad tunnel indicates that the proposed transit tunnel would be bored beneath the railroad tunnel without significant impacts on the tunnel or railroad operations except for some temporary single-track operation. The Tashiro-Kaplan Building could require underpinning or grouting of the soil underneath to facilitate tunneling and to minimize disturbance to the building. Structural protection would be included to ensure the integrity of the BN tunnel crossing at University Street and Third Avenue. Additional geotechnical work would be done to design site specific measures for these and other potentially sensitive structures. At this time, 33 buildings have been identified which could

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require underpinning or special protection due to the proximity of the tunnel boring or cut and cover excavations.

Groundwater Control

Where groundwater flows must be controlled during excavation, the following methods could be employed:

- o Mining the tunnel using compressed air to create pressure inside the tunnel to compensate for the water pressure in surrounding soils.
- o Grouting water-bearing strata to impede ground water flows around the excavation.
- o Installing well points or dewatering wells in problem locations to intercept groundwater before it reaches the excavation.
- o Freezing the ground in limited areas to block the passage of groundwater.

Additional geotechnical work would recommend the most appropriate methods of groundwater control for specific locations along the tunnel route.

Seismically-sensitive Soils

Potential mitigating measures for structures on liquefiable soils in the Union Station area could include the use of pilings or the founding of structures on deeper bearing strata or soil densification to reduce liquefaction potential. Additional geotechnical analysis and design would help identify the most appropriate engineering solutions.

5.15 Unavoidable Adverse Impacts

Chapters 4, 5 and 6 describe the environmental impacts of the Downtown Seattle Transit Project. In some cases, suggested mitigating measures could be incorporated into the design to reduce the adverse impacts. In other cases, adverse impacts could be reduced but not eliminated, and are therefore determined to be unavoidable. The unavoidable impacts caused by the alternatives would be as follows:

Land Use

Land acquired for tunnel stations and tunnel access could preclude development of housing, retail or office space on the site during construction. However, joint use of property on which tunnel project facilities would be located would be considered once construction and operational needs are met.

In many cases, a subsurface easement could be the extent of the acquisition, therefore permitting development above the transit facility. In other cases, a surface easement could be acquired, allowing the possibility of future air rights development.

The area bounded by Pine Street, Olive Way and Boren and Ninth avenues could be acquired in part or in full depending on the option selected for implementation. This

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would also preempt future development of housing or commercial land use unless joint use would be pursued.

If the No Action alternative is selected, planned CBD growth over the long-term would not occur as projected by the City and Puget Sound Council of Governments. Growth might or might not occur in other other parts of Seattle, the suburbs or in other nearby cities instead.

Displacement

The project would remove one 16-unit, low-income rental apartment building, displacing about 18 residents, 35 businesses and parking spaces at the Vance Car Parks and System Parking, Inc and Bruce Kaplan Parking. At completion of construction, parking would be restored at the Vance Car Parks.

Visual

There would be additional overhead wiring for the circulation system, the Pine Street exclusive bus lane and the other wire additions necessary for the tunnel routes to operate on the surface during off-hours.

Air Quality

There would be increased dust during construction.

Noise

Sound levels would increase temporarily during construction.

The Tunnel alternative would increase the peak-hour sound levels 2 to 3 dBA over No Action in the area immediately adjacent to the north staging area.

Economic Activity

During construction, downtown streets would be disrupted. On-street parking and load zones would be displaced and roadways would at least be partially closed to general traffic. This could have an adverse impact on local businesses, especially convenience stores.

The displacement of on-street parking and delivery/load zones could adversely affect adjacent businesses. Delivery costs for some businesses could increase due to increased distance to a load zone.

5.16 Relationship Between Local Short-Term Uses of the Environment and the Maintenance of Long-Term Productivity

Maintaining and enhancing the vitality of downtown Seattle is a goal commonly held by King County, the City of Seattle and the Puget Sound Council of Governments and the focus of land-use and transportation policies. These local governments are working to concentrate additional employment and retail in the CBD and in four other regional activity centers. Concentrating growth in these areas would reduce public infrastructure costs, e.g. street, transit, water and sewer and the environ-

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mental and economic costs of urban sprawl. Without transportation improvements in downtown Seattle the entire region would pay directly for continued congestion in the CBD through higher operating costs and a shift of service hours from suburban and city neighborhoods to a slower moving downtown service.

Temporary disruption to the environment and commitment of irretrievable energy, labor and capital would be required to achieve long-term productivity. The long-term benefits with any of the action alternatives, however, would include reduced energy consumption and vehicle exhaust emissions, as well as adequate transit capacity and transit circulation in downtown Seattle in 1990.

5.17 Irreversible And Irretrievable Commitments Of Resources

Certain types of resources consumed would be irreversible or irretrievable, once committed to an alternative use considered in this EIS. Irretrievable resources would include energy, land, capital, construction materials and labor. The use of these resources would be considered permanent; however, their permanent use for one of the alternatives does not imply that they have been used unproductively.

5.17.1 Energy

Energy consumed during construction and operation of the alternatives would be irretrievable. Energy demand for construction would vary according to the type and magnitude of construction under way. Energy for system operation would also vary depending on the modal-split of passenger trips and other factors. The detailed energy analysis in Chapter 5 describes the energy consumption impacts.

5.17.2 Land

Construction of the preferred alternative would consume land potentially available for other uses. Once construction and operations needs are met, however, alternative uses of surface and air rights not required for transit purposes would be considered and would be encouraged by the City of Seattle.

5.17.3 Capital

Capital required for construction would be irretrievably committed.

5.17.4 Construction Materials

Construction materials irretrievably committed for the action alternatives could include, for example, cement, concrete, aggregate, lumber and steel.

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CHAPTER SIX

HISTORIC PROPERTIES AND PARKLANDS

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HISTORIC, CULTURAL, ARCHAEOLOGICAL AND PARKLAND RESOURCES

6.1 Historic, Cultural and Archaeological Resources

6.1.1 Introduction

6.1.2 Summary of Applicable Federal Laws

6.1.3 Coordination with Public Agencies

6.1.4 Area of Potential Environmental Impact

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6.1.7 Individual Properties

6.2 Archaeology

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6.2.2 Archaeological Resources

6.2.3 Significance of Archaeological Resources

6.2.4 Impacts and Mitigation Measures

6.3 Section 4(f) Evaluation

6.3.1 Introduction

6.3.2 Parklands

6.3.3 Historic Properties

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CHAPTER 6

HISTORIC, CULTURAL, ARCHAEOLOGICAL AND PARKLAND RESOURCES

6.1 Historic, Cultural and Archaeological Resources

6.1.1 Introduction

This chapter presents an inventory and impact assessment of the Seattle Downtown Transit Project on certain historic properties and parklands. This discussion is treated separately from the chapter on environmental impacts because it is responding to the specific requirements of certain federal laws.

6.1.2 Summary of Applicable Federal Laws

Several significant historical and architectural structures are in the project area. A comprehensive survey was conducted of properties including potentially eligible for the National Register of Historic Places. These buildings would be protected under Section 106 of the National Historic Preservation Act of 1966 Public Law 89-665 (as amended). The act requires examining federally-assisted projects for their effects on all historic and cultural resources listed or are eligible for inclusion in the National Register of Historic Places. Section 4(f) of the Department of Transportation Act Public Law 89-670 and Executive Order 11593 also protects historic properties as well as parks, recreation areas and wildlife refuges, when such properties are proposed for transportation projects. A discussion of parklands follows in Section 6.2.

6.1.3 Coordination with Public Agencies

Metro has coordinated with the State Historic Preservation Officer (SHPO) since the early planning studies to determine the alternatives in late 1982. Metro staff has continued this coordination through meetings, field trips and coorespondence to resolve issues such potential environmental impact, project timing and scheduling, and documentation content. The SHPO will continue to participate actively in the environmental review process and will review station plans and final designs, as necessary, before construction (documentation of coordination is available at Metro).

The City of Seattle Office of Urban Conservation has also participated actively in this study. It will continue to be involved through the design review and construction processes. The local historic preservation officer and her staff will also continue to coordinate meetings with the Pioneer Square Preservation Board, the International Review District Board and the Landmarks Preservation Board. Future development over the Ninth and Pine Station would be subject to applicable City regulatory processes.

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6.1.4 Area of Potential Environmental Impact

This document describes properties in the area of potential environmental impact. Based on discussions with the SHPO (correspondence, Appendix J) and the City of Seattle Office of Urban Conservation staff and a review of similar projects, the area of potential environmental impact for the preferred alternative would include one-half block on either side of the Third Avenue alignment and a full block around transit center and off-street staging sites. Buildings were also inventoried on the east side of Second Avenue; however, at-grade station entrances were dropped from further consideration during preliminary engineering. The inventory included properties of which 45 were either on or determined Eligible for the National Register of Historic Places. The keeper of the National Register has determined that these properties are eligible for the register.

Preliminary research included reviewing national, state and local registers, consulting with the SHPO and City of Seattle Office of Urban Conservation staff, and surveys conducted by historic and architectural researchers (see list of preparers). The original inventory considered historic properties in the area of environmental impacts for all alternatives. An additional 12 properties were determined eligible under the Fourth Avenue alignment.

Detailed inventory forms were prepared on 75 properties and are included in the Downtown Transit Technical Report on Historic and Cultural Archaeological and Parkland Resources, Volume 1.

6.1.5 Application of Criteria of Effect

The Advisory Council on Historic Preservation (ACHP) has developed criteria to determine whether a proposed project would have an effect on a property on or eligible for the National Register. These criteria of effect as described in 36 CFR 800.3(a) are as follows:

> "The effect of a federal, federally assisted, or federally licensed undertaking on a National Register eligible property is evaluated in the context of the historical, architectural, archaeological, or cultural significance possessed by the property. An undertaking shall be considered to have an effect whenever any condition of the undertaking causes or may cause any change, beneficial or adverse, in the quality of the historical, architectural, archaeological, or cultural characteristics that qualify the property to meet the criteria of the National Register. An effect occurs when an undertaking changes the integrity of location, design, setting, material, workmanship, feeling, or association of the property that contributes to its significance in accordance with the National Register criteria. An effect may be direct or indirect. Direct effects are caused by the undertaking and occur at the same time and place. Indirect effects include those caused by the undertaking that are later in time or farther removed in distance, but are still reasonably foreseeable. Such effects may include changes in the pattern of land use, population density or growth rate that may affect properties of historical, architectural, archeological, or cultural significance. . . ."

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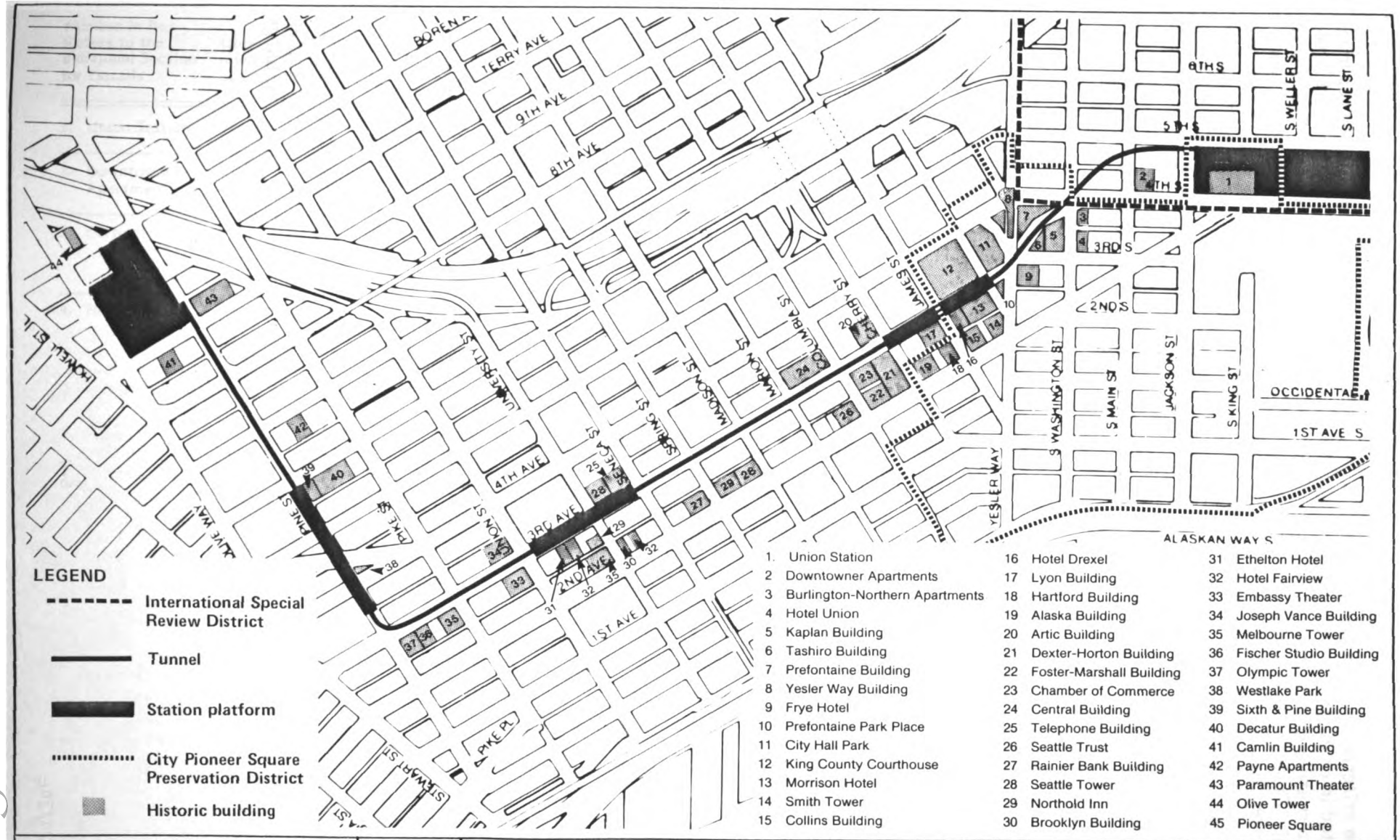

DOWNTOWN SEATTLE TRANSIT PROJECT

METRO

City of Seattle

FIGURE 6-1

Historical/cultural sites

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The criteria of effect were applied, in consultation with the SHPO, to the properties listed in or eligible for the National Register. It was determined that the Preferred Alternative would have no effect on 13 of the 45 historic resources (see Table 6-1). Only Pioneer Square properties, Union Station, the Seattle Tower, the Olympic Tower, the Arctic Building and the Paramount Theatre are listed in the National Register. The other properties have been determined to be eligible. In all cases the project would not change the integrity of the location, design, setting, materials, workmanship, feel or association of the property.

1990 Conditions: No Action

The No Action alternative would have no effect on historic, cultural or archaeological resources.

6.1.6 Application of the Criteria of Adverse Effect

The specific criteria of adverse effect (36 CFR 800.3(b) are as follows:

1. Destruction or alteration of all or part of a property

2. Isolation from or alteration of the property's surrounding environment

3. Introduction of visual, audible, or atmospheric elements that are out of character with the property or alter its setting

4. Neglect of a property resulting in its deterioration or destruction

5. Transfer or sale of a property without adequate conditions or restrictions regarding preservation, maintenance or use.

The Criteria of Adverse Effect have been applied to all structures on, nominated to, or potentially eligible for the National Register of Historic Places. It was determined that, under the locally preferred alternative, there would be no adverse effects on 42 properties listed or eligible for inclusion in the National Register. The properties found to have adverse effects would be Union Station, Pioneer Square, and the King County Courthouse. The Union Station, Pioneer Square and the King County Courthouse are listed in the National Register.

The following discusses the individual criteria of Adverse Effect (see Table 6-1).

1. Destruction or Alteration

Impacts

All properties in the historic and parkland inventory would be unchanged by the transit project. Possible exceptions would be the Tashiro Building and the Kaplan Warehouse where the transit tunnel will be constructed beneath these buildings Union Station and the King County Courthouse (both in Pioneer Square).

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TABLE 6-1
DETERMINATION OF ADVERSE EFFECT ON HISTORIC PROJECTS

Number in Box Refers to the Individual Section for Details	Determination of Effect	1. Destruction or Alteration	2. Access/ Isolation	3. Visual	3. Noise	3. Vibration	3. Air Quality	4. Structural Integrity	5. Change of Ownership
1. Union Station	Yes	Yes	No	No	No	No	No	No	No
2. Downtowner Apartments	Yes	No	No	No	No	No	No	No	No
3. Burlington-Northern Tunnel	Yes	No	No	No	No	No	No	No	No
4. Hotel Union	No Not on alignment	No	No	No	No	No	No	No	No
5. Kaplan Building	Yes	No	No	No	No	No	No	No	No
6. Tashiro Hardware Building	Yes	No	No	No	No	No	No	No	No
7. Prefontaine Building	Yes	No	No	No	No	No	No	No	No
8. Yesler Way Bridge	No Not on alignment	No	No	No	No	No	No	No	No
9. Frye Hotel	Yes	No	No	No	No	No	No	No	No
10. Prefontaine Place Park	Yes	No	No	No	No	No	No	No	No

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TABLE 6-1 (cont'd)
DETERMINATION OF ADVERSE EFFECT ON HISTORIC PROPERTIES

Number in Box Refers to the Individual Section for Details	Determination of Effect	1. Destruction or Alteration	2. Access/ Isolation	3. Visual	3. Noise	3. Vibration	3. Air Quality	4. Structural Integrity	5. Change of Ownership
11. City Hall Park	Yes	No	No	No	No	No	No	No	No
12. King County Courthouse	Yes	Yes	No	No	No	No	No	No	No
13. Morrison Hotel	Yes	No	No	No	No	No	No	No	No
14. Smith Tower	No Not on Alignment	No	No	No	No	No	No	No	No
15. Collins Building	No Not on alignment	No	No	No	No	No	No	No	No
16. Hotel Drexel	Yes	No	No	No	No	No	No	No	No
17. Lyon Building	Yes	No	No	No	No	No	No	No	No
18. Hartford Building	No Not on alignment	No	No	No	No	No	No	No	No
19. Alaska Building	No Not on alignment	No	No	No	No	No	No	No	No
20. Artic Building	Yes	No	No	No	No	No	No	No	No

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TABLE 6-1 (cont'd)
DETERMINATION OF ADVERSE EFFECT ON HISTORIC PROPERTIES

Number in Box Refers to the Individual Section for Details	Determination of Effect	1. Destruction or Alteration	2. Access/ Isolation	3. Visual	3. Noise	3. Vibration	3. Air Quality	4. Structural Integrity	5. Change of Ownership
21. Dexter Horton Building	Yes	No	No	No	No	No	No	No	No
22. Foster & Marshall Building	No Not on alignment	No	No	No	No	No	No	No	No
23. Chamber of Commerce Building	Yes	No	No	No	No	No	No	No	No
24. Central Building	Yes	No	No	No	No	No	No	No	No
25. Pacific Telephone & Telegraph	No	No	No	No	No	No	No	No	No
26. Seattle Trust	No Not on alignment	No	No	No	No	No	No	No	No
27. Rainier Bank Building	No Not on alignment	No	No	No	No	No	No	No	No

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TABLE 6-1 (cont'd)
DETERMINATION OF ADVERSE EFFECT

Number in Box Refers to the Individual Section for Details	Determination of Effect	1. Destruction or Alteration	2. Access/ Isolation	3. Visual	3. Noise	3. Vibration	3. Air Quality	4. Structural Integrity	5. Change of Ownership
28. Seattle	Yes	No	No	No	No	No	No	No	No
29. Northhold Inn	No Not on alignment	No	No	No	No	No	No	No	No
30. Brooklyn Building	No Not on alignment	No	No	No	No	No	No	No	No
31. Ethelton Hotel	Yes	No	No	No	No	No	No	No	No
32. Hotel Fairview	Yes	No	No	No	No	No	No	No	No
33. Embassy Theatre	Yes	No	No	No	No	No	No	No	No
34. Joseph Vance Building	Yes	No	No	No	No	No	No	No	No
35. Melbourne Tower	Yes	No	No	No	No	No	No	No	No
36. Fischer Studio Building	Yes	No	No	No	No	No	No	No	No

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TABLE 6-1 (cont'd)
DETERMINATION OF ADVERSE EFFECT ON HISTORIC PROPERTIES

Number in Box Refers to the Individual Section for Details	Determination of Effect	1. Destruction or Alteration	2. Access/ Isolation	3. Visual	3. Noise	3. Vibration	3. Air Quality	4. Structural Integrity	5. Change of Ownership
37. Olympic Tower	Yes	No	No	No	No	No	No	No	No
39. Sixth & Pine Building	Yes	No	No	No	No	No	No	No	No
40. Decatur Building	No Not on alignment	No	No	No	No	No	No	No	No
41. Camlin Hotel	Yes	No	No	No	No	No	No	No	No
42. Payne Apartments	No Not on alignment	No	No	No	No	No	No	No	No
43. Paramount Theatre	No	No	No	No	No	No	No	No	No
44. Olive Tower	No	No	No	No	No	No	No	No	No
45. Pioneer Square	Yes	No	No	No	No	No	No	No	No

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No other historic properties would be used as station entrances. This would include all buildings on Fourth, Third and Second avenues, and Pine Street. No use would be made of the Union Station structure or its descending-to-track-level entrances; however, provision would be made to ensure future access to Union Station for any use or rehabilitation. Existing service and pedestrian access could be altered by the transit station design.

Construction Staging would be confined in the south using the abandoned train yards south of Union Station, and in the north to property bound by Boren Avenue (north), Pine Street (east), Ninth Avenue (south), and Olive Way (west). The Westlake right-of-way could also be used for construction staging. No historic property or parklands would be used for construction staging or system operations staging.

2. Access/Isolation

Impacts

Access to all historic properties and parklands would be maintained except for unavoidable short periods during construction. On-site construction operations would be managed to minimize construction-related disruptions to building use and access. The alley east of the Smith Tower would be maintained for access to Smith Tower. If Jefferson Street is vacated or closed, access to the Morrison Garage would be maintained. Future access to Union Station would be maintained assuring possible future rehabilitation and use of the station; however, existing service and pedestrian access may be altered or restricted by the transit station design.

3. Visual, Audible, Atmospheric Elements

Impacts - Visual

The transit improvement project would include a comprehensive program of street treatments including locating street furniture, bus shelters, vending equipment, trees, planters, alarm boxes, hydrants, parking meters, rebuilding streets and sidewalks, widening sidewalks, improving pedestrian movement and upgrading utilities.

During the design process, Metro would ensure that the project adheres to the principals set forth in the preliminary design phases and discussed above, i.e. the treatment would be of an appropriate scale and integrated into the existing street patterns. The design would be subject to review by the state Historic Preservation Officer and local boards, commissions and permitting authorities to ensure compatibility with all historic buildings along the alignment.

Impacts - Audible (Noise)

Sound levels in the downtown would be decreased by the operation of electric-powered buses in a tunnel, reduction of surface bus traffic, and the reduction of diesel bus operations in the downtown.

Local sound levels adjacent to the staging areas at the north and south end of the tunnel could be expected to increase. A sound level increase of approximately 3 dBA affecting the upper stories of the Olive Tower in the north result from the

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bus staging operations. Union Station in the south experience some noise increases from staging operations. A proposed lid at both the north and south stations could reduce any noise increase resulting from staging operations.

Impacts - Audible (Vibration)

The operation of the bus tunnel is not expected to generate vibration levels that would produce any effect upon historic properties. The tunnel structure and the soil layers surrounding it would reduce vibration transmission to levels far below those experienced in surface operations.

Ground-borne vibration may cause structural damage classed as follows:

Specific structures and buildings adjacent to construction operations would be monitored with battery-powered velocity alarm modules at present alarm levels (0.5 inches per second for particularly sensitive or weak structures, and one inch per second for historical structures). Upon triggering of the preset alarm, the Engineer-in-Charge would make a safety determination before resuming operation. In no instance would the vibration velocity exceed two inches per second. This preventive program would be established through contract specification as the most practical and effective method.

The following procedures would be followed to monitor vibration and to ensure the protection of historic properties in the construction area:

First, especially sensitive structures within 30 feet (radial distance) of station construction and tunnel boring would be monitored in accord with contract-specified protection measures.

Second, historic structures within 15 feet (radial distance) of station construction and tunnel boring would be monitored in accord with contract-specified protection measures.

Third, the estimated degree of impact, the specific mitigation measures, and monitoring requirements for individual impacted historic structures, within the construction corridor, would be detailed as part of the project construction contract specifications.

Impacts - Atmospheric

Analyses indicate CBD air quality would improve, although some local areas (including the area adjacent to the staging areas) would experience slight increases in exhaust particulate matter. Ambient standards would not likely be violated.

The tunnel options would require mechanical ventilation of the tunnels and the platform areas. During preliminary engineering and design, the ventilation systems would be designed to meet indoor air quality standards for transit patrons and employees.

Ventilation shafts would be located in the street or sidewalk with a grate at the surface. If this is not possible they would be located in or adjacent to buildings. Historic buildings would be used only if there is no other alternative. If an historic

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building is considered, the design would be subject to review by the state Historic Preservation Officer and local officials.

4. Neglect of Property - Structural Integrity

Structural Integrity

Impacts

A brief summary of most of the anticipated foundation conditions and types of underpinning that may be used are illustrated in the 106 and 4(f) technical reports.

In general, an average soil influence line slope of 1.5 vertical to 1.0 horixontal is used. Only foundations that fall within the influence lines will be considered for underpinning or protection.

The underpinning/protection methods consist of two basic types:

- o A "less rigid" shoring wall in conjunction with underpinning consisting of piles or piers directly below the building foundation, and
- o A "rigid" shoring wall designed to support the excavation and building foundation. This system is termed "rigid" since it is designed to prevent subsidence during construction of the subway station.

As the alignment, profile, configuration, constraints and soils information are developed further, so would the methods of building underpinning/protection. The end product would be a system that would protect the buildings from any detrimental settlement or damage and would be an integral part of the overall construction methods and system design.

5. Change of Ownership

Impacts

The only properties on the historic and parklands inventory for this project with the potential for a change of ownership would be Union Station. Although it is unlikely that the project would acquire this or any other historic property any transfer or sale would include provisions to maintan or enhance of the property. Such provisions would be subject to the review of the state and local historic preservation officers.

6.1.7 Individual Properties

Properties listed or eligible to be listed on the National Register of Historic Places include the Pioneer Square Preservation District and 44 individual structures. Additional inventory information can be found in Appendix K and the Technical Documents (Metro, 1984) including the Determination of Eligibility forms reviewed by the SHPO. The Department of Interior also made a formal Determination of Eligibility (Figure 6-2).

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United States Department of the Interior

NATIONAL PARK SERVICE
WASHINGTON, D.C. 20240

IN REPLY REFER TO 413

MAR 18 1985

The Director of the National Park Service is pleased to inform you of our determination pursuant to the National Historic Preservation Act, as amended, and Executive Order 11593 in response to your request for a determination of eligibility for inclusion in the National Register of Historic Places. Our determination appears on the enclosed material.

As you know, your request for our professional judgment constitutes a part of the Federal planning process. We urge that this information be integrated into the National Environmental Policy Act analysis and the analysis required under section 4 (f) of the Department of Transportation Act, if this is a transportation project, to bring about the best possible program decisions.

This determination does not serve in any manner as a veto to uses of property, with or without Federal participation or assistance. The responsibility for program planning concerning properties eligible for the National Register lies with the agency or block grant recipient after the Advisory Council on Historic Preservation has had an opportunity to comment.

We are pleased to be of assistance in the consideration of historic resources in the planning process.

Attachment

FIGURE 6-2
Eligibility Forms

E.O. 11593
DETERMINATION OF ELIGIBILITY NOTIFICATION
National Register of Historic Places
National Park Service

Project Name:

Location: Seattle, King County **State:** WA

Request submitted by: DOT/UMTA Aubrey Davis

Date Received: 4-5-84 **Additional information received:**

Name of property	Eligibility SHPO opinion	Eligibility Secretary of the Interior's opinion	Criteria
New Richmond Hotel/ Downtowner Apts.	Eligible	Eligible	
Great Northern Railroad Tunnel (BN Tunnel)	"	"	
Lyon Building	"	"	
Dexter Horton Building	"	"	
Chamber of Commerce Bldg.	"	"	
Central Building	"	"	
Pacific Telephone and Telegraph Building	"	"	
Northhold Inn	"	"	
Hotel Bybee	"	"	
Bogardus-Elliott Building	"	"	
Joseph Vance Building	"	"	
Mann Building	"	"	

cont'

for Barbara Savage
Keeper of the National Register
Determined Eligible
Date: 4-18-84

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E.O. 11593

DETERMINATION OF ELIGIBILITY NOTIFICATION
National Register of Historic Places
National Park Service

Project Name:

Location: Seattle, King County **State:** WA

Request submitted by: DOT/UMTA Aubrey Davis

Date Received: 4-5-84 **Additional information received:**

Name of property	Eligibility SHPO opinion	Eligibility Secretary of the Interior's opinion	Criteria
Republic Building	Eligible	Eligible	
Fischer Studio Building	"	"	
Shafer Building	"	"	
Decatur Building	"	"	
Earlington Apartments	"	"	
Camlin Hotel	"	"	
Olive Tower	"	"	
Northern Securities Bldg.	"	"	
Liggett Building	"	"	
Joshua Green Building	"	"	
Holland Building	"	"	
1411 Fourth Ave. Bldg.	"	"	
Great Northern Building	"	"	
Cobb Medical-Dental Arts Bldg.	"	"	

for Beth L. Savage
Keeper of the National Register
Determined Eligible
Date: 4-18-84

WASO-21

E.O. 11593

DETERMINATION OF ELIGIBILITY NOTIFICATION
National Register of Historic Places
National Park Service

Project Name:

Location: Seattle, King County **State:** WA

Request submitted by: DOT/UMTA Aubrey Davis

Date Received: 4-5-84 **Additional information received:**

Name of property	Eligibility SHPO opinion	Eligibility Secretary of the Interior's opinion	Criteria
Old National Bank	Eligible	Eligible	
Y.M.C.A. Buildings	"	"	
Leamington Hotel-Apartments	"	"	
Yesler Way Bridge over Fourth Avenue*			
Ben Bridge Jewelers Clock	"	"	
Carroll's Jewelers Clock	Eligible	Eligible	

*Listed within the boundaries of Pioneer Square-Skid Road District (6/70).

for Beth L. Savage
Keeper of the National Register
Determined Eligible
Date: 4-18-84

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E.O. 11593

DETERMINATION OF ELIGIBILITY NOTIFICATION
National Register of Historic Places
National Park Service

Project Name:

Location: Seattle, King County **State:** WA

Request submitted by: DOT/UMTA Aubrey Davis

Date Received: 2-20-85 **Additional information received:**

36 CFR Part 63.3
Determination

Name of property	Eligibility SHPO opinion	Eligibility Secretary of the Interior's opinion	Criteria
Seattle Trust & Savings Bank (Boston Company Building)	Eligible	Eligible	
Hadfield Building (Brooklyn Building)	Eligible	Eligible	
Foster & Marshall Bldg. (Seattle National Bank Bldg.)	Eligible	Eligible	
Baillargeon Building (Rainier Bank Building)	Eligible	Eligible	

for Beth L. Savage
Keeper of the National Register
Determined Eligible
Date: 3/7/85

WASO-27

6-15

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The following historic properties could possibly be adversely affected by the preferred alternative. For a map of their location in relation to the preferred alternatives, see Figure 6-1. For matrix of effect see Table 6-1 and discussion under 6.1.6. For more detailed descriptions of all individual properties see the Technical appendix: Determinations of Eligibility.

Pioneer Square Preservation District - #45

Pioneer Square is the site of Seattle's original CBD, an 88-acre area of architecturally-significant historic structures dating back to the major reconstruction period following the Seattle Fire of 1889. Once the city's major commercial district, the area's structures incorporate a variety of architectural styles, primarily of the Victorian, Romanesque-revival style, constructed mostly from brick masonry with sandstone and terra cotta trim. The district is significant for its architecture and because it is located on the original town site. The area, through its historic structures, symbolizes the growth and development of Seattle between 1889 and 1920. Properties reviewed that are part of the Pioneer Square Preservation District include: Union Station, Downtowner Apartments, Burlington Northern Tunnel, Kaplan Building, Frye Hotel, Tashiro Building, Prefontaine Building, City Hall Park, King County Courthouse, Morrison Hotel, Hotel Drexel, and Prefontaine Place Park.

The Jackson Street Bridge in Pioneer Square would also be rebuilt. This would be a separate project coordinated by the Seattle Engineering Department.

International District

The International District is a 35-block area which has been identified with the Asian community since the early 1900s. After the completion of the 1910 Jackson Street Regrade project, Chinese and Japanese merchants shifted their businesses from Pioneer Square to the newly regraded King Street area.

The predominant and important buildings in the district are the three- to six-story anonymous brick structures built between 1910 and 1920. Buildings in the International District are important for their historic or social role in the community rather than for their architecture. The plain facades serve as backdrops for the many Asian signs, balconies and applied ornamentation that give the district its unique identity. Union Station and the Downtowner Apartments are part of the International Special Review District.

Union Station - #1 - Fourth Avenue and King Street (Figure 6-3)
National Register of Historic Places

Union Station and King Street Station were built in the early 1900s as part of a transportation network which envisioned rail routes to Alaska and connections to the Orient and Siberia. The side-by-side stations were built but the rail network northward and Orient connections were never fully realized. The growth in airline service in the 1950s cut deeply into rail travel. The Milwaukee Railroad discontinued rail service at Union Station in May 1971.

The Union Station was designed by San Francisco architect D. J. Patterson. Major design elements reflect Roman Classic Revival period architecture of the early

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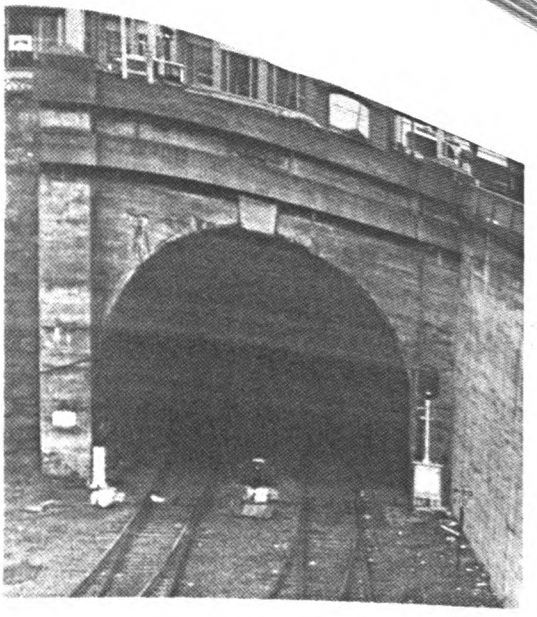
Union Station

Downtowner Apartments



Burlington-Northern Tunnel entrance

DOWNTOWN SEATTLE TRANSIT PROJECT

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FIGURE 6-3

Union Station, Downtowner Apartments and the Burlington Northern Tunnel Entrance

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1900s. The building has a brick veneer. The reinforced concrete structure consists of five major floor levels, two above and two below the street-level lobby.

Major exterior features are made of heavy terra cotta entablatures, red brick pilasters and horizontal banding with radiating brick voussoirs around a 45-foot-wide lunette window on the south facade. The building has a north-south orientation with a passenger concourse and two covered platforms at the rear. The central barrel-vaulted waiting hall is flanked by three-story-high office wings at either side. Although underutilized since 1971, the building exterior and interior are largely unaltered.

General deterioration of the exterior and local damage from major earthquakes in 1949 and 1965 have separated some brick masonry cornices. Major structural improvements would be required of any project at Union Station.

The Union Pacific Station property is surrounded by elevated streets, bridges and retaining walls, some having structural deficiencies and requiring repairs.

Downtowner Apartments (New Richmond Hotel) - #2 - 308 Fourth Avenue South (Figure 6-3)
Eligible for National Register of Historic Places

Built in 1910 in a record-breaking 300 days, the Downtowner Apartments was and still is the tallest structure in the International District.

This nine-story building originally contained 304 rooms on the upper floors and 11 retail shops at the street level. In the early 1970s, the building was renovated using federal HUD monies, and it now houses low-income elderly tenants who occupy 240 apartment units.

The designers of the New Richmond Hotel were A. Warren Gould and E.F. Champney, established Seattle architects.

Great Northern Railroad Tunnel - #3 - beneath Seattle Central Business District, south portal just south of Washington Street at Fourth Avenue South (Figure 6-3)
Eligible for National Register of Historic Places

During 1903-05 the Great Northern Railroad constructed a mile-long tunnel beneath Seattle's Central Business District in order to channel freight and passenger trains from its incoming lines north of the city to the improved freight yards and new Union Station on the tidelands south of the old city core.

The tunnel has been in continuous use for both passenger and freight traffic since its completion. Built by and for the Great Northern, it became the property of the Burlington Northern in 1970 when the Great Northern, the Northern Pacific, the Chicago, Burlington and Quincy, and the Spokane, Portland and Seattle lines merged to form the Burlington Northern Railroad.

Kaplan Building - #5 - 300-314 South Washington, 127 Prefontaine Place South (Figure 6-4)
National Register of Historic Places

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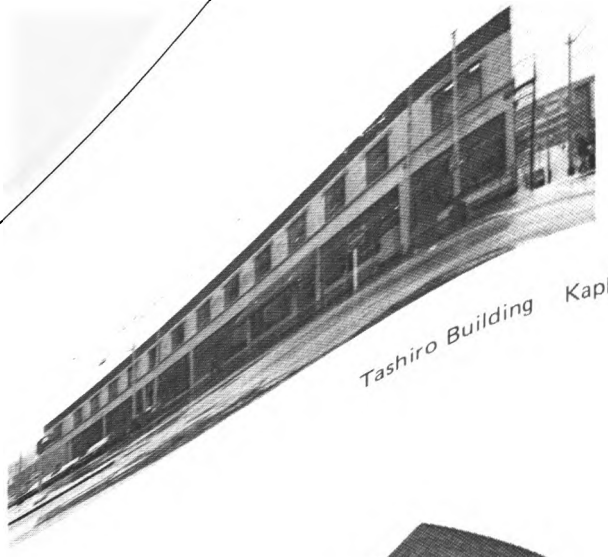
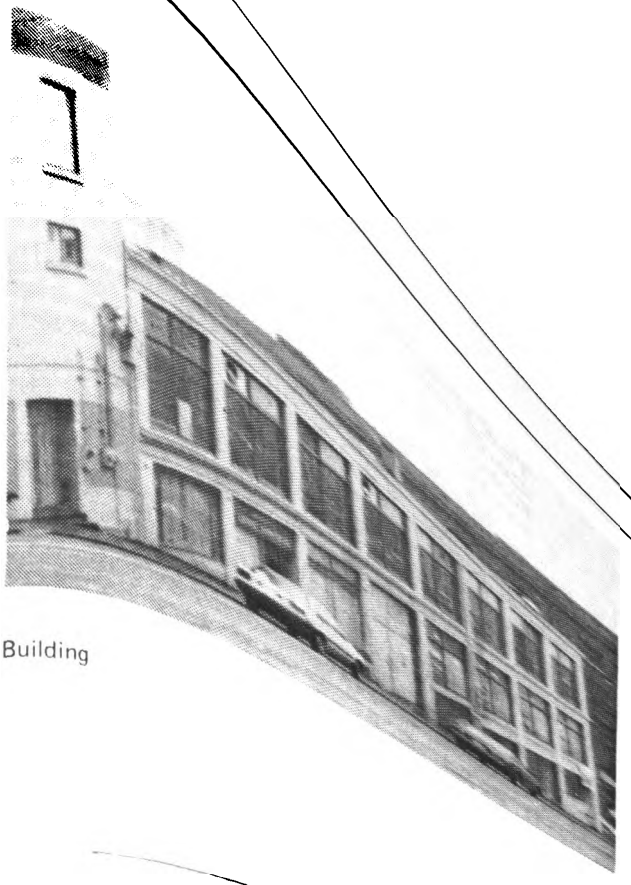
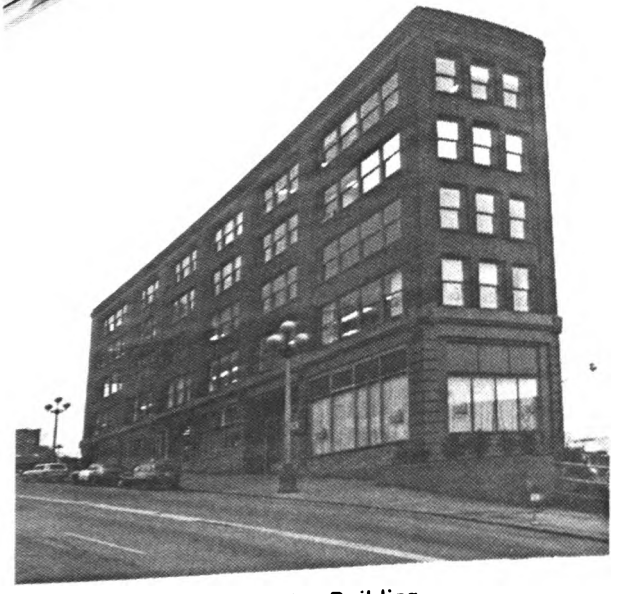


Tashiro Building



Kaplan Building



Prefontaine Building

Frye Hotel

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FIGURE 6-4

Kaplan Warehouse, Prefontaine Building, Tashiro Hardware Building, Frye Hotel

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The building dates from 1900-1910, the decade of Seattle's explosive growth. Contemporary with the neighboring Tashiro Hardware Building and the Prefontaine Building nearby it is compatible with both buildings in terms of construction material and the straightforward articulation of its exterior.

Tashiro Building - #6 - 101-113 Prefontaine Place South (Figure 6-4)
National Register of Historic Places

The building dates from 1900-1910. It is contemporary and, like the Kaplan warehouse, compatible with the nearby Prefontaine Building in terms of construction material and the straightforward articulation of its exterior.

Prefontaine Building - #7 - 100-108 Prefontaine Place South (Figure 6-4)
National Register of Historic Places

The building dates from 1900-1910. Its six-story, red brick, north facade crucialil defines of the southerly border of the open space created by City Hall Park. The triangular free-standing structure is unique in that its southwesterly frontage is contoured in response to the curved street segment, cut through the block after 1905.

Frye Hotel - #9 - 219-225 Yesler Way (Figure 6-4)
National Register of Historic Places

The Frye Hotel at Third and Yesler was among the tallest buildings in downtown Seattle when it was constructed in 1900. The Hotel, designed by Bebb and Mendell, is highly ornamented in the tradition of the Second Renaisance Revival and is finished with pale brown brick and terra cotta trim on its public facades. It is currently used as senior citizens' housing.

Prefontaine Place Park - #10 - Third and Yesler (Figure 6-5)
National Register of Historic Places

Henry Yesler deeded the 1800-square-foot (0.4-acre) triangle park in 1909 to the city for a library. A park was developed in 1925 and named after Father (Msgr) F. X. Prefontaine (b. Montreal 1838), who chose it as the site for Seattle's first Catholic Church built in 1869.

The small park has a brick terrace surrounding a circular pool decorated with sculptured tortoises and spouting water jets. This space is used almost exclusively by the homeless and residents of nearby hotels and residential units to socialize. Most arrive from the south and west and do not cross Third Avenue to reach the park.

City Hall Park - #11 - Fourth Avenue and Yesler Way, Third Avenue and Jefferson Street (Figure 6-5)
National Register of Historic Places

City Hall Park occupies a city block (0.7 acre) south of the King County Courthouse in the Pioneer Square Historic District. Its boundaries are Jefferson Street to the north, Third Avenue to the west, Yesler to the south and Fourth Avenue to the east.

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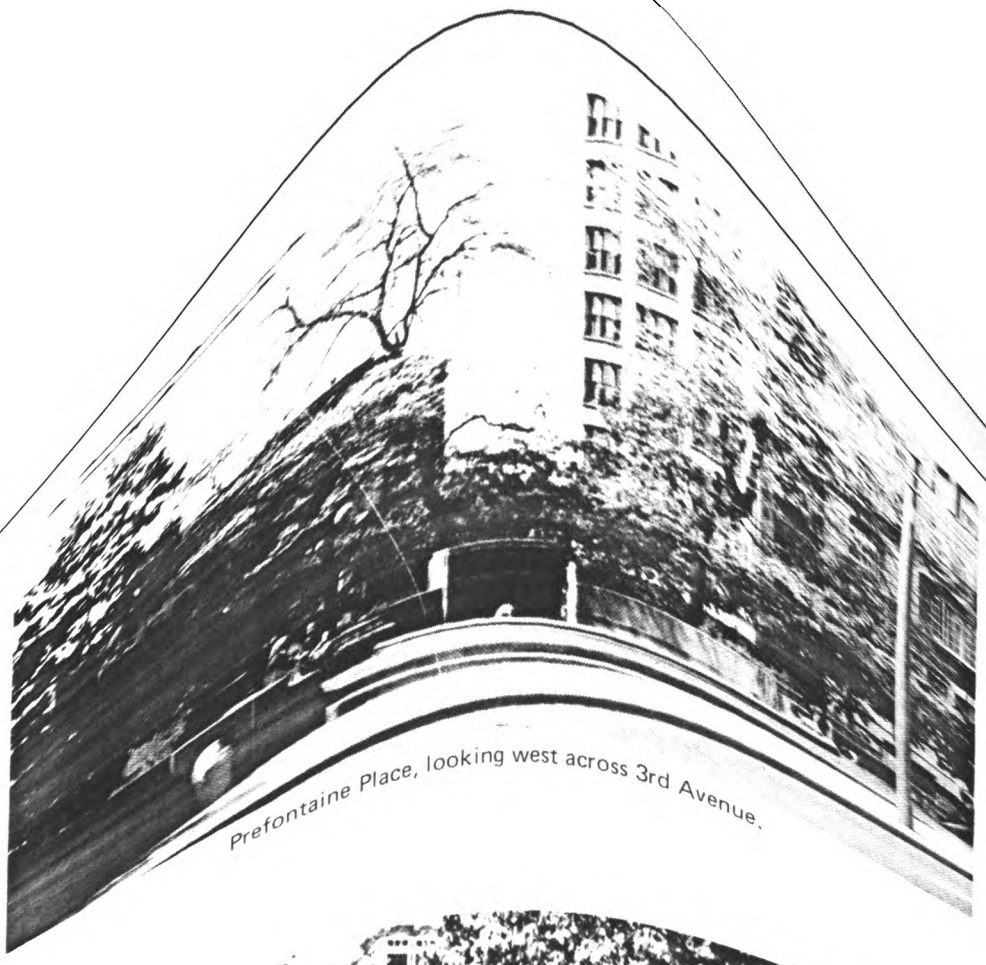
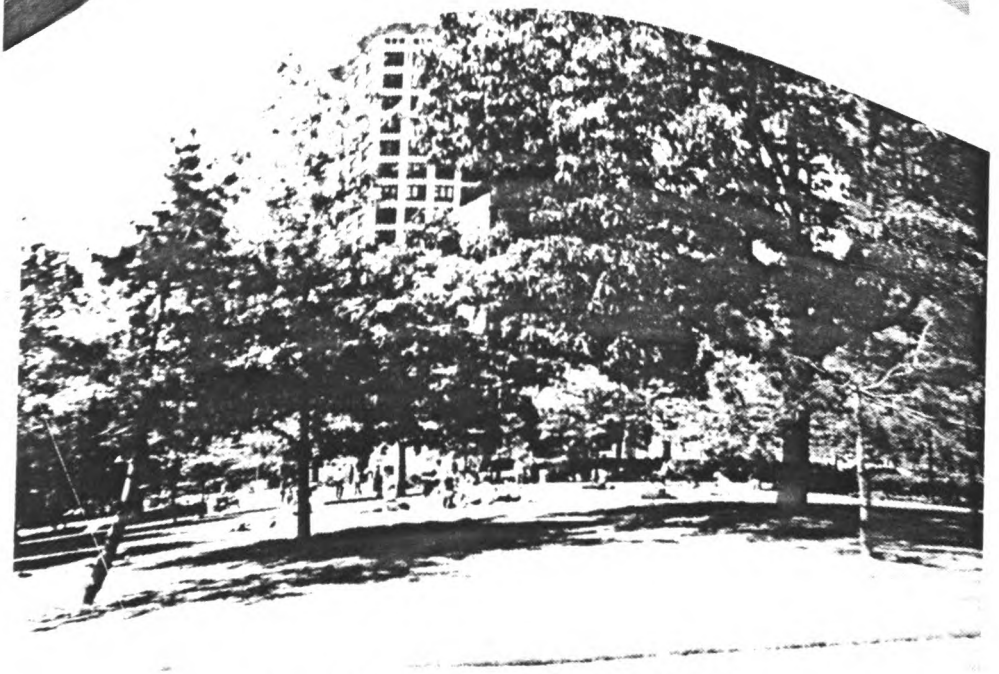


Prefontaine Place, looking west across 3rd Avenue.



City Hall Park looking west from 5th Avenue.

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FIGURE 6-5

Prefontaine Place and City Hall Park

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The area is the site of the Battle of Seattle between settlers and Indians in 1856. A plaque in the southwest corner of the park commemorates the event. Before being turned into a park, the site contained several buildings including City Hall, then a wood-framed structure nicknamed Katsenjammer Castle. The City vacated the castle in 1909 and moved into the newly-built Public Safety Building at Fourth Avenue and Yesler Way. The site was cleared of structures soon after and has been open space ever since, making it one of Seattle's oldest parks.

The park has mature trees, benches, checkerboard tables, seats, lamp posts and a commemorative rock with cannon balls and two plaques.

City Hall Park is heavily used by the homeless and nearby residents. The parking along Dilling Way at the southern end of the park is used by employees or visitors to nearby buildings and not by park users.

Principal park activities usually take place around noon and include sitting on benches or chairs, lying on the lawn, playing checkers and picnicking.

King County Courthouse - #12 - Third Avenue and James Street (Figure 6-6)
National Register of Historic Places

The King County Courthouse dates from the last of the district's three historic periods; 1911-1916. The site, which King County acquired in 1903, comprised the entire block bounded by Third and Fourth avenues, James and Jefferson streets. The design by A. Warren Gould in 1910 was a 22-story, H-shaped skyscraper in the tradition of the Second Renaissance Revival. The 13-story legs of the H-shaped building extended the entire length of the block. In conformance with revised city ordinances restricting building heights, a series of setbacks formed a pyramid-topped tower on the taller central connection. Owing to budgetary limitations, the plan was to erect the first six stories. An additional five stories conforming to Gould's original design were constructed in 1930-31, but the heightened connection and tower was never carried out. In 1951 the building was vacated by the city upon completion of the new Public Safety Building on Third Avenue and James Street. King County has been the exclusive occupant since that time.

Morrison Hotel - #13 - 501-517 Third Avenue (Figure 6-6)
National Register of Historic Places

The building dates from 1900-1910. The mass and formality of its brick facades suitably define a corner of the green open space created by City Hall Park and Prefontaine Place. Originally, it was the home of the Arctic Club, successor of the Alaska Club organized by veterans of the Klondike Gold Rush in 1897-1898. The club occupied the entire second floor. Plans were drawn by James H. Schack and Daniel R. Huntington.

Hotel Drexel - #16 - 519-525 Third Avenue (Figure 6-6)
National Register of Historic Places

The Hotel Drexel is believed to predate the Great Fire which destroyed Seattle's business section in 1889. The construction date assigned by the County Assessor, however, is 1890. In any event, when the site was regraded after the fire, the two-story frame building was raised upon a basement and ground story of solid brick

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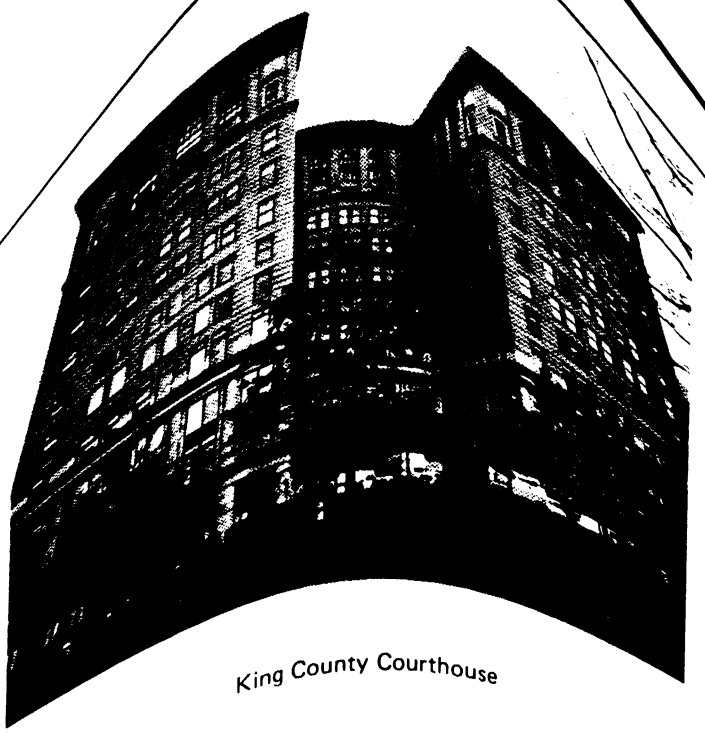
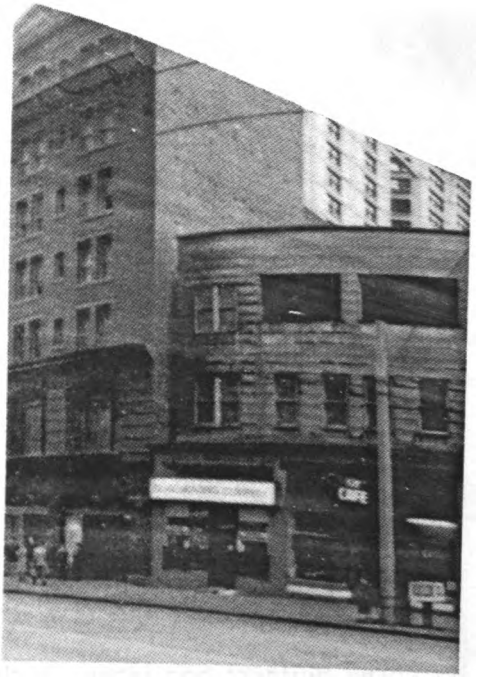


King County Courthouse

Hotel Morrison



Hotel Drexel

DOWNTOWN SEATTLE TRANSIT PROJECT

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FIGURE 6-6

King County Courthouse, Hotel Morrison and Hotel Drexel

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masonry. The latter project was carried out under the supervision of Timotheus Josenhans and Norris B. Allan, well-known local architects of the day. The old hotel was remodeled during the Post World War II period, and as a consequence its most historic upper stories are now disguised by false stone facing.

Lyon Building - #17 - 607 Third Avenue (Figure 6-7)
Eligible for National Register of Historic Places

The Lyon Building is a six-story commercial building located on the northwest corner of Third Avenue and James Street, designed by John Graham and David Myers during their partnership (1905-1911). It was built at a cost of $285,000 for A. Auzias-Turenne, a pioneer who made his fortune in the Klondike Gold Rush. A bank and retail business occupy the street level on Third Avenue. Because of the steep slope of James Street, the basement level is above grade on this elevation and occupied by retail shops.

Artic Building - #20 - 306 Cherry Street (Figure 6-7)
National Register of Historic Places

The Artic Building occupies the northeast corner of Third Avenue and Cherry Street. The 10-story office building has recently undergone a major rehabilitation. It was erected on the property of Judge Joseph R. Lewis, Chief Justice of Washington Territory and a descendant of Betty Washington, sister of George Washington. Built as the headquarters of the Artic Club, a social gathering of Seattlites who participated in the Alaska Gold Rush, the building was designed by A. Warren Gould, a local architect noted for a number of Seattle's finest commercial buildings. The Artic Building has a glazed terra cotta facade with walrus heads adorning the piers at the third floor. The main entrance and a number of retail businesses are located along Third Avenue. The building also has an entrance on Cherry Street.

Dexter Horton Building - #21 - 710 Second Avenue (Figure 6-7)
Eligible for National Register of Historic Places

The Dexter Horton Building was named for the founder of the Dexter Horton Bank, known today as Seattle First National Bank. Its headquarters were housed in this building from its completion in 1923 until the bank's move to the SeaFirst Tower at Third and Madison in the late 1960s.

A Seattle-based architect, John Graham, who was the city's major designer of office buildings in the downtown, prepared plans for the building. The 15-story structure rose in two sections. The bank had its headquarters in the lower stories of this modern structure. The building accommodations included 1,000 offices, representing a rental area of approximately 5-3/4 acres, making it one of the largest office buildings in the country. Interior finishing and equipment included every modern innovation known at the time, from high-speed elevators, averaging 600 feet a minute, to "ultra-modern," centralized lavatories.

The builders had intended that the new structure be built using local materials and services whenever possible. The exterior is faced with terra cotta furnished by the Northern Clay Company of Auburn, Washington. Granite came from the West Coast Monumental Company of Seattle.

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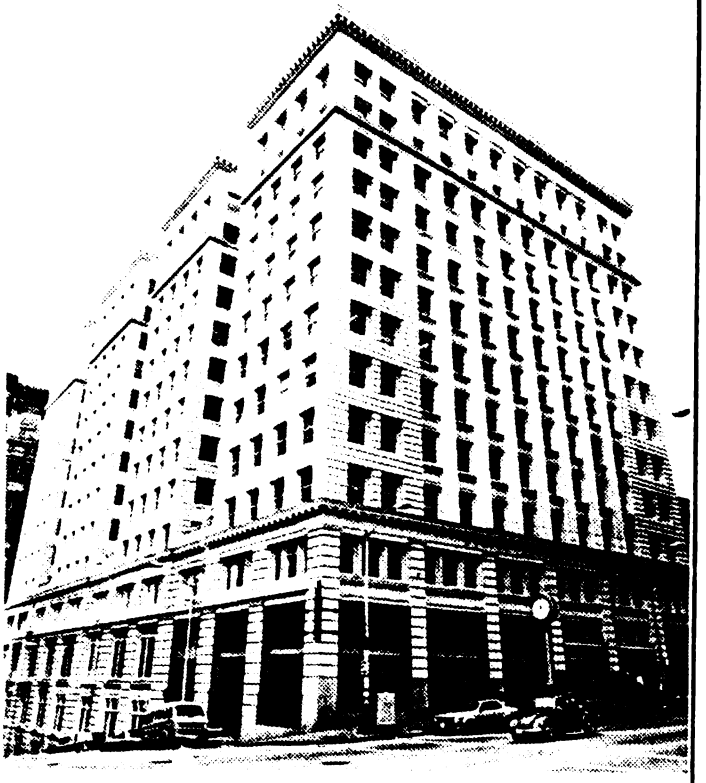
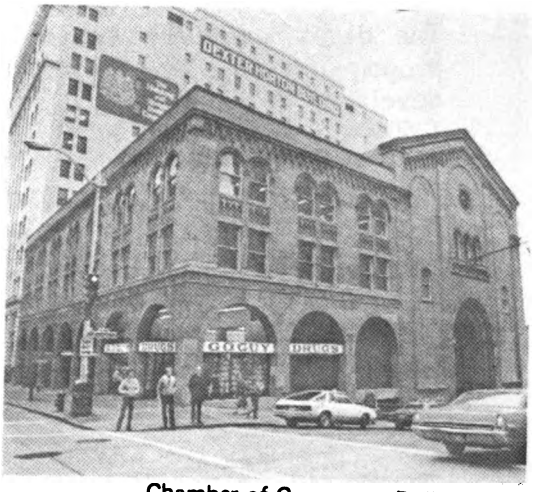
Lyon Building



Dexter Horton Building

Artic Building



Chamber of Commerce Building

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FIGURE 6-7

Lyon Building, Dexter Horton Building, Arctic Building, Chamber of Commerce Building

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Chamber of Commerce Building - #23 - 219 Columbia Street (Figure 6-7)
Eligible for National Register of Historic Places

The Chamber of Commerce building, designed by Harlan Thomas and the firm of Schack, Young, and Myers, was constructed in 3.5 months and completed in October 1924 for $275,000. The chamber originally occupied the upper floors, where offices and exhibit space for Northwest products were located. Public spaces included a spacious dining room that would accommodate over 700 people, several private dining rooms and a large lounge. The Seattle Real Estate Board, the Seattle Chapter of the American Association of Engineers and the Merchants' Exchange were also housed in the building.

In 1970 the building was remodeled, including restoration of the arches in the facade (storefronts had been tampered with during its 45 years of use), and renovation of the interior spaces. In 1983, the Seattle Chamber of Commerce vacated the building to move to the One Union Square and TRA purchased the building.

Central Building - #24 - 810 Third Avenue (Figure 6-8)
Eligible for National Register of Historic Places

The Central Building, designed by C. R. Aldrich, provided downtown Seattle with more office space than any other commercial building to that time. It had 214,000 square feet of floor area and contained 350 office rooms, 11 store and banking rooms, and 15 or more "basement" locations. Although only 8 floors were built, the owners has intended to complete it to an "average height of 14 floors, making it one of the impressive pieces of architecture in the United States."

The developers were Arthur L. Hawley and Judge W. D. Wood, who had been proponents of a civic center several years earlier. The Central Building was developed through the "unit ownership" idea, created by Hawley and Wood, in which 1,500 "units" were sold at $1,000 each to cover the cost of construction.

Despite alterations to the elevators and entrance doors, the Central Building lobby is intact. It includes two marble staircases with substantial curved bannisters and newell posts gracing either side of the lobby and leading to the mezzanine, and four elevators, paired at either side of the entrance foyer.

Pacific Telephone and Telegraph Building (Pacific Northwest Telephone Building) - #25 - Third Avenue and Seneca Street (Figure 6-8)
Eligible for National Register of Historic Places

The Pacific Telegraph Building was designed in 1920 by a San Francisco architect, E. B. Cobby, and was intended to house both the offices and the equipment of the Pacific Telephone and Telegraph Company.

The building exhibits an innovative fire-proof and unusually heavy structural system, which was necessary because of the nature of the heavy equipment the building was to house.

The three-story base is clad in glazed terra cotta. An ornamental frieze below a shallow cornice separates the terra cotta clad base from the office floors above it. These 11 floors feature unadorned, brick-faced piers and paired, double-hung

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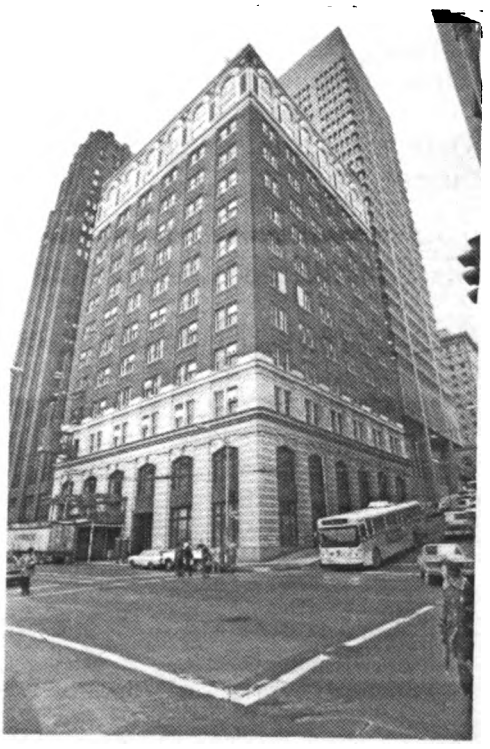
Central Building

Seattle Tower



Pacific Telephone and Telegraph

DOWNTOWN SEATTLE TRANSIT PROJECT

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FIGURE 6-8

Central Building, Pacific Telephone and Telegraph and Seattle Tower

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windows. The top two stories are brick-faced with substantial terra cotta trim and feature round-arched window openings, ornamental spandrels and decorative medallions. The 12th and 13th floors were added in 1926.

Seattle Tower/Northern Life Tower - #28 - 1214-1222 Third Avenue (Figure 6-8)
National Register of Historic Places

The Northern Life Tower is a 27-story skyscraper on the corner of Third Avenue and University Street. Built on the edge of the city's financial district, it was designed for the Northern Life Insurance Company by A. H. Albertson and completed in 1928. The ground-level facade is of pink granite panels with a brick veneer on the piers. The brick continues above on a structural steel frame. The style resembles the setback form popular in modern highrise design on the East Coast during the 1920s. The detailed masonry together with terra cotta trim make up much of the exterior's fine art deco decoration. Once Seattle's tallest building, it is regarded today as one of the finest design achievements in the city. The main entrance lobby and retail shops front on Third Avenue.

Ethelton Hotel (Bogardus-Elliott Building) - #31 - 1317 Third Avenue (Figure 6-9)
Eligible for National Register of Historic Places

The Bogardus-Elliott Building (now the Ethelton), a six-story hotel, is one of the many small downtown hotels constructed around the turn of the century to house the large influx of people who came to Seattle with the coming of the railroads and the Yukon Gold Rush in 1898. Bebb & Mendel, designers of the Bogardus-Elliott Building, were all respected members of the architectual community and had achieved national attention.

While the street-level shopfronts are occupied, the upper-story hotel floors are currently vacant.

Hotel Fairview (Hotel Bybee) - #32 - 1321 Third Avenue (Figure 6-9)
Eligible for National Register of Historic Places

The Hotel Bybee is one of the few turn-of-the-century, low-rise buildings remaining in the Central Business District. It is one of many small hotels constructed in downtown around the turn of the century.

At the street level, the building's entrance and retail storefronts are not distinguished, having undergone successive remodelings over the years. While the street-level shopfronts are occupied, the upper hotel floors are currently vacant.

Embassy Theatre (Mann Building) - #33 - 1411 Third Avenue (Figure 6-9)
Eligible for National Register of Historic Places

Although the Embassy Theatre was constructed in 1926, a theatre had been on the site as early as 1911, when the Union Theatre opened its doors. The Union was one of a chain of theatres operated by Eugene Levy.

Henry Bittman, the architect of the Mann Building, was responsible for a great many downtown terra cotta buildings.

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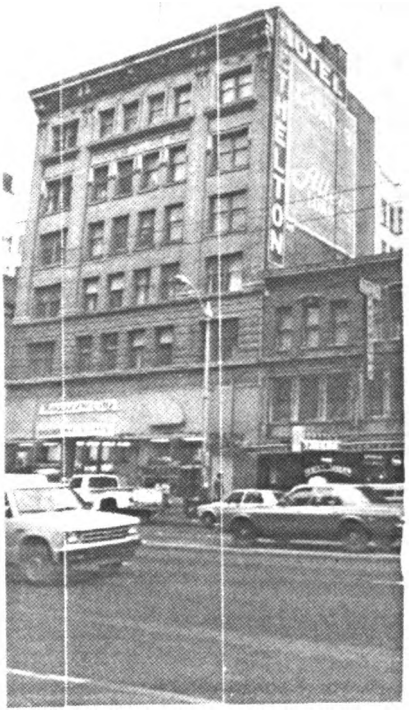
Hotel Fairview



Ethelton Hotel

Embassy Theatre

DOWNTOWN SEATTLE TRANSIT PROJECT

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FIGURE 6-9

Ethelton Hotel, Hotel Fairview and Embassy Theatre

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Joseph Vance Building - #34 - 1402 Third Avenue (Figure 6-10)
Eligible for National Register of Historic Places

The Joseph Vance Building, built in 1929 by V. W. Voorhees, is located on the northeast corner of the intersection of Third Avenue and Union Street. Fourteen stories in height, it houses retail businesses at ground level and offices on the floors above. The two major facades are entirely clad in tan-colored terra cotta with polychrome terra cotta trim.

The street-level shopfronts and interior retail spaces have been altered. An original marquee has been removed, and the entrance is now framed by polished rose granite. Red vitrolux tiles surround the display windows of the corner retail space, remodeled in the 1940s.

Melbourne Tower (Republic Building) - #35 - 1511 Third Avenue (Figure 6-10)
Eligible for National Register of Historic Places

The Republic Building, a 10-story commercial building, is one of several structures built in downtown Seattle during the 1920s that formed a cohesive group by nature of their height, their structural system and the treatment of their exterior cladding. Each is a corner building with nearly identical street elevations, which emphasize the vertical qualities of these highrise structures. The builder was Lawton and Moldenhauer.

Fischer Studio Building - #36 - 1519 Third Avenue (Figure 6-10)
Eligible for National Register of Historic Places

Between 1912-15 the Fischer Studio Building presented a unique approach to housing performing artists in Seattle. It was designed to accommodate both living and teaching spaces for dancers, musicians and vocalists, while also providing a large performing space on the top floor for recitals by these artists and their pupils.

The building was constructed in two phases. The first three stores, designed by Bebb & Mendel, were built in 1912; the remaining five stores, designed by Bebb & Gould, were added in 1915. The completed building contained retail space at ground level, 40 small studio and one-bedroom apartments on five floors and an auditorium in the upper two stories.

An extensive remodeling of the interior was undertaken in 1974 to convert the building to condominiums. The number of residential units was reduced to 25 so that larger apartments could be accommodated. Even the auditorium space was converted for residential use, although some of the original classical details of the walls and ceilings were retained.

Olympic Tower (United Shopping Tower) - #37 - 217 Pine Street (Figure 6-11)
National Register of Historic Places

Considered one of Seattle's finest art deco commercial buildings, the tower was recently rehabilitated and renamed. Originally built in 1929 as the United Shopping Tower, it is located on the southwest corner of Third Avenue and Pine Street. A 13-story reinforced concrete structure with enamel terra cotta on two sides, the three-story base provides retail frontage at Third and Pine and supports a 10-story

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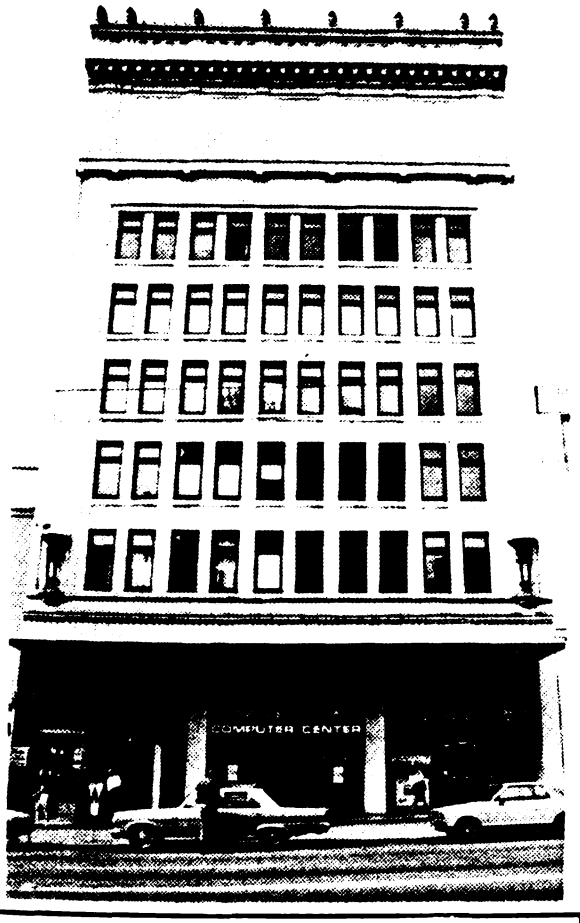
Melbourne Tower

Joseph Vance Building



Fischer Studio Building

DOWNTOWN SEATTLE TRANSIT PROJECT

METRO City of Seattle

FIGURE 6-10

Joseph Vance Building, Melbourne Tower and Fischer Studio Building

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Olympic Tower

Sixth and Pine Building

Camlin Hotel

DOWNTOWN SEATTLE TRANSIT PROJECT

METRO City of Seattle

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FIGURE 6-11

Olympic Tower, Sixth and Pine Building and Camlin Hotel

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tower setback from Third Avenue at the fourth floor. Another vertical articulation at the 12th floor forms an ornate two-story "penthouse." Art deco terra cotta adorn the frieze at the second floor and again at the 11th floor. The terra cotta is decorated with a flower motif at the frieze, parapet and penthouse. The building below grade extends under the city sidewalk into an areaway around the corner. The main entrance is off Pine Street.

Sixth and Pine Building (Shafer Building) - #39 - 515 Pine Street (Figure 6-11)
Eligible for National Register of Historic Places

The Shafer Building is an excellent example of the Chicago-style commercial architecture developed in the late 1880s. Although it is a late (1923) addition to Seattle's collection of Chicago-style commercial buildings, the Shafer Building's extraordinarily minimal structure, large window expanses, honest expression of structure and function and adept application of "Gothic" motifs to the terra cotta surfaces provided Seattle's downtown with one of its best highrise structures.

As the tallest building north of Pike and Fourth, the Shafer Building demonstrates the shift in major retailing and commercial space northward, probably encouraged by the establishment of the Frederick & Nelson department store at Fifth and Pine in 1918.

Camlin Hotel - #41 - 1619 Ninth Avenue (Figure 6-11)
Eligible for National Register of Historic Places

The Camlin Hotel is an example of a type of multi-unit residential building which was common in Seattle in the 1920s. These were usually straightforward utilitarian structures which were overlaid with "period" ornamentation to lend them a distinctive character. As was the practice with many commercial buildings of the period, the sides of the building that did not face onto the street were left bare on the assumption that later developments would obscure these sides from view.

Paramount Theater - #43 - 901 Pine Street (Figure 6-12)
National Register of Historic Places

The Paramount is Seattle's version of the Paramount Theater in New York. It covers approximately half a city block and stands eight stories high. The front of the building is on Pine Street with the sides extending south down Ninth Avenue. An ornate iron fire escape is on the side of the building. The front consists of the box office flanked on either side by the main entrance doors. A triangular marquee projects over the sidewalk and forms a base of a restored vintage electric sign. The building front contains two other smaller storefronts. Built in 1928, it is noted for its exterior elegance and rich luxurious interior decor. The architects, Marcus Pritteca and F. J. Peters, were noted for this work as well as a number of other theater houses throughout the Northwest and West Coast. Originally a motion picture house, the present owner has recently completed restoration and is now booking live performances.

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Olive Tower

Paramount Theater

DOWNTOWN SEATTLE TRANSIT PROJECT

METRO City of Seattle

FIGURE 6-12

Paramount Theatre and Olive Tower

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Olive Tower - #44 - 1624 Boren Avenue (Figure 6-12)
Eligible for National Register of Historic Places

One of a number of downtown residential hotels built between 1915-1930, the Olive Tower had 74 two-room apartments and was reputed to have an "abundance of interior light." The architect, Earl Morrison, established himself as one of the foremost apartment building designers in the city with the Olive Tower. He adapted and refined its modernistic form using Gothic decoration rather than the more up-to-date art deco designs, for his successful Textile Tower on Seventh Avenue and Olive Street.

6.2 Archaeology Resources

6.2.1 Introduction

The Downtown Transit Project follows existing right-of-way through extensively urbanized areas. Very little undisturbed original ground surface is visible, and little is known of archaeological sites in the CBD. A more detailed description of the archaeologic study performed for this project is contained in the Metro's technical report: Archaeological Resources Assessment for the Downtown Seattle Transit Tunnel Project, Dec. 19, 1984.

6.2.2 Archaeological Resources

The history of landform alteration in downtown Seattle as well as reconstruction associated with the Great Fire of 1889 suggest that archaeological resources could be preserved under some of the city's present buildings and streets.

The present site of Seattle was settled in 1852, and the pioneers immediately began to cut soils from the higher areas and fill the lower areas, including the tideflats of Elliott Bay at the mouth of the Duwamish River. These grades and regrades covered larger areas and involved greater volumes of materials as earthmoving technology improved through the later 19th and earlier 20th centuries. Following the Great Fire, downtown buildings were immediately reconstructed, and city officials decided to widen the streets and raise their levels. Raising the streets buried the lower stories of many reconstructed buildings in and near the southern portion of the project area.

Earthmoving and the demolition and reconstruction of buildings in the downtown area clearly has destroyed large portions of the city's archaeological record. However, some portions of the record may be preserved within the area of the Downtown Seattle Transit Project. Because the study area is almost completely covered by paved streets and buildings, normal archaeological exploration methods, consisting of the examination of soil exposures and the excavation of shovel test pits, are not feasible. Also, a portion of the study area, generally south of Jackson Street, remained tidelands until the 1890s.

To assess the potential for buried significant archaeologic resources the following tasks were completed (see Archaeological Resources Assessment for the Downtown Seattle Transit Tunnel Project, December 19, 1984):

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- o Review of historical maps, profiles, records and geotechnical borehole data to profile "operation areas" or areas of fill that might contain archaeological resources associated with former street grades.

- o Archival research to chronicle historical development within each operation area to characterize the nature and extent of potential archaeological resources; consultations with the State Historic Preservation Officer and the Seattle Historic Preservation Officer regarding possible resource significance.

- o Review of ongoing project geotechnical borehole data from operation areas to confirm and refine their definition and identify evidence of archeological remains.

The analysis of historical profiles and geotechnical borehole data has identified five operation areas where fill above original ground may preserve archeological remains beneath the present street grade. The archival research has indicated the types of historical land use associated with the operation areas, indicating what kinds of archaeological remains might be found in them.

6.2.3 Significance of Archaeological Resources

The significance of archaeological remains is evaluated in terms of their eligibility for listing in the National Register of Historic Places. The Advisory Council on Historic Preservation has established four criteria for evaluating cultural properties:

> The quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location design, setting, materials, workmanship, feeling, and
>
> a) that are associated with events that have made a significant contribution to the broad patterns of our history;
>
> b) that are associated with the lives of persons significant in our past
>
> c) that embody the distinctive characteristics of a type, period or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction
>
> d) that have yielded, or may likely yield, information important in prehistory or history (36 CFR 60.4).

Archaeological remains normally are considered under criterion (d) which addresses their likelihood of yielding information important in prehistory or history. The identification of deposits and the significance of these deposits would be determined as early as possible in accordance with the Memorandum of Agreement (MOA), Figure 6-13.

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STATE OF WASHINGTON
OFFICE OF ARCHAEOLOGY AND HISTORIC PRESERVATION
111 West Twenty-first Avenue KL-11 • Olympia, Washington 98504 • (206) 753-4011

JACOB E. THOMAS
Director

March 1, 1985

Ms. Susan L. Killen
Environmental Planning Division
METRO, Exchange Building
821 Second Avenue
Seattle, WA 98104

Dear Ms. Killen:

We have reviewed the 4(f) Preliminary Case Peport for METRO's Downtown Seattle Transit Project. In our opinion, METRO has taken unusual precautions to avoid impacts on historic and archaeological sites and to minimize adverse effects of the project where historic or archaeological sites could not be avoided.

METRO first contacted the Office of Archaeology and Historic Preservation concerning this project in 1982. We discussed potential planning issues with their representatives, and suggested that a cultural resource survey be conducted before the final alignment was decided. Since then we have been in regular contact with METRO's planning staff.

METRO has identified all historic properties within the impact area including 28 buildings which are eligible for the National Register but not yet listed. This information is being used in evaluating options for locating station access points, ventilators, and all aboveground improvements. Through this process, potential adverse effects have been limited to only three historic buildings, and a Memorandum of Agreement is now being negotiated to mitigate the harm that might be caused if these buildings are actually included in the project. More than a dozen historic buildings were eliminated from consideration for use in connection with the project, and the decision on the location of at least one of the stations was influenced by potential impacts on adjacent historic properties. The project design calls for measures to limit construction noise and vibration to a level that will not cause structural damage to historic property and sufficient shoring will be provided to avoid undermining or otherwise weakening building foundations.

Since the Pioneer Square Historic District occupies the entire southern end of Seattle's central business district, it is inevitable that the southern terminus of the project will be located in Pioneer Square if it is to serve businesses in that area. The selection of the rail

yard behind Union Station for the southern end of the tunnel is the preferred option because it is below the surrounding street elevation and any associated construction will be less visible when viewed from elsewhere within the historic district.

The most significant unknown at this time is the potential effect of the project on archaeological sites. METRO has done preliminary studies to determine where archaeological sites might exist based upon the history of ground disturbance in the area and the city's early development patterns. However, the impracticality of subsurface investigation in an urban setting has limited the archaeological field reconnaissance to a series of test borings which serve to confirm the archival record. The proposed Memorandum of Agreement would establish a process whereby further archaeological investigations would take place under the supervision of the State Historic Preservation Officer. We believe that a phased approach to the archaeological studies will result in the most cost effective method for identifying significant archaeological resources and recovering the data they contain. Provided that the proposed Memorandum of Agreement is implemented, we believe that the Downtown Seattle Transit Project has fully complied with Section 4(f) of the Department of Transportation Act.

Sincerely,

Jacob E. Thomas
State Historic Preservation Officer

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FIGURE 6-13

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MEMORANDUM OF AGREEMENT

Seattle Downtown Transit Project

WHEREAS, the Urban Mass Transportation Administration (UMTA), U.S. Department of Transportation, has determined that the Seattle Downtown Transit Project (Project) will have an effect upon properties included in or eligible for inclusion in the National Register of Historic Places and has requested the comments of the Advisory Council on Historic Preservation (Council) pursuant to Section 106 of the National Historic Preservation Act (16 U.S.C. 470) and its implementing regulations, "Protection of Historic and Cultural Properties" (36 CFR Part 800),

NOW, THEREFORE, UMTA, the Washington State Historic Preservation Officer (SHPO), and the Council agree that in the event UMTA decides to fund the preferred tunnel alternative, the undertaking shall be implemented in accordance with this Memorandum of Agreement in order to take into account the effect of the undertaking on historic properties.

Execution of this Memorandum of Agreement evidences that UMTA has afforded the Council a reasonable opportunity to comment on the Project and its effects on historic properties and that UMTA has taken into account the effects of its undertaking on historic properties.

UMTA will ensure that the following measures are carried out by the Municipality of Metropolitan Seattle (METRO) if the tunnel alternative is selected:

I. UNION STATION, PARAMOUNT THEATER AND MODIFICATIONS TO ANY NATIONAL REGISTER ELIGIBLE BUILDING

A. Union Station

Project facilities, including any lid, at Union Station will be built as described in the project final Environmental Impact Statement and in accordance with the following conditions:

1. Final plans and specifications for transit tunnel project facilities at Union Station will be developed in consultation with the Washington SHPO, the City of Seattle Office of Urban Conservation and any affected local review boards, who will be afforded 30 days to review and comment on these documents. If there are any objections to the final designs, there will be further consultation between METRO, the Washington SHPO and the City of Seattle Office of Urban Conservation for agreement. If no agreement is reached, the Council will be afforded ten days to offer a recommendation regarding this disagreement. METRO, in consultation with UMTA, will take this recommendation into account in reaching a final decision regarding the design.

2. All trackage and structures associated with Union Station to be substantially altered or demolished will be recorded prior to demolition or alteration so that there will be a permanent record of their present appearance. Historic American Engineering Record/Historic American Buildings Survey (HAER/HABS) (National Park Service, Department of the Interior, Western Regional Office, 450 Golden Gate Avenue, Box 36063, San Francisco, California 94102) will first be contacted to determine what documentation is required. All documentation must be accepted by HAER/HABS prior to the demolition or alteration.

B. Paramount Theater

The parties acknowledge that future development over the Ninth and Pine Station shall be subject to applicable City regulatory processes.

C. Modifications to any National Register Eligible Building

Modifications will be in accordance with the "Secretary of the Interior's Standards for Rehabilitation" and the guidelines for new construction contained therein (Attachment 1). Modifications for station entrances will be designed in consultation with the Washington SHPO and the City of Seattle Office of Urban Conservation, and subject to the review established in I.A.1., above.

II. AREAS OF ARCHAEOLOGICAL SENSITIVITY

As early as possible in the Project planning and design, an Archeological Identification and Data Recovery Plan will be developed and implemented to guide the identification of archeological deposits that will be affected by the Project, the evaluation of such deposits for eligibility to the National Register of Historic Places, and the recovery of such archeological data. This Plan will be reviewed in accordance with I.A.1, above.

A. Content and Purposes of the Identification and Data Recovery Plan include, but are not limited to:

1. A Research Design

This research design will meet the "Secretary of the Interior's Standards and Guidelines for Archeological Documentation" (48 Federal Register, September 29, 1983, pp. 44734 - 37) and be responsive to the principles in Part I and recommendations in Part III of the Council's "Treatment of Archeological Properties: A Handbook" (Handbook).

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a. Continued detailed historical research and analysis: Continued historical analysis will be undertaken on the positive and negative potential for, archeological nature of, and relative importance of archeological deposits that would be affected by the Project.

b. Research questions or topics: Based on the historical research and analysis, research questions or topics will be developed that make a substantial contribution to the prehistory and/or history and/or address anthropological issues relative to Seattle and area. Research questions or topics will not be posed that could be readily answered from archeological data available outside the Project or that could be answered by non-archeological means. Further, this research design will justify the importance of the chosen research questions or topics.

c. Project-specific evaluation criteria: Based on the above and the analysis in the EIS, criteria or archeological expectations will be developed for evaluating whether archeological deposits to be affected by the Project are eligible for the National Register of Historic Places. These criteria or expectations will specify the archeological bases (i.e., archeological features and/or artifacts, amount of such material, relations between such material, and observable indications of archeological integrity or lack of integrity, etc.) from which it will be determined whether or not such deposits can answer well the research questions or topics detailed above.

2. A Strategy for Identification

A strategy will be developed for identifying whether these are eligible for the National Register. The scope of this strategy will be determined in consultation with the Washington SHPO. The results of the strategy, once implemented, will be evaluated in consultation with the Washington SHPO, and by application of the Project-specific evaluation criteria, above, and the National Register Criteria (36 CFR 60.4). If there is disagreement as to whether an archeological deposit meets the National Register Criteria, a determination of eligibility will be requested in accordance with 36 CFR Part 63.

3. A Plan for Data Recovery

A plan for answering the research questions or topics in the research design will be developed. It will be designed to strike a reasonable balance, in the public interest, among the needs to address significant research through archeology, the significance of the deposits and data to history, science, and the public, and the need

to minimize costs and to complete the construction of the Project in a timely manner. Further, it will address the data and analytical approaches and needs to answer the research questions or topics. The recommendations in Part III of the Council's Handbook will be detailed also.

B. Implementation of the Archeological Identification and Data Recovery Plan

Once reviewed in accordance with I.A.1., above, this Plan will be implemented. II.A will be carried out by a professional archeologist meeting the qualifications in the draft regulation, 36 CFR Part 66, Appendix C and who is knowledgeable of and experienced in urban historical archeology.

III. DESIGN COMPATIBILITY BETWEEN NEW CONSTRUCTION AND HISTORIC PROPERTIES

A. If additional or different projects are undertaken in whole or part by Metro located on Project sites near historic properties, design guidelines will be developed and implemented. The guidelines will be designed to minimize the adverse effects of substantial new construction that may be incompatible with or which may alter the setting and environment of such properties. These guidelines will set forth recommendations regarding height (including height limits), massing, relationship between the building and property lines and other development, building setbacks, fenestration patterns, external colors, textures, and materials of the new construction to ensure compatibility with historic properties. These guidelines will be developed in consultation with the Washington SHPO and subject to the review set forth in I.A.1., above. Plans for these projects will be reviewed in accordance with I.A.1., above, to ensure conformance with these guidelines. It is understood that METRO's obligations under this provision do not extend to construction undertaken by a third party on property (or a portion of property) not needed for nor acquired by METRO for the Project. METRO has no current plans for public/private development at the station sites, and it is METRO's intention to limit acquisition of real property interests to easement rights wherever possible, leaving further development to the landowner. The parties acknowledge that future development on a lid at Union Station shall be subject to applicable City regulatory processes.

B. Less substantial new construction (e.g., substations, vents, and cooling towers and surface parking lots, etc.) will be designed as compatibly as feasible with nearby historic properties.

IV. EFFECTS OF NOISE AND VIBRATION ON HISTORIC AND CULTURAL PROPERTIES

To the extent feasible, the transit tunnel and related facilities will be designed so as to not adversely affect historic and cultural properties due to increased noise and vibration.

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V. Failure to carry out the terms of this agreement requires that UMTA again request the Council's comments in accordance with 36 CFR Part 800. If UMTA cannot carry out the terms of the Agreement, it shall not take or sanction any action or make any irreversible commitment that would result in an adverse effect with respect to National Register or eligible properties covered by the Agreement or would foreclose the Council's consideration of modifications or alternatives to the Project that could avoid or mitigate the adverse effect until the commenting process has been completed.

VI. If any of the signatories to this Agreement determine that the terms of the Agreement cannot be met or believe a change is necessary, that signatory shall immediately request the consulting parties to consider an amendment or addendum to the Agreement. Such an amendment or addendum shall be executed in the same manner as the original Agreement.

VII. Within 90 days after carrying out the terms of the Agreement, UMTA shall provide a written report to all signatories to the Agreement on the actions taken to fulfill the terms of the Agreement.

Washington SHPO 5/2/85
JACOB E. THOMAS (date)

UMTA REGIONAL ADMINISTRATOR 5/3/85 (date)
AUBREY DAVIS

Executive Director, ACHP May 21, 1985 (date)

Chairman, ACHP (date)

I concur:

METRO (Alan Gibbs) 5/1/85 (date)

City of Seattle (Charles Royer) 5/1/85 (date)

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6.2.4 Impacts and Mitigation Measures

Should the study identify potential resources deemed to meet the National Criteria (36 CFR Sec. 60.6) in consultation with the Washington SHPO, plan for further study and treatment would be developed based in the fundings of the study and implemented as specified in the MOA. Should such treatment involve data recovery, the treatment plan would take into account the principles and recommendations set forth in the Council's "Treatment of Archaeological Properties: A Handbook" and would be in accordance with the proposed guidelines, 36 CFR Part 66. All work would be carried out by appropriate professionals.

6.3 Section 4(f) Evaluation

6.3.1 Introduction

The 4(f) statement, which is issued by UMTA, is required by Section 4(f) of the Department of Transportation Act of 1966 (49 USC 1653(f)). The Act declares it a national policy that special effort be made to preserve the natural beauty of the countryside, public park and recreation lands, wildlife and waterfowl refuges and historic sites. Section 4(f) permits the Secretary of Transportation to approve a project that requires the use of publicly-owned land from a park, recreation area, or wildlife refuge, or any land from a historic site of national, state or local significance only if the following determinations have been made: there is no feasible and prudent alternative to the use of such land, and all possible planning has been undertaken to minimize harm to the 4(f) lands resulting from such use. The 4(f) document is included as Figure 6-15.

6.3.2 Parklands

Existing Conditions

The City of Seattle has 5,000 acres of parklands. More than 400 parks and 325 play areas are available for recreational pursuits. A parkland inventory was completed in the CBD (CH2M-Hill, 1983), as part of the requirements of the Department of Transportation Act Section 4(f) within the project study area. Parks potentially affected by the project are listed below (see Figure 6-14). City Hall Park and Prefontaine Place are covered in Section 6.1.

Cherry/Columbia/Fifth Park - Cherry and Columbia, east of Fifth Avenue (1.1 acres)

This park consists of several landscaped areas, paths and benches, adjacent to access ramps to the I-5 express lanes. The site is owned by the state Department of Transportation and landscaped areas are maintained by the Seattle Department of Parks and Recreation.

Westlake Mall (Proposed Park)

This area consists of the Westlake Avenue right-of-way between Pine Street and Fourth Avenue, and a small adjacent triangle of land now occupied by a drug store. The total area, including the bookstore site, is 0.6 acres. A public park has been proposed for the site for two decades. The Westlake Avenue right-of-way currently is closed to traffic and contains a few benches and limited landscaping funded from a 1960 park bond issue. It is used by a mix of people who sit on the benches, feed the birds, eat food purchased from nearby food carts and walk across the area as a

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FIGURE 6-14

Downtown parks

(Source: Downtown Seattle Transit Project Technical Report: Parklands and Historic, Cultural and Archaeological Resources, July 1983)

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shortcut to the retail district. The area's development as a major park is awaiting current City efforts to redevelop the larger Westlake area.

Street Parks (Proposed Parks)

The City of Seattle's Land Use and Transportation Plan Framework Policies for Downtown Seattle (September 1984) proposes that several streets in the study area be developed with special landscaping and pedestrian amenities. Occidental Street between Yesler Way and Jackson Street is an example of a street park. Two proposed street parks are shown in Figure 6-14. The Terry Avenue Street Park would be between Pine and Lenora streets. The Marion Street Park would be between Alaskan Way and Second Avenue on the Marion Street right-of-way. These street parks would lie within or adjacent to the project area.

Impacts

Cherry/Columbia/Fifth Park

This park would not be used by the project. Any changes in traffic patterns adjacent to the park would not affect the use of this park.

Westlake Mall

The park, when developed, would be in the vicinity of a station entrance; however, there would not be a station entrance in the park. There could be an increase of pedestrian use of the park if a station entrance is developed in nearby properties. Metro and the City are working together to ensure such pedestrian increase would have minimal impacts on the park. During construction the "yet-to-be completed" Westlake Park could be used as a construction staging area.

> "Westlake Park" planning will be pursued on a schedule designed to coordinate the Park's construction with other construction in the area. It is anticipated that the Park will be installed following the completion of the METRO Westlake station, especially surface improvements, and to coordinate as closely as possible with the opening of the Rouse Westlake project, probably in late 1989."
>
> (from a letter to Susan Killen from Rebecca Barnes, 12-21-84)

Metro and the City of Seattle have worked through the design stages and will continue to work to assure that the effects of the project on the Westlake Park will be minimal. Station access points have been located separately from the proposed park. Also, there are several well located access points at this station which should minimize and discourage the need to cross the park to use the tunnel station. A bus stop presently located on Fourth Avenue adjacent to the proposed park would be designed to minimize impacts to the park.

Street Parks

The proposed Terry Avenue Street Park could still be developed between Pine Street and Olive Way. Once the station and staging area is constructed a lid could be put

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on top of the property and a park developed, at grade, on the lid. The City as joint lead on this project is aware of the plans for the station and wishes to continue to propose a street park at this location as part of its long-range plans.

The proposed Marion Street Park would not be affected by the project since it is west of the alignment.

6.3.3 Historic Properties

The project proposes the use of land of historic properties under the Preferred Alternative.

Union Station/Pioneer Square Historic District

Description and Significance: The description and significance of Union Station is disucssed in section 6.1.7 of this chapter.

Union Station is located within the Pioneer Square Historic District and the International Review District.

Proposed Use: The project proposes to use the station property to the east and south of Union Station, an area currently occupied by unused railroad track below street level. This area would be the southern terminus station and staging area for incoming and outgoing bus traffic connecting the transit tunnel with local freeways. It would also be the southern conversion point for transit vehicles from diesel to electric operation.

Construction of the transit terminus station and accompanying stairs, escalators and other pedestrian facilities, adjacent to or in the vicinity of Union Station, would not cause the station structure to be altered. Major pedestrian facilities, including stairs, escalators and elevators, would extend from the street level to the Metro station platform level. These could be grouped at Weller Street and Fourth and Fifth avenues. Pedestrian access could also be in the area of Jackson Street and Fifth Avenue. In either case the pedestrian facilities would be designed to fit in scale with the existing buildings.

The project would include a "lid" above the tracks on the property south and east of Union Station. This lid would be either at street level or one floor below street level. The linear edge of the lid would be no closer than 60 feet from Union Station.

Alternatives: Alternatives to the use of the Union Station property would include moving the alignment; however, no other alignment at the southern terminus would directly connect with the I-90 access already under construction.

Mitigation: New construction would be compatible in terms of scale, massing, color and materials. Any lid would be designed to be no closer than 60 feet from both the east and south facades. The design would be subject to review by both state and local historic preservation officers.

Coordination: The SHPO has been consulted through the planning and preliminary engineering of this project and would review the final design. Mitigation measures for the Union Station agreed to by UMTA, ACHP and the SHPO appear in the Memorandum of Agreement.

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Kaplan Building

Description and Significance: The description and significance of the Kaplan Building is discussed in section 6.1.7 of this chapter.

Proposed Use: The preferred alignment has twin bore tunnels passing under the Burlington Northern Railroad tunnel near the intersection of Prefontaine Place and South Washington Street. From this point it passes under both the Kaplan and Tashiro Buildings to connect with Third Avenue to the north.

Alternatives: The draft EIS explored several alternatives, one included a transit tunnel below Fourth Avenue. The Third Avenue alignment was chosen as the preferred alternative, however, when the Fourth Avenue alignment tunnel faced significant conflicts with the existing tunnel of the Burlington Northern Railroad and the Yesler Bridge.

Four additional sub-alternatives using the Third Avenue alignment were explored, which either avoided the Kaplan-Tashiro block entirely or attempted to find the safest construction methods for tunneling under the block.

Tunnel Beneath Prefontaine Place. The alignment crosses under the Burlington Norther Tunnel, passing the Downtowner Apartments to the north and east. Recent investigation into the structure of the Prefontaine Building foundation indicates that the building is supported on beams supported on piling spanning the BN Tunnel. The piles rest in both the Fourth Avenue and Prefontaine Place right-of-way. There are signs that the Prefontaine Building's foundations have settled. These indications make it clear that tunneling below the BN Tunnel, especially at a point so near the Prefontaine Building's foundations, is not possible without risk to the Prefontaine Building.

Second Avenue Extension to Third Avenue and Yesler Way. The alignment considered begins at the southwest corner of Union Station, continues north along the Second Avenue Extension to Third Avenue South, and up Third Avenue South to Yesler Way. Other than the Fourth Avenue and Prefontaine Place alignments, this is the only alternative that would have no affect on the Kaplan-Tashiro block. Structural systems for viaducts along the Second Avenue Extension, Fourth Avenue and Jackson Street are not adaptable to transit roadway widths and turning radii.

Twin Bore Tunnels Under the Downtowner Apartments. This alternative, like the preferred alignment, passes through the Kaplan-Tashiro block. Its advantages are mainly operational. It provides-longer turning radii for transit vehicles. In order to accomplish this, however, it would be necessary to pass diagonally under the Downtowner Apartments, a register eligible property and residence.

Twin Bore Tunnels Under the BN Tunnel. This alternative also has twin bore tunnels. It crosses under the BN railroad tracks immediately south of the portal of the BN Tunnel and under a corner of the BN Tunnel portal structure. This alternative involves more risk to the BN Tunnel portal than alternative A-1 because of its nearness to the portal itself.

Mitigation: The tunnel would be monitored during construction. Construction techniques such as grouting and the use of special supports could be used to protect

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the structural integrity of the tunnel. Coordination with Burlington Northern Railroad would also be maintained to coordinate railroad traffic during construction.

The project staff is aware of current proposals for private redevelopment of the Kaplan-Tashiro block, under which six stories of new construction would be added above the Buildings. This would be subject to approval of the Pioneer Square Board. The existing exteriors of both buildings would be preserved. If this proposal goes forward, the project's staff is prepared to coordinate its construction method and design with the needs of the developer at any time during the preparation of the construction documents. Although it is unlikely that the project would acquire this property any transfer or sale would include provisions to maintain or enhance of the property. Such provisions would be subject to the review of the state and local Historic Preservation officers.

Coordination: The SHPO has been consulted through the planning and preliminary engineering of this project and would review the final design. Mitigation measures for the Kaplan Building agreed to by UMTA, ACHP and the SHPO appear in the Memorandum of Agreement.

Tashiro Hardware Building

Description and Significance: The description and significance of the Tashiro Hardware Building is discussed in section 6.1.7 of this chapter.

Proposed Use: For a description of the proposed use refer to the discussion under the Kaplan Building in this section.

Alternatives: For a description of the alternatives refer to the discussion under the Kaplan Building in this section.

Mitigation: For a mitigation of the alternatives refer to the discussion under the Kaplan Building in this section.

Coordination: The SHPO has been consulted through the planning and preliminary engineering of this project and would review the final design. Mitigation measures for the Toshiro Hardware Building agreed to by UMTA, ACHP and the SHPO appear in the Memorandum of Agreement.

King County Courthouse

Description and Significance: The description and significance of the King County Courthouse is discussed in section 6.1.7 of this chapter.

Proposed Use: The project would have five stations, two of them along Third Avenue. One of the Third Avenue alternatives positions a tunnel station between Yesler Way and Cherry Street. The area immediately surrounding the King County Courthouse at this station location has an especially high concentration of historic and recreational properties, the highest concentration of such properties anywhere within the project corridor.

Alternatives: The project has identified possible alternatives to the preferred proposal described. These alternatives are:

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1. Locate these elements within the street rights-of-way. Dimensional studies now show that the usable sidewalk width would become as little as eight feet if this alternative is imposed. Moreover, this width can only be maintained if the station elements are distributed in continuous lines parallel to the curb and not clustered in a few locations. The effects of this on street aesthetics, on pedestrian movement, on access to properties for normal service and in emergencies, and on the internal layout of the stations themselves are adverse.

2. To use properties in the Courthouse neighborhood other than those proposed. This alternative can be used either to reduce the degree of use for buildings on the proposed list or to substitute other properties altogether for those buildings. The effect of this alternative could increase the number of sensitive properties used by the Project or place the station in a location not responsible to patronage demand.

3. To relocate the proposed station outside the Courthouse neighborhood. Positioning this station south of its present location would place it well within, rather than at the boundary of, the Pioneer Square Historic District. The buildings in that area are typically smaller and of less substantial construction than those in the Courthouse neighborhood. The resulting impacts of alternating these buildings to accommodate station facilities would therefore be correspondingly more adverse. Moving the station north along Third Avenue would have similar effects, since there are sensitive properties on both sides of Third Avenue in the next two blocks. Moving the station either north or south would remove the station a matter of blocks from the center of its calculated patronage area. To do so would compel the project staff to provide a level of service well below its intended level, and it was determined that to do so was neither prudent nor feasible.

Mitigation: The west entrance and structural bays would be altered to include a station entrance designed to be compatible with the architectural aspects of the structure. All new construction would be compatible in terms of scale, massing, color, and materials and would be responsive to the Secretary of Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings.

Coordination: The SHPO has been consulted through the planning and preliminary engineering of this project and would review the final design. Mitigation measures for the King County Courthouse Building agreed to by UMTA, ACHP and the SHPO appear in the Memorandum of Agreement.

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FIGURE 6-15

DOWNTOWN SEATTLE PROJECT
4(f) STATEMENT

INTRODUCTION

Section 4(f) of the DOT Act of 1966 (49 USC 1653(f)) provides that the Secretary of Transportation shall not approve any project requiring the use of any land from an historic site of national, state or local significance, unless: (1) there is no feasible and prudent alternative to the use of such land, and (2) such program includes all possible planning to minimize harm to such resource.

PROPOSED ACTION/ALTERNATIVES

As described in the draft and final EIS, because of the growing problem of traffic congestion and conflicts between surface transit and other traffic in the Seattle CBD, service levels for transit will deteriorate markedly after 1990 unless special measures are taken to improve transit circulation in the downtown. Metro has studied five alternatives, including a No Action alternative, as ways to address this growing transit congestion problem, and has found that only the tunnel alternative has adequate long-term transit capacity. It has, therefore, been identified as the preferred alternative. Furthermore, all the non-tunnel action alternatives are mall alternatives which would impact virtually all of the 4(f) properties along the corridor. Under the tunnel alternative, impacts would be limited to station impacts primarily. Please refer to other portions of this final EIS, or the draft EIS, for a detailed description of the preferred alternative.

A number of tunnel alignments were studied by Metro, including a Fourth Avenue and a Third Avenue alignment, and a number of variations were studied in particular at the south end of the tunnel, which originates within the Pioneer Square Historic District. Of the various alignments studied, up to 46 historic properties could have been used and/or adversely affected in some manner by the Project. During the planning and preliminary engineering phase of the Project, Metro and its consultants were extremely sensitive to this issue, and ultimately selected as the preferred alignment the one that would have the least negative impact on the fewest number of historic properties.

The Fourth Avenue alignment was rejected in part because of technical problems related to the proximity of the Burlington Northern Railroad (BNRR) tunnel, which is on the National Register. Uncertain soil conditions and the structure of the BN tunnel itself made it imprudent to adopt that alternative. In addition to the technical problem, such an alignment would require cut and cover construction at Fourth and Yesler Way, which would necessitate replacement of the historic Yesler Street Bridge. Concern for both operating efficiency and historic properties led to the rejection of the Fourth Avenue alignment. The 4(f) properties tha are proposed for use under the preferred alignment are discussed below.

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III. 4(f) RESOURCES

A. Union Station

1. Union Station is included within the Pioneer Square Historic District. The structure is located at the north end of a parcel bounded by 4th Avenue S., 5th Avenue S, Airport Way S. and Jackson Street. Union Station and King Street Station were built in the early 1900s and were designed by San Francisco Architect D.J. Patterson. Major design elements reflect Roman Classic Revival period architecture of the early 1900s. The building has a brick veneer. The reinforced concrete structure consists of five major floor levels, two above and two below the street-level lobby.

   Major exterior features are made of heavy terra cotta entablatures, red brick pilasters and horizontal banding with radiating brick voussoirs around a 45-foot-wide lunette window on the south facade. The building has a north-south orientation with a passenger concourse and two covered platforms at the rear. The central barrel-vaulted waiting hall is flanked by three-story-high office wings at either side. Although underutilized since 1971, the building exterior and interior is largely unaltered.

   General deterioration of the exterior and local damage from major earthquakes in 1949 and 1965 have separated some brick masonry cornices. Major structural improvements would be required of any project at Union Station.

   The Union Pacific Station property is surrounded by elevated streets, bridges and retaining walls, some having structural deficiencies and requiring repairs.

2. Proposed Use

   Under the preferred alternative, the Union Station building itself would not be altered or used in any way. The property to the east and south of the building, which is currently occupied by unused railroad tracks below street level, would be used to construct a transit tunnel terminus station, including stairs, escalators and other pedestrian facilities. These facilities would extend from the street level to the station platform level, and would be designed to fit in scale with the existing buildings. Union Station has historically been a transportation facility, and that transportation focus will be continued by the project. While the building itself is not expected to be acquired or used for the project, the station facilities on the connecting property will be designed to maintain the existing character of the property. Due to the fact that the tunnel and station would be approximately 30 feet below adjacent grades, and due to the fact that buses will be operating in the electric mode through the tunnel, there will be no significant air quality degradation as a result of the project. Noise levels at this site could increase due to staging operations while buses pass

from diesel to electric operation, and vice versa. Metro plans to build a lid above the railroad yard to the south. Although Metro does not plan to acquire the building itself, construction of the station on the adjoining tracks will be done in such a manner so as not to foreclose any opportunities for adoptive reuse of the building by the owner, and to prevent isolation of the structure.

3. Alternatives

The only alternatives to the use of Union Station are no build, or locate the southern terminus station somewhere else. Because of the location of freeways and the layout of the Seattle CBD the tunnel must, in order to be effective, provide a direct connection between the major freeways into downtown and must begin and end relatively close to the edge of the downtown commuter area. The I-90 Freeway will connect to the site, as well as I-5. The connection is by way of the railroad right-of-way. Its size and close proximity to the proposed tunnel entrance make it an ideal staging area for buses to switch from diesel to electric power. The southern end of the CBD is sandwiched between and is a part of both the International District and the Pioneer Square Historic District, and there simply are no other sites with all the necessary characteristics needed to make the project work effectively.

Any move further south would remove the terminus further from the edge of the CBD and potential freeway connections; further west would move it further into the Pioneer Square Historic District, further east into the International District, and further north too far into the CBD.

Thus, there is no feasible and prudent alternative to the use of the site.

4. Mitigation

UMTA, Metro, the SHPO and the ACHP have executed a Memorandum of Agreement providing for consultation and review of all plans and specifications for transit facilities at Union Station, and for full documentation and recording of any trackage or structure to be substantially altered or demolished.

Although it is unlikely that Metro will actually acquire title to any of the property, particularly to the building itself, if it did so, any transfer or sale would include provisions for the maintenance or enhancement of the property.

B. Kaplan and Tashiro Buildings

1. Description of Significance

The Kaplan Warehouse dates from 1900-1910, the decade of Seattle's explosive growth. Contemporary with the neighboring Tashiro Hardware Building and the Prefontaine Building nearby it is compatible with both buildings in terms of construction material and the straightforward articulation of its exterior.

The Tashiro Hardware Building also dates from 1900-1910. It is contemporary and compatible with the nearby Prefontaine Building.

The Kaplan-Tashiro Block is bounded on the east by Prefontaine Place, on the south by Washington Street, and to the west by Third Avenue South buildings. Both buildings, completed in 1908, have exterior characteristics which contribute materially to the District, but no original interiors of any significance remain. Both are in fair to good condition.

2. Proposed Use

Under the preferred alternative, the tunnel would pass underneath the two buildings. At the south portal near 5th Ave. S. and S. Main the tunneling would begin work at the existing earth embankment and proceed to the northwest. Using special construction techniques, the structural integrity of both buildings would be preserved. Any cracking that might occur during construction would be confined to finishes and non-structural elements and would be repaired after construction. It is possible that the basement of the two buildings would need to be vacated for a period of up to 2 years during construction to allow placement of structural protection before tunnel construction begins. No other historic structure between Union Station and the Tashiro/Kaplan Buildings (except for the Jackson Street Bridge) would be used for the Project.

3. Alternatives

Any alignment connecting Union Station and Third Avenue must pass through a part of the Pioneer Square Historic District and every alignment must cross below some historic property.

During preliminary engineering several subalignments besides the preferred alignment discussed above were identified for study. One, discussed in the draft EIS, called for the tunnel to run beneath Prefontaine Place. Recent investigation into the foundation structure of the Prefontaine Building indicates that the building is supported on beams supported on pilings that span the BN tunnel. The piles rest in both the Fourth Avenue and Prefontaine Place right-of-way, and there is evidence that both the BN Tunnel and Prefontaine Building foundations have settled in the past, although at different rates. It is, therefore, clear that tunneling below the BN tunnel, especially at a point so near

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the Prefontaine Building's foundation, is not possible without risk to the structure. This alignment would also require underpinning the foundations of the Kaplan Building.

A second alignment considered would begin at the southwest corner of Union Station, continue north along the Second Avenue Extension to Third Avenue South, and up Third Avenue South to Yesler Way. Other than the Fourth Avenue and Prefontaine Place alignments, this is the only alternative that would have no affect on the Kaplan-Tashiro block. Structural systems for viaducts along the Second Avenue Extension, Fourth Avenue and Jackson Street are not adaptable to transit roadway widths and turning radii. All existing viaducts would have to be removed and rebuilt, at considerable expense and disruption to existing circulation patterns. It is probable that the turning radii required by the transit system would necessitate tunneling beneath the Frye Hotel and a partial taking of the Union Station building. Both of these are also National Register properties. It was not considered a prudent alternative.

A third alternative, like the preferred alignment, passes through the Kaplan-Tashiro block. Its advantages are mainly operational. It provides longer turning radii for transit vehicles than the first alternative. In order to accomplish this, however, it would be necessary to pass diagonally under the Downtowner Apartments, a Register Eligible property and residence for low income housing tenants. The depth of the Downtowner's foundations are unknown. There is concern regarding extensive foundation underpinning and whether this would be practical. Twin bore tunnels through the Kaplan-Tashiro block are practical at the proposed depth of this sub-alternate. Although there might be some earth settlement under the two buildings, this could be controlled by careful monitoring and soil stabilizing techniques. This alignment passes outside the BN Tunnel, avoiding any adverse affects on the property. This alternate would necessitate, however, the demolition and rebuilding of extensive portions of the Jackson Street viaduct in order to provide adequate transit clearances. (As discussed later, the Jackson Street Bridge is in need of significant rehabilitation in any case, and would also be affected by the preferred alternative). Altogether, this alternative fails to provide better protection for the Kaplan-Tashiro properties, while introducing other adverse effects. It also requires costly mitigation measures for the Downtowner, making it less prudent than the preferred alternative.

A final alternative considered would cross under the BN Railroad tracks immediately south of the portal of the BN Tunnel and under a corner of the BN Tunnel portal structure. It is designed to miss to the extent possible the existing BN Tunnel. The transit tunnels would be constructed as twin bore tunnels except for the section which passes under the BN tracks. This section is presently conceptualized to be constructed via a mining technique with special structures supporting the railroad tracks. This

alternative requires an S-curve alignment for the transit tunnels which require slightly slower, but acceptable, speeds. This alternative also passes under the Kaplan and Tashiro buildings. This alternative involves more risk to the BN Tunnel portal than the first alternative because of its nearness to the portal itself.

Based on this information, the preferred alignment is considered the most prudent and feasible, and offers the best opportunity to preserve historic properties and to satisfy the operating requirements of the transit project.

4. Mitigation

The structural integrity of the tunnel buildings would be maintained with construction techniques and monitoring discussed in the previous sections. Coordination with Burlington Northern Railroad would also be maintained to coordinate railroad traffic during construction.

The Project is aware of current proposals for private redevelopment of the Kaplan-Tashiro block, under which six stories of new construction would be added above the Buildings. This would be subject to approval of the Pioneer Square Board. The existing exteriors of both buildings would be preserved. If this proposal goes forward, the Project is prepared to coordinate its construction method and design with the needs of the developer at any time during the preparation of the Project's construction documents. Although it is unlikely that the project would acquire this property any transfer or sale would include provisions for the maintenance or enhancement of the property. Such provisions would be subject to the review of the state and local Historic Preservation Officers.

C. Jackson Street Bridge

1. Description of Significance

The South Jackson Street Bridge is located on South Jackson Street between Fourth Avenue South and Fifth Avenue South. This arterial provides two lanes of traffic in each direction. The entire structure is located within the right-of-way of South Jackson Street in the Pioneer Square Historic District.

2. Proposed Use

The entire bridge is in a deteriorated condition and in need of major rehabilitation. The City of Seattle is planning to rehabilitate the bridge as part of a separate project, including the addition of safety features. The transit tunnel project, independent of the City work, would require some restructuring of the eastern portion of the bridge in order to safely accommodate tunnel construction and operation beneath it. Because of the timing of the two projects the work would be coordinated, with each entity paying a proportionate share of the cost.

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The rehabilitation project consists of replacing the deteriorated structural steel, enlarging and strengthening all the columns to provide for current seismic design loads, replacing the bridge bearings and expansion joints, removing the nonstructural deck overlay, placing a waterproof membrane, constructing a new pavement surface, construction of a traffic rail, replacing the existing lighting and traffic control systems and other minor items.

3. Alternatives

The South Jackson Street Bridge is a major east/west arterial, and serves as a primary vehicular and pedestrian access to the Pioneer Square Historic District, Seattle Central Waterfront and the Kingdome. Vehicular traffic flows at a rate of 14,000 ADT, measured in 1984, which includes approximately 800 Metro transit diesel buses and electric trolleys from several routes. The bridge also provides service for fire equipment and other emergency vehicles. The bridge links the International District on the east and the Kingdome on the west.

The project is needed to restore the structural integrity of the bridge and thereby provide continuing vehicular and pedestrian access and circulation.

The no action alternative would cause continued deterioration of the structure with corresponding reductions in vehicle volumes and load limits necessary to extend the life of the bridge. Eventually, closing of the bridge would be required for public safety. When this occurs, a daily volume of 14,000 vehicles would need to be diverted to other streets including transit, emergency vehicles and pedestrians. Because of the absence of other east-west alternate parallel streets to South Jackson Street, the impact of a bridge closure would be significant.

The closure of South Jackson Street between Fourth and Fifth Avenues would cause negative impacts to noise, air quality, and the District economy. Public services, particularly bus service, would need to be re-routed. The use of fuel would, therefore, increase, assuming the volume of existing trips including transit remained constant.

The proposed rehabilitation of the existing bridge is expected to have the least adverse effects of all the alternatives considered in this report. The project should have a positive impact on the Pioneer Square Historic District because it will provide for the continuation of pedestrian and vehicular access to he district and will not introduce any visual impacts which detract from the historic characteristics of the Section 4(f) property.

The no action or avoidance alternative, therefore, are considered neither prudent nor feasible.

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4. Mitigation

During detailed design, special consideration will be given to the surrounding historic area in an effort to produce a complementary structure. Possible measures include painting the structural steel a dark green color and restoration of the existing concrete railing. If possible, two lanes will be kept open for traffic at all times during the rehabilitation work.

Final design of the bridge would be subject to review by the Pioneer Square Historic District Review Board and International District Review Board. The construction work by Seattle Engineering would be coordinated with Metro.

D. King County Courthouse (Third Avenue South Station)

1. Description of Significance.

The King County Courthouse is bounded by Third and Fourth Avenues and James and Jefferson Streets, and is a primary structure within the Pioneer Square Historic District. The first six stories date from 1911-1916, and an additional five stories were added in 1930-31. The building has a recessed entry at the Third Avenue entrance, and has an existing pedestrian tunnel under Fourth Avenue connecting the Courthouse lobby to the King County Administration Building to the east. Based on a review of the alternative station locations (discussed below), the courthouse is the only 4(f) property proposed for use at this station.

2. Proposed Use

The Downtown Seattle Transit Project is currently weighing alternatives for station locations. The alternatives employ five stations, two of them along Third Avenue. One of the Third Avenue alternatives positions a tunnel station between Yesler Way and Cherry Street. In this analysis, this area will be referred to as "the Third Avenue South Station."

A station requires surface sites for access and ventilation. The access facilities include stairs, escalators and elevators. Convenience and visibility are important locational characteristics. For the Third Avenue North Station there are a number of options for locating access and ventilation facilities. It is difficult to find locations that meet service objectives, that minimize historic building impacts, that do not conflict with the present operating systems of a property, and that maintain the design standards of the transit operation.

The design standard for the station calls for construction of an underground platform approximately 400 feet in length with access to the platform provided from mezzanines. Entrance from the surface to the mezzanines requires station access at both the north and south ends or in the middle of the platform.

The Third Avenue South station must contain the following approximate number of access elements:

- 4 escalators
- 3 public stairways
- 3 emergency (enclosed) stairways
- 2 elevators for elderly and handicapped persons
- 1600 square feet of ventilation shaft area.

Patronage projections for the stain may show a need for less than the maximum, but considering the maximum the proposed design seeks to establish fixed locations where all possible elements might be housed.

Each subway mezzanine will require escalator, stairway, emergency stairway, and elevator access from the surface. If a station should contain more than two mezzanines, as may be considered in subsequent station planning, then the number of elements listed above would be adjusted upward reflecting the number of mezzanines serving each station. At this stage, however, each station is to have a minimum of two subway mezzanines.

The present station design shows the location of the mezzanines above both the north and south end of a platform. Access to the mezzanine from the surface may be confined to one side or provided on both sides of the street.

3. Alternatives

The area immediately surrounding the King County Courthouse has an especially high concentration of historic and recreational properties, the highest concentration of such properties anywhere within the Project corridor. Out of consideration for these properties, and because the system design is still in preliminary engineering, this Project has established the principle that as few of these properties as possible will be used, and that none of the remaining properties will be forced to accept a damaging burden of station facilities. In the latter case, the test of whether a use of property is damaging is whether the transit facility removes or alters any significant attributes of a property which originally qualified it as a potential "4(f)" property. This also includes a concern for whether the use of any property threatens its traditional ability to function economically or socially once the Project is complete.

Enough is known at this stage of design to estimate a maximum impact of the Third Avenue South Station, i.e. its maximum requirement for stairs, elevators, escalators, and ventilation ducts. A review of all the Third Avenue South Station properties can also identify which properties should not be used under any circumstances. Among the remaining properties, each individual property has its own level of tolerance for accepting station elements. By establishing a maximum tolerable use for each building, it is then possible to derive a list of properties in

the Third Avenue South Station area that represents opportunities for the location of station facilities with the least possible impact on the Third Avenue South station area as a whole.

In the spirit of the Department of Transportation Act and the National Historic Preservation Act, it was advisable for this Project to establish constraints on the use of sensitive properties as early in the design process as possible. Project designers received guidance as to what properties were adaptable for Project uses, to what extent they were adaptable, and what the rules were for making use of them. Based on this information, there are thirteen alternative locations in the Third Avenue South Station area where various elements of the tunnel station might be located. Not all these buildings necessarily abut the proposed station.

A review and comparison of each property in turn has resulted in these conclusions for station facilities on the east side of Third Avenue

1. The street right-of-way along Third Avenue will offer a sidewalk width of about nineteen feet once the Project is completed. Allowing for a mandatory three-foot setback from the new curb, the placement of any stair or escalator in the sidewalk area would then leave only about eight feet of sidewalk width for pedestrian movement between a new stair or escalator and the nearest building. Given the certainty of higher pedestrian concentrations around station access points, it is immediately apparent that locating station facilities in the sidewalk area will produce unacceptable barriers to pedestrian flow. Moreover, the available sidewalk width precludes placing these elements side by side. The effect of this is to compel stairs, elevators, and escalators to be distributed in a nearly continuous line along the face of a block, which in the Third Avenue South station area is judged to produce more adverse effects on adjacent historic properties than to locate them selectively in the buildings themselves. There is one exception to this conclusion, which is that the station ventilation system may be accommodated through grills in the roadway itself. If this option is feasible, it will remove the necessity to position these in adjacent buildings, landscaping or street furniture.

1a. Rights-of-way on Jefferson, James, and Cherry Streets are even more restricted than Third Avenue. Adjacent to the Courthouse, less than half the Jefferson Street right-of-way nearest the building is paved, and is used as the service road to the Courthouse. The remainder is developed as part of City Hall Park. James Street is the principal connector between Pioneer Square and the freeway, and is a designated emergency vehicle corridor. It will also be used as a leg of the transit circulator system being installed as part of this Project. For these reasons, the curb extensions necessary to accommodate station access elements are not possible on this

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street. Cherry Street has similar sidewalk widths, and being less heavily committed to traffic, might accept some localized sidewalk widening near Third Avenue.

2. The Arctic Building lies at the extreme north end of the Third Avenue South station alternatives. The building is a National Register structure and has recently been remodeled. The corner storefronts at Third and Cherry nearest the station are occupied by a bank. Although it might be adapted to station use, the use of the setback area in front of the Public Safety Building (not on or eligible for the National Register) to the south and the building's northerly location has led the Project to exclude the Arctic Building from the list of station opportunities.

3. The Public Safety Building is set back about ten feet from its property line, a feature which suggests that portions of this setback can accommodate elements of the transit station. Portions of the setback are required for the building entry and for emergency building exits, which reduces the frontage available for station facilities. The remainder of the setback is developed as planters. This setback, the location, and the fact that the Public Safety Building is publicly owned and not a designated historic property, make it logical to view the setback as a preferred location for station facilities at the north end of the station.

4. The King County Courthouse is also a publicly owned property. Its Third Avenue sidewalk is largely taken up by a transit stop today, and it is possible that this will continue when the Project is completed. Because of the need to maintain curb access to transit vehicles, any station elements located in this block must, therefore, be tightly clustered near the pedestrian crosswalks at Jefferson and James - which is recognized as unacceptable - or a place found within the building itself for these elements. The recessed entry to the Courthouse presents an opportunity to gain access to the transit station without significantly affecting the outward appearance of the building. It is estimated that no more than five building bays along Third Avenue would be required by the Project for station access. There is an existing pedestrian tunnel connecting the Courthouse lobby under Fourth Avenue with the King County Administration building to the east. This pedestrian tunnel offers a positive amenity to a station at this site, since a large proportion of patrons of this station can approach the station from two buildings, entirely under cover. For these reasons, the Courthouse has been identified as a location for station facilities.

5. City Hall Park is located south of the most southerly station alternative, and is also fairly remote from the center of this station's patronage area. Both considerations argue against locating station components at this site. The

traditional association of this park as the foreground to the King County Courthouse, and its status as a National Register Park, also argue against its use by the Project.

On the west side of Third Avenue, there are more properties from which to choose than on the east side. Since the side streets slope downhill from Third Avenue toward the west, the west side does offer the attractive possibility that station access from these side streets can introduce daylight into the station itself. On the west side of Third Avenue, the Project has reached the following conclusion on what are appropriate sites for station facilities.

6. The Third Avenue right-of-way has the drawbacks already mentioned for the east side of the street, and for these reasons compels a search for appropriate sites outside the right-of-way.

7. Rights-of-way on Jefferson, James, and Cherry Streets have many of the same restrictions mentioned for the east side, with the exception of Jefferson Street, a vehicular right-of-way between Third Avenue and Yesler Way. The Project has identified this right-of-way as an opportunity for station access at the south end of the most southerly station alternative. There are two alternative ways to accomplish this; one using a full closure, the other a partial closure of Jefferson Street. Both alternatives proposed to regrade the present inclined street to provide a horizontal approach to a station entrance below the present Third Avenue crosswalk. This possibility would replace vehicular traffic with a pedestrian facility and introduce retaining walls on the north and south sides of Jefferson. Access would be maintained to the Morrison Hotel and the Smith Tower. A station entrance at this site would also give a visual entry to the Pioneer Square Historic District from the Project.

8. Prefontaine Park is not proposed for use by the Project. Prefontaine Park is an unusually small property, offering little opportunity for the location of station facilities. If Jefferson Street is redeveloped in whole or in part for station access it could become less isolated from that portion of the Pioneer Square District to the north. Traffic revisions necessitated by this alternative may require a curb setback at the southeast corner of the park, but this will not affect the park or its use.

9. The Morrison Hotel provides housing and services for low-income residents under a variety of publicly funded programs. Considerable sums of public monies have been invested in building improvements during recent years, one result of which has been the restoration of most of its Third Avenue storefronts. Because of its architectural distinction and status in the Pioneer Square District and its use as low income housing, rather than compromise major programs and

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investments, the Morrison Hotel was determined not to offer an opportunity for station facilities. The Third Avenue sidewalk is now heavily used for a surface transit stop, which will probably continue when the Project is completed.

10. The Hotel Drexel is contiguous to the station. Additional studies have confirmed that the nature and condition of the Drexel's historic structure make it doubtful that station facilities can be incorporated here without substantial structural alterations. Therefore, this argues against the use of the Drexel as a station location.

11. The Lyon Building lies just outside the Pioneer Square Historic District, and is classified as eligible for the National Register. During the 1950s and 1960s, its two street-level frontages were extensively altered. On the south of the James Street side, the existing areaway frontage was removed and new storefronts installed which created a continuous storefront arcade at the basement level, approximately six feet behind the existing building columns. The latter were reclad in brick to match the remaining exterior. Further remodeling of this basement arcade presents an opportunity to provide horizontal access within the building to the side of a transit station. Along the Third Avenue facade, a second recessed arcade about 15 feet deep and 50 feet long was also constructed. Use of some or all of this second arcade for station elements offers an opportunity to serve the station without damaging any significant portions of the original building, and to accomplish this using architectural elements in character with the remainder of the building. Both these arcades are designated as possible locations for station facilities. This property could be used if a station access location was desired in the middle of the platform.

12. The Saint Charles Hotel currently provides accommodations for low-and moderate-income residents. Among the building's best attributes are the remaining portions of its original storefronts, especially the three central bays along Third Avenue, with recessed arches framed by ornamented pilasters, both in wrought iron. To the north and south there are remodeled storefronts, although most of the original ironwork remains. The Saint Charles offers a possible location for station facilities. The corner of the Saint Charles, at the intersection of Third and Cherry, is identified as an opportunity for station facilities. The Saint Charles Hotel is not eligible for the National Register. Its use is a logical complement for the Public Safety Building end loading platforms.

13. The Dexter Horton Building is classified as eligible for the National Register. It is adjacent to the transit station. The elevation of the street floor structure, its northerly location, together with the position of three stories of [illegible] at the Third Avenue and Cherry Street corner,

makes it unlikely that this area can be adapted to station use. Farther north on Third, there are areas adjacent to the building lobby that might be altered, but these are sufficiently remote from the station that the Project has concluded the Dexter Horton Building is not an opportune location for station facilities.

Two approaches to accessing the platform were considered: providing access through mezzanines at the ends of the platforms or at cross-streets. Both configurations considered ensure maximum usable space of the platforms by moving stairs and escalators to the ends or side of the platforms. Platform access designs which restrict the access to within the station would have reduced greatly the necessary patron loading space and would have potentially required additional platform length at considerable costs.

In the Third Avenue South station area, this offers two options for providing station access. Under the end-loading option, access could be provided in the vicinity of Jefferson Street and Cherry Street. Under the cross street option platform access could be provided in the vicinity of James Street, a cross street.

Each option requires the use of at least one historic property. The end-loading option would use the King County Courthouse as one access point. The cross-street loading option would require the use of the following: the Hotel Drexel and/or the Lyon Building. Therefore, it has been determined that there is no feasible and prudent alternative to the use of an historic property in this area. The end-loading mezzanine alternative was selected as the best alternative. As indicated in the analysis above, the use of a historic property at this station location is the best alternative.

Finally, Metro considered whether to relocate the proposed station outside the Third Avenue South area. Positioning this station south of its present location would place it well within, rather than at the boundary of, the Pioneer Square Historic District. The buildings in that area are typically smaller and of less substantial construction than those in the Third Avenue South area. The resulting impacts of altering these buildings to accommodate station facilities would, therefore, be correspondingly more adverse. Moving the station north along Third Avenue would have similar effects, since there are sensitive properties on both sides of Third Avenue in the next two blocks. Further moving the station either north or south would remove the station a matter of blocks from the center of its calculated patronage area. To do so would compel the Project to provide a level of service well below its intended level, and it was determined that to do so was neither prudent nor feasible.

It has, therefore, been determined that there is no feasible and prudent alternative to the use of this property.

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4. Mitigation

The west entrance and structural bays would be altered to include a station entrance designed to be compatible with the architectural aspects of the structure. All new construction would be compatible in terms of scale, massing, color, and materials and would be responsive to the Secretary of Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings.

E. Westlake Park

1. Description of Significance

The so-called "Westlake Park" is at this time not a park at all but for reasons discussed below is treated as a park for section 4(f) purposes. The site in question is triangular in shape and extends along the eastern boundary of Westlake Avenue, and between 4th Avenue, Pine Street, and Pike Street. It is currently made up of two separate parcels, one occupied by a privately owned triangular-shaped building and the other consisting of a vacated street right-of-way. Although the City does not actually own either parcel, it is entitled under state law to use the right-of-way for municipal purposes, and it has initiated condemnation to acquire the remainder of the site. Because of this, it is being treated as publicly-owned land for purposes of Section 4(f).

Although the City has not formally adopted a land use plan designating the site as a future park, it has taken several steps which to us indicate an intention to develop this site as a park in the future: 1) a savings account has been established, apparently as the result of a 1968 Forward Thrust municipal bond issuance, for development of Westlake Park; 2) the City has initiated a condemnation action to acquire the property for park purposes; and 3) the City Council and the Mayor have signed a document called the "Framework Policies" which reflect an intent to develop the Park. Formal land use planning documents incorporating these policies are expected to be signed in the not-too-distant future.

Although we would not ordinarily treat a piece of property as a 4(f) resource where it is not publicly owned and where it has not been designated as a park in a formal planning document, we believe that the unique circumstances in this case warrant its treatment as a 4(f) resource.

2. Proposed Use

The property would be used on a temporary basis during construction as a staging area. A station wall will be constructed below ground along the edge of the property paralleling Pine Street. At the end of construction, no further use of the property will be needed for the tunnel project, and the below-ground wall will not be apparent from the surface.

3. Alternatives

In view of the extremely dense retail development at the Westlake Station area (located on Pine Street between Third Avenue and 6th Avenue) and in view of the City's plans to develop this site as a park in the future, this site offers an ideal choice for staging purposes. Use of this site for staging purposes offers an excellent opportunity to coordinate the transit project not only with the City's Westlake Project but with its eventual plans to develop Westlake Park.

Since there is no park currently in existence or planned during the construction period, and since the property will have to undergo regrading and preparation in any case before it can be developed as a park, using this property as a temporary staging area is considered the best alternative at this location.

4. Mitigation

Station access locations have been designed to avoid the proposed park area in order to preserve its potential use as a park. The schedule for construction of the Westlake Station has been set to assure that development of the proposed Westlake Park can proceed according to the City's schedule. Finally, when station and tunnel construction is completed at this location, the site will be graded and prepared for the City's landscaping activities.

V. ARCHAEOLOGICAL RESOURCES

The Urban Mass Transportation Administration and the Advisory Council on Historic Preservation have entered into a Memorandum of Agreement (MOA) which establishes, among other things, a process for identification, evaluation and data recovery relating to archaeological resources discovered during construction. The MOA is responsive to the concerns expressed by the Department of Interior as part of its 4(f) review, and is included as part of the final EIS, along with this 4(f) statement.

. COORDINATION

In accordance with Section 4(f) of the DOT Act, this Project has been submitted to DOI for coordination, and comments from DOI have been received and considered. Copies of all pertinent correspondence are included. Furthermore, we have also enclosed a letter from the State Historic Preservation officer in connection with the 4(f) Report.

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CONCLUSION

Based upon the above considerations, it is determined that there is no feasible and prudent alternative to the use of the 4(f) resources identified herein, and that the proposed action includes all possible planning to minimize harm to the 4(f) properties; resulting from such use.

Aubrey Davis
Regional Administrator

May 9, 1985
Date

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United States Department of the Interior

OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

MAY 3 1985

In Reply Refer To:
ER-85/419

Mr. Aubrey Davis
Regional Administrator, Region X
Urban Mass Transportation Administration
Federal Building, Suite 3142
915 Second Avenue
Seattle, Washington 98174

Dear Mr. Davis:

This is in response to the request for the Department of the Interior's comments on the draft Section 4(f) statement for the Downtown Seattle Transit Project, King County, Washington.

CULTURAL RESOURCES COMMENTS

The draft statement indicates that the Urban Mass Transportation Administration (UMTA) is making an important and commendable effort to identify, evaluate, and protect above- and below-ground cultural resources that otherwise might be adversely affected by construction of the Seattle Transit project. UMTA appears to have carefully considered alternative alignments and methods for accomplishing this project and to have chosen the alternative with the least impact to cultural resources. The proposal has taken into account above-ground National Register listed and eligible properties in its consideration of possible station locations and optional tunneling alignments and the chosen locations have the least impact to these resources.

Thus, we concur that no feasible and prudent alternatives exist to the use of lands which contain cultural resources, and that all possible planning to minimize harm to above-ground cultural resources has been undertaken.

However, the information developed for the report entitled "Archeological Resources Assessment for the Downtown Seattle Transit Tunnel Project" indicates that the transit project will likely affect below-ground historic remains, some of which will be eligible for the National Register. We believe the remains may contain a great deal of information valuable to the history and evolution of downtown Seattle, and urban development in general. They may also have interpretive value for the public, depending on the status of exhibits of historic remains in Seattle.

Therefore, we recommend that any below-ground cultural resources discovered during construction be evaluated for eligibility for the National Register in accordance with Title 36, Code of Federal Regulations, Part 63. In addition, the plan for further study and treatment that will be developed and implemented as specified in the forthcoming Memorandum of Agreement (MOA) should be in accord with the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation (48 Fed. Reg. 44716, September 29, 1983). A copy of the MOA should be included in the final Section 4(f) statement.

PARK AND RECREATION RESOURCES

We concur that there would be no use of the existing Cherry/Columbia Fifth Park or the proposed Terry Avenue and Marion Street Parks. However, the mitigation plan being prepared by Metro and the City to insure that only minimal impacts would occur to the proposed Westlake Park as a result of increased pedestrian use should be thoroughly described in the final statement.

SUMMARY COMMENTS

The Department of the Interior has no objection to Section 4(f) approval of the Downtown Seattle Transit Project provided that the following two conditions are met:

1. The proposed Memorandum of Agreement establishes a process for further archeological investigations that is in accord with the Secretary's Standards and Guidelines.

2. The mitigation plan being developed to minimize impacts to Westlake Park is clearly defined in the final statement.

We appreciate the opportunity to provide these comments.

Sincerely,

Bruce Blanchard, Director
Environmental Project Review

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CHAPTER SEVEN

COST EFFECTIVENESS AND FINANCIAL EVALUATION

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COST EFFECTIVENESS AND FINANCIAL EVALUATION

7.1 Cost Effectiveness

7.1.1 Capital Costs

7.1.2 Operating and Maintenance Costs

7.1.3 UMTA Cost Effectiveness Indecies

7.2 Financing Plan for the Preferred Alternative

7.2.1 Revenue Assumptions

7.2.2 Financing the Capital Plan

7.2.3 Financing Operating Expenses

7.2.4 Discussion of Financial Projections

7.2.5 Discussion of UMTA Financial Ratings

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CHAPTER 7

COST EFFECTIVENESS AND FINANCIAL EVALUATION

This chapter reassesses the cost effectiveness of the locally preferred alternative based on the results of preliminary engineering. Preliminary engineering refines, as necessary, the costs, transit ridership and travel time projections of the TSM and the locally preferred alternatives. Preliminary engineering also provides the implementation schedule for the construction of the locally preferred alternative and operation of the Metro transit system upon completion of project construction. Metro is producing a financial plan which will include agreements on the allocation of financial resources. The cost effectiveness and financial evaluation measures resulting from preliminary engineering will be used by UMTA to rate the Downtown Seattle Transit Project preferred alternative with major investment projects proposed by other localities.

The cost-effectiveness index is explained in more detail below, following the description of capital costs and operating and maintenance costs, which have been estimated in accordance with the prescribed formula. Preliminary engineering has provided information on costs, transit ridership, travel time, implementation schedule for construction and operation, and financial plan assumptions.

As noted in Chapter 2, the Non-intercept Mall has been designated as a TSM alternative in the final EIS because it represents a lower cost alternative that meets a number of the project objectives. The 1984 Policy on Major Capital Investments explains that TSM is the best that can be done to improve transit service without making a major capital investment. A major capital investment is a project that generally involves separate right-of-way, exclusive transit use and costs in excess of $100 million. The capital costs of the proposed Non-intercept Mall would be close to $100 million, and would not necessarily be used by transit exclusively, as compared with close to $400 million for the proposed tunnel for transit vehicles.

The cost effectiveness calculations contained in this chapter are not specifically required by the national or state environmental policy acts, but are required by UMTA's 1984 Policy Statement referenced above. It is combined with this EIS document to assist the public and agency decisionmakers.

It should be emphasized that there are important environmental and other impacts and considerations, including qualitative ones, that are not intended to be reflected in the cost-effectiveness index. Chapter 2 (comparison of alternatives) should be referred to for the overall environmental evaluation of all of the alternatives under consideration.

7.1 Cost Effectiveness

The transportation benefits of each alternative are accompanied by varying environmental and fiscal impacts. This section describes the cost measures used to calculate UMTA's cost effectiveness indices. A discussion of the various environmental impacts and transportation benefits of each alternative is provided in Chapters 2, 4, 5 and 6. Travel time impacts are discussed in Chapter 4. As noted

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above, this section compares the Non-intercept Mall (TSM) alternative, and the preferred alternative, as it has evolved in the preliminary engineering work to date in order to calculate UMTA's cost effectiveness indicies.

Projections for capital costs and operating and maintenance costs to be used in the UMTA cost effectiveness evaluation are taken from estimates prepared for the draft EIS and during preliminary engineering.

7.1.1 Capital Costs

The base year capital costs are comprised of all capital construction costs, including equipment and land required during the construction period to implement each alternative, that are not required in the No Action alternative. Comparative tables of these costs for all alternatives are provided at the end of Chapter 2. The base year capital cost for the preferred alternative is presented in 1984 dollars. The base year capital cost of the Non-intercept Mall (TSM), from the draft EIS is in 1983 dollars; however, the construction cost index for the Seattle area did not increase from 1983 to 1984, so these estimates are assumed to be in equivalent dollars. The construction cost estimate for the preferred alternative prepared in the preliminary engineering work is presented in Table 7-1. The base year capital cost of the Non-intercept Mall (TSM) is estimated at $101.1 million (1984 dollars), and the preferred alternative is estimated at $352.1 million (1984 dollars).

TABLE 7-1

PRELIMINARY ENGINEERING PROJECT COST ESTIMATE
(Dollars in millions)

Cost Item	Base Year Cost (1984 $'s)	Inflated Cost (Mid-point of Construction)
Tunnel		
Stations	$ 142.1	$ 174.1
Underground Bus-way	63.1	71.8
Right-of-Way	38.3	42.2
Engineering & Project Administration	55.8	63.2
Subtotal	$ 299.3	$ 351.3
Contingency	35.3	43.3
Tunnel Total	$ 334.6	$ 394.6
Surface Construction	12.5	15.3
Circulation System	5.0	5.7
DSTP Total Estimate	$ 352.1	$ 415.6

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Buses are assumed to be purchased under the same schedule for all of the alternatives for the downtown, including both action and non-action alternatives. The capital costs for dual power bus purchases have not been included in the cost estimates for either the Non-intercept Mall (TSM) or the preferred alternative. The Non-intercept Mall (TSM) cost estimate does, however, include costs for some circulator buses.

The No Build Alternative requires the purchase of diesel and trolley buses which results in a fleet size requiring more buses than any of the action alternatives. The Non-intercept Mall (TSM) alternative, because of its slower speeds would require a larger bus fleet than the preferred alternative, but less than the No Build alternative. Both the Non-intercept Mall (TSM) and preferred alternative would use the dual power bus, which is a more expensive vehicle. The added marginal cost of the dual power articulated bus over a diesel articulated bus is approximately $150,000 per bus in 1984 dollars. The preferred alternative would need approximately 490 dual-power buses. The Non-intercept Mall (TSM) would similarly need approximately 490 dual-power buses to minimize the number of diesel buses operating in the downtown area. The estimated marginal cost of the dual-power buses for these two alternatives would be about $73 million (1984 dollars). The capital costs for the dual-power buses are not included in this cost-effectiveness analysis. Metro is presently proceeding with the purchase of these vehicles and it is assumed that the vehicles would be used for either the preferred alternative or the Non-intercept Mall (TSM).

7.1.2 Operating and Maintenance Costs

Metro combines operating and maintenance costs for the transit system into a coach cost per revenue service hour. In 1984, it cost $47.31 to operate a bus for one hour of revenue-generating service. Approximately 47 percent of this cost was operating cost, 33 percent was maintenance cost and 20 percent was general and administration costs. The same bus-hour cost was used to estimate bus costs for year 2000 in 1984 dollars.

Operating and maintenance costs were evaluated by comparing the number of bus hours needed to operate the entire transit system for each alternative. The number of bus hours for each alternative was determined by evaluating the downtown travel time for each year 2000 bus route which travels through the Central Business District. Thus the critical determinants of operating and maintenance costs are downtown bus volumes and speeds, since average bus speed determines the number of bus hours needed for each route. Bus speed for operations within the tunnel were estimated using two computer simulation models. One model simulated the tunnel operations during peak periods for moving bus platoons through the tunnel and stations. The second computer model was used to simulate bus activities in the staging areas at the two portal stations. The speed, time, and distance estimates from both of these models were combined to calculate the average speed of the bus routes that would operate through the tunnel.

Table 7-2 displays the annual systemwide bus hours and the costs savings for each alternative. Table 7-2 also displays estimated costs for additional service supervisors, electricity and operations and maintenance on the mall and at the tunnel stations. As can be seen these incremental costs would be more than offset by savings in bus-operating hours.

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Table 7-2 indicates that the preferred alternative would provide larger operating-hour savings than No Action or the Non-intercept Mall (TSM). The percentage improvement in downtown route time and cost savings would be actually much greater than these systemwide savings.

There are uncertainties in predicting year 2000 bus speeds and the operating hours and costs. Therefore, the figures in Table 7-2 are best used for comparison rather than as statements of absolute cost.

TABLE 7-2

SUMMARY OF ANNUAL NET OPERATING AND MAINTENANCE COSTS[1]

	Annual Systemwide Bus Hours[2]	Annual Bus-Hour Cost[3]	Annual Direct Facility O & M Cost	Total Annual O&M Cost
Non-intercept Mall (TSM)	3,218	$152.24	$0.59	$152.8
Preferred Alternative	3,147	$148.88	$2.08	$150.9

---

1 Costs are in millions of 1984 dollars.

2 In thousands of bus hours projected for year 2000. For comparison there were 2.4 million annual bus hours in 1984.

3 Based on $47.31 cost per bus hour in 1984.

7.1.3 UMTA Cost Effectiveness Indicies

On May 18, 1984, UMTA published a document entitled "A Detailed Description of UMTA's System for Rating Proposed Major Transit Investments." This was updated in September, 1984 in an UMTA publication, "Application of the Major Investment Policy for Fiscal Year 1986: Calculation of Indices, Possible Revisions, and Data Requirements." These documents describe a cost effectiveness measure which compares the total costs of an alternative to its benefits. Benefits here are measured in terms of the additional annual transit patronage attracted and the annualized value of travel time savings for existing riders.

Two cost effectiveness indices are used by UMTA. One index provides a perspective of the federal government, in which the federal funds needed for the project are compared to its total benefits. The second index provides a perspective of society

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in general, in which total funds needed (regardless of the source) are compared to total benefits.

These cost effectiveness indices are computed as follows:

(1) Federal Index = $$\frac{\Delta\$\ CAP + \Delta\$\ O\&M + \Delta\$TT - \Delta\$LOC}{\Delta RIDERS}$$

(1) Total Index = $$\frac{\Delta\$\ CAP + \Delta\$\ O\&M + \Delta\$TT}{\Delta RIDERS}$$

where the Δ's represent differences in costs and benefits between preferred alternative and the TSM alternative, and:

$CAP = annualized capital costs (based on 1984 dollars);

$O&M = annualized operating and maintenace costs (1984 dollars);

$TT = annualized value of travel time savings for existing riders;

$LOC = annualized value of local share of capital funding; and

RIDERS = annual transit ridership, measured in "linked" trips

(All number values are in millions, and the O&M, TT and RIDERS values represent year 2000 projections.)

In its September 1984 publication, UMTA provided directions for converting the capital costs of an alternative to an equivalent annualized cost. For each capital cost item of a project, the annualized equivalent is computed through a single factor that depends on the item's economic life and the assumed discount rate (fixed at ten percent for all Federal projects). Table 7-3 presents the annualized capital costs and the annualized value of the local capital match for the Non-intercept Mall (TSM) and the preferred alternative. The calculation of the annualized value of local match is the annualized capital cost times the local share for the capital item summed over all items.

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TABLE 7-3
ANNUALIZED CAPITAL COSTS
(Dollars in Millions)

	Cost Item	Cost (1984 $)	Lifetime (Years)	Annualization Factor[1]	Annualized Cost	Local Share Percentage	Annualized Cost Local Share
Non-intercept Mall (TSM):	Structures	$ 42.8	30	0.106	$ 4.5	50%	$ 2.3
	Signals; Electric	13.3	30	0.106	1.4	50%	0.7
	Pavement	10.2	20	0.117	1.2	50%	0.6
	Right-of-Way	34.8	100	0.100	3.5	50%	1.7
	Total	$ 101.1			$10.6		$ 5.3
Preferred Alternative: Tunnel	Structures	$ 69.3	30	0.106	$ 7.4	50%	$ 3.7
	Signals; Electric	5.0	30	0.106	0.5	50%	0.3
	Pavement	4.4	20	0.117	0.5	50%	0.2
	Right-of-Way	38.3	100	0.100	3.8	50%	1.9
	ROW Major Preparations[2]	217.6	100	0.100	21.8	50%	10.9
	Sub-Total	$ 334.6			$34.0		$17.0
Surface Construction	Pavement	$ 12.5	20	0.117	$ 1.5	100%	$ 1.5
Circulation System	Electric	$ 5.0	30	0.106	$ 0.5	100%	$ 0.5
Preferred Alternative	Total	$ 352.1			$36.0		$19.0

1 The annualization factor is provided by UMTA. It reflects the assumed economic lifetime of the various cost items and a ten percent discount rate.

2 Tunnel construction, tunnel lining and underground stations.

Note: Capital costs for the dual-power buses are not included in this analysis. Metro is presently proceeding with the purchase of these vehicles and it is assumed that the vehicles would be used for either the preferred alternative or the Non-intercept Mall (TSM).

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Chapter 4 provides a discussion of ridership and travel time projections for each alternative. Table 7-4 outlines the ridership values necessary for the calculation of UMTA's cost effectiveness indices.

As discussed in Chapter 2, the TSM alternative to be used in these calculations is the Non-intercept Mall (TSM) alternative. Values necessary to convert travel time into its monetary equivalent in 1984 dollars have been detemined by UMTA to equal $4.00 per hour for work trips and $2.00 per hour for non-work trips, based on UMTA national average values to ensure consistency in comparing projects across the nation. These values are multiplied by the projected ridership for the TSM alternative and by the travel time savings of the preferred alternative over the TSM to calculate the monetary equivalent of travel time for use in UMTA's cost-effectiveness indicies.

TABLE 7-4

RIDERSHIP MEASURES YEAR 2000

Measures	Non-intercept Mall (TSM)	Preferred Alternative
Ridership, Total[1]	104.9	110.3
Work	60.3	63.4
Non-work	44.6	46.9
CBD Travel Times		
Peak Hour	23.7 min or, .395 hr	19.8 min or, .330 hr
Travel Time Savings[2]		
Peak Hour	N.A.	3.9 min or, .065 hr
Value of Travel Time Savings[3]	N.A.	$15.7 million

1 Ridership values in millions of annual riders.

2 Difference between the average downtown travel time, including travel on surface streets, for the preferred alternative and travel time for the TSM.

3 Calculation: $4 per hour multiplied by the travel time savings and by the work ridership for the TSM.

No travel time savings have been assumed for off-peak periods, which conservatively estimates the total value of the travel time savings.

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Using the above data, the cost effectiveness index computation is as follows:

Difference in Annualized:	Preferred Alternative Minus TSM	Difference
Capital Costs	= $36.0-10.6	= $ 25.4 M
Total Annual O&M Costs	= $150.9-152.8	= $ -1.9 M
Value of Travel Time Savings	-	= $ 15.7 M
Local Share Capital Funding (at 50% Federal match)	= $19.0-5.3	= $ 13.7 M
Ridership	= 110.3-104.9	= 5.4 M

$$\text{Federal Index} = \frac{\$25.4 - \$1.9 - \$15.7 - \$13.7}{5.4} = \$0/\text{new rider}^1$$

$$\text{Total Index} = \frac{\$25.4 - \$1.9 - \$15.7}{5.4} = \$1.44/\text{new rider}$$

[1] Actual calculation of this index results in value of $-1.09/new rider; however, UMTA has assigned a value of zero to any index which has a negative value.

These cost effectiveness indices represent the cost per new passenger attracted to the transit system for the preferred alternative as compared with the Non-intercept Mall (TSM) alternative. These values are used by UMTA in ranking the various major transit investment projects proposed by localities across the nation. Metro's Downtown Seattle Transit Project preferred alternative is currently ranked as being one of the most cost effective in the nation.

7.2 Financing Plan for the Preferred Alternative

Metro has prepared a plan for financing the preferred alternative using existing sources of revenue. This plan would not require any additional tax, public vote, or state legislative action, but would require federal assistance at 50% of the tunnel cost plus the issuance of approximately $215 million in long-term debt backed by the 0.6 percent sales tax which is currently in place. Debt is required because the costs will be incurred during the construction period and revenues from the sales tax during the same period are not sufficient to pay all costs without borrowing and pledging future revenues.

The financial plan which has been developed is flexible. Several revenue sources which were not included in the plan are potentially available to finance the project. These sources could reduce the amount of borrowing required to finance the project. The amount of debt that Metro is legally able to issue is substantially greater than the amount required by the financial plan. In a practical sense the amount of debt

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that can be issued is limited not by statute, but by the amount of current revenues required to maintain and expand the system after the tunnel is completed. The financial plan allows adequate revenue for this purpose.

The balance of this section explains the revenue and expenditure projections used in the financing plan and discusses the financial consequences for Metro of constructing the preferred alternative. The Metro Council is presently reviewing this financing plan. A formal financing plan will be adopted by the Metro Council as part of its annual budget process in June 1985.

7.2.1 Revenue Assumptions

Present Revenue Sources

Metro currently derives transit revenue from the following sources:

- Farebox revenue.
- A retail sales tax of 0.6 percent of the value of taxable retail sales in King County. One-third of the revenue from this source has been set aside by the Metro Council for capital projects. The remainder is available for operations
- A Motor Vehicle Excise Tax equal to 1 percent of the value of the motor vehicles registered in King County
- Grants-in-aid from the federal government under Sections 3 and 9 of the Urban Mass Transportation Act
- Operating revenues from Metro's subscription service and other contractual services
- Miscellaneous non-operating revenues, including interest income on balances in Metro's Revenue Fund and Construction Fund.

Metro's adopted 1985 budget includes estimated total transit revenues of $209.3 million, of which $135.3 million would be available to support transit operations (see Table 7-5). In assessing the financial feasibility of the preferred alternative, projections of revenue from existing sources have been made through 2000 (See Tables 7-6 and 7-7). These projections are based on the following assumptions:

1. Sales Tax. Revenue from the excise tax on retail sales is projected to increase at 8 percent annually from 1984 through 2000, or 2 percent above the projected inflation rate of 6 percent. The real rate of increase implied by this projection is lower than the rates of increase experienced in the late 1970s, though greater than the low-growth rates experienced during the recent recession.

2. Motor Vehicle Excise Tax. Revenue from this source is also projected to increase at 8 percent annually from 1984 through 2000.

3. Farebox Revenue. The average fare paid by Metro riders will increase 14 percent in 1985. In subsequent years, fares would increase every other year

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in order to keep pace with the rate of inflation. Farebox revenue for each year is obtained by multiplying the average fare by the projected number of riders.

4. Federal Operating Assistance. The Section 9 federal transit assistance program allows Metro to use block grant funds for operations in an amount not to exceed 80 percent of 1982 operating assistance or $6,190,000. It is assumed that Metro would receive and set aside this amount for operating assistance from its block grant allocation in 1985. In 1986 and thereafter, this federal operating assistance is assumed to be phased out.

5. Federal Capital Grants. Federal contributions to Metro's capital program are assumed from:

   a. Section 9. Metro's current allocation under the Section 9 block grant program is $28 million, of which $6,190,000 is used to support operations. The planners assume a 25 percent cut in Section 9 funding in 1986 to $21 million. Beyond 1986, Section 9 funding is assumed to increase at the rate of inflation.

   b. Section 3. Capital funding under Section 3 of the Urban Mass Transportation Act is assumed to be available in an amount equal to 50 percent of the capital cost of the electric bus tunnel, up to a maximum of $50 million in any single year. With an estimated cost of $394.6 million for the electric bus tunnel, the federal share is assumed to be $197.3 million.

   Note: While Metro's local funding is available without action by any other governmental body, the federal funding is not presently assured, as President Reagan's proposed 1986 federal budget does not include funding for major new transit projects.

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TABLE 7-5

METRO TRANSIT BUDGETED 1985 REVENUE
(Millions of 1985 Dollars)

Available for Operations	
Fares	$ 31.7
Other Operating Revenues	4.6
Sales Tax (0.4 percent)	54.1
Motor Vehicle Excise Tax	31.7
Federal Operating Grant	6.2
Other Non-operating Revenue	7.9
Subtotal	$ 135.3
Available for Metro Transit's Capital Programs	
Federal Capital Grants	$ 46.9
Sales Tax (0.2 percent)	27.1
Subtotal	74.0
TOTAL REVENUES	$ 209.3

Potential Revenue Sources

In addition to Metro's existing revenue base, other potential revenue sources could be used to finance future capital improvements including the following:

1. Revenue from the City of Seattle and/or Local Improvement District (LID). The City of Seattle and property owners and businesses in the CBD would benefit from a major downtown capital improvement. State Legislation authorizes cities and towns to establish local improvement districts to create improvements including, but not limited to, construction or improvement of streets and roadways. Metro is also authorized to set up LIDs for purposes which relate to its authorized functions. A local improvement district would gain additional financial contributions from those downtown properties most directly benefited from the project.

2. State Department of Transportation. Since the preferred alternative would substantially benefit the entire regional transportation system, it would be appropriate to expect the state Department of Transportation to contribute to the project. The contribution could be a donation of DOT land at the northern end of the tunnel alignment, conversion of HOV ramps and a decision by the DOT to finance a portion of the busway connection to Interstate 90.

In the financial projection that follows, no assumptions have been made regarding revenues potentially available from the sources mentioned above, except that $5.3 million could be generated from sales of surplus land acquired by DSTP funds in

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1990. To the extent that revenues can be secured from these potential sources, Metro's borrowing can be reduced.

7.2.2 Financing the Capital Plan

The total capital cost associated with the preferred alternative described in Chapter 2, inflated to the time of construction, is estimated at $415.6 million. The proposed financing is as follows (in millions of dollars):

Tunnel		$394.6
Federal Share (Discretionary)		
Previous Grants, WA-03-0053 & WA-09-0044:	$ 2.0	
Pending Grant, WA-03-0059	$195.3	
Sub-Total	$197.3	
Local Share		
Obligated to Date, PE/FEIS	$ 11.0	
Future, Including Borrowing	$186.3	
Sub-Total	$197.3	
Surface Construction - Metro Funds		$ 15.3
Circulation System - Metro Funds		$ 5.7
Project Total		$415.6

Total Federal Share (UMTA): $197.3 or 47.5% match
Total Local Share (Metro): $218.3 or 52.5% match

Borrowing

Metro is authorized pursuant to state law to issue general obligation bonds and to pledge its full faith and credit to the payment thereof. Bonds may be issued in principal amounts up to three-fourths of one-percent of the value of taxable properties within Metro's jurisdictional area without a special election. The Metro Council, within this statutory restriction, may at present authorize the issuance of up to approximately $400 million in tax-exempt bonds. With a special election, additional bonds up to 5 percent of taxable property could be issued. Metro's transit program has no debt outstanding at the present time. Metro will also be pursuing potential new revenue sources (discussed below) which could be used to reduce the amount of debt issuance for financing the preferred alternative.

It was assumed that project financing would be obtained to cover projected cash needs through 1990 at an interest rate of 8 percent. In 1990 the existing debt could then be converted to long term (20-year) bonds at an interest rate of 10 percent.

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7.2.3 Financing Operating Expenses

In 1984, the average cost per service hour was $47.31. For financial projections, the average cost per hour was assumed to increase at the rate of inflation (6 percent). Total operating expenses are calculated by multiplying the cost per hour times the projected number of service hours. The level-of-service hours is a result of projections made with regard to ridership and productivity (passengers per hour) for the preferred alternative, which reflects a net decrease in operating hours and operating costs. If revenues available for operations exceed operating expenses, the balance can be used to finance capital projects. When operating revenues fall short of operating expenses, revenues which would otherwise be available for capital projects must be diverted to cover the operating deficit.

The financial projections for the period 1985-1990 are shown in Table 7-6 and for the period 1991-2000 in Table 7-7. Table 7-6 shows a slight negative operating balance of $4.1 million at the end of this decade with total operating revenues of $959.5 million. The operating balance projected for the 1991-2000 decade is $165 million with total operating revenues of $3,058.8 million. This positive operating balance contributes additional funds for future capital needs including debt service.

7.2.4 Discussion of Financial Projections

The projected financial performance of the Metro system over the period from 1985 to 2000 shows that Metro would have to borrow up to a maximum level of $240 million during construction of the preferred alternative and would have to issue about $215 million in bonds at the end of construction to provide long-term financing for the project. These tables provide financial information in current year dollars (the year in which the money is actually spent), not in constant 1984 dollars as used elsewhere in this document. Capital costs, therefore, appear to be larger than those in 1984 dollars. Projections for all of the alternatives being considered were provided in the draft EIS, Chapter 7.

The level of debt required to finance the preferred alternative is readily affordable by Metro, as shown by several financial tests. The debt service on the bonds can be compared to the income stream available to pay it off. Debt service on the bonds ($25.3 million per year) represents 19 percent of Metro's projected total sales tax revenue in 1991 or 57 percent of that part of the sales tax revenue which Metro has dedicated to capital improvements. The debt service can also be viewed in the context of overall demands on Metro's resources during the 1990's. Debt service on the bonds over the 1990s would amount to $253 million, which represents only 31 percent of the projected local revenues available for capital projects or debt service (the sales tax plus operating balance).

Total revenue available for capital or debt service over the 1990s is projected at $922.3 million. Funds which are not required for debt service or for replacement capital in the 1990s would be available for limited system expansion or improvement. The magnitude of the funds available for capital is an indicator of the flexibility available to Metro in carrying out the project. If the projections of the financing plan are not achieved, the funds can be used to pay debt service on

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additional long-term debt to offset any shortfalls in the basic program. However, if the projections hold true, the funds are available for maintenance of the transit system and related improvements.

7.2.5 Discussion of UMTA Financial Ratings

In addition to the requirement for a cost effectiveness evaluation UMTA's New Start Policy requires evaluation of the local fiscal commitment to a project. To assist in the evaluation UMTA employed the firm of James J. Lowrey, Co. which submitted on January 15, 1985, a report entitled "Financial Ratings of Proposed New Start Fixed Guideway Projects." A summary of the information in this report on the Seattle preferred alternative is provided below:

UMTA's financial ratings are comprised of three componenets.

Financial Rating Components	Ratings for Seattle's Preferred Alternative
Non Federal Capital Overmatch	High
Proposed Plan of Capital Financing	High
Stable and Reliable Source of Operating Revenue	High

Seattle is the only project among those with Congressional earmarks for 1985 for Section 3 appropriations which ranks "High" in all three components.

The Summary of the Lowrey Report concludes that Seattle Metro is proposing a local capital match which is well above the Congressional guideline of 50 percent.[1] Furthermore, the Plan of Financing to achieve this goal is well reasoned, built on conservative financial assumptions, and within the economic capacity of the Agency. The plan is also flexible and has the strength to withstand potential cost overruns. The Metro Council continues to exercise control over a completely dedicated revenue base which has more than met the need for operations. Seattle Metro has one of the strongest transit-revenue bases of the systems examined in this report, and no doubt one of the strongest in the Country.

[1] See Section 7.2.2 above.

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TABLE 7-6

SUMMARY OF FINANCIAL PROJECTIONS: 1985-1990
(Millions of Current Year Dollars)

OPERATING STATISTICS:	1990
Passengers	86,700,000
Hours of Service	2,955,000
Passengers per Hour	29.34
OR/OE (Operating Revenue/Operating Expense)	.284

FINANCING:	1985-1990
Operations	
Revenues	
Farebox Revenues	$ 242.6
Taxes & Other Revenues	710.8
Federal Operating Assistance	6.1
Total Operating Revenues	$ 959.5
Operating Expenses	963.6
Operating Balance	$ (4.1)
Capital Program	
Revenues	
Sales Tax (0.2%)	$ 205.1
Capital Grants	
Federal discretionary	195.3[1]
Federal formula, state	174.5
Resale of Land	5.3
Funds on Hand	52.9[2]
Total Capital Revenues	$ 633.1
Capital Expenses	
Downtown Project	$ 409.5[3]
Other Capital Costs	399.3
Total Capital Costs	$ 808.8
Net Funds Required (Capital Costs - Capital Revenues - Operating Balance)	$ 179.8
Long-Term Debt Required[4] (Principal and Interest)	$ 215.3

[1] See discussion on page 7-10.

[2] Excludes $21 million needed for working capital in 1990.

[3] Excluding costs incurred prior to 1985.

[4] Net funds required plus net interest costs.

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TABLE 7-7

SUMMARY OF FINANCIAL PROJECTIONS: 1991-2000
(Millions of Current Year Dollars)

	2000
OPERATING STATISTICS:	
Passengers	110,300,000
Hours of Service	3,147,000
Passengers per Hour	35.05
OR/OE (Operating Revenue/Operating Expense)	.342

FINANCING:	1991-2000
Operations	
Revenues	
Farebox Revenues	$ 853.8
Taxes & Other Revenues	2,205.0
Total Operating Revenues	$ 3,058.8
Operating Expenses	2,893.8
Operating Balance	$ 165.0
Capital Program	
Revenues	
Sales Tax (0.2%)	$ 641.9
Capital Grants (Formula Funds)	368.3
Total Capital Revenues	$ 1,010.2
Debt Service	$ 252.9
Total Available Capital Funds, 1991-2000 (Operating Balance + Capital Revenues - Debt Service)	$ 922.3[1]

[1] These funds would be sufficient for replacement of buses and for some limited expansion in the 1990s.

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CHAPTER EIGHT

COMMENTS AND RESPONSES

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COMMENTS AND RESPONSES

8.1 Introduction

8.1.1 Draft EIS Review and Comments Process

8.1.2 Description of Comments Received

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8.2.13 Historical, Cultural, Archaeological and Parkland Resources

8.2.14 Public Participation

8.2.15 Miscellaneous

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CHAPTER 8

COMMENTS AND RESPONSES

8.1 Introduction

The purpose of this chapter is to present the substantive comments that were made on the draft EIS and to provide responses to those comments. Comments made in the draft EIS are primarily responded to in the final EIS. As a result of the comments, revisions to the text and graphics in the draft EIS have been made in the final EIS.

The draft EIS public comment and review process was the culmination of Metro's initial planning and studying of the alternatives for the Downtown Seattle Transit Project. This was only one of the aspects of public participation in the Downtown Seattle Transit Project's development and design. Appendix L discusses other opportunities for public participation.

8.1.1 Draft EIS Review and Comments Process

Publication of the draft EIS was announced in the Federal Register on March 23, 1984. During the week of March 19 notices (encompassing the official "Notice of Intent to Hold Public Hearings") appeared in metropolitan, community and ethnic newspapers serving the Puget Sound region. These notices included the time, date and place of the public hearing on April 25, 1984 and notified the public of the availability of the draft EIS.

By the close of the public hearings, approximately 225 copies of the draft EIS had been distributed.

8.1.2 Description of Comments Received

Nineteen letters commenting on the draft EIS were received from public officials and government agencies and 25 letters were received from private individuals and organizations. More than 40 persons attended the public hearing. Transcripts of the testimony were prepared by a court reporters and are available at Metro.

Although most comments were limited to simple statements of support or opposition to the project, some raised particular issues or concerns. The following issues were raised most frequently during the public hearing or in comment letters:

- How does the draft EIS address the preferred alternative?
- What alternatives do we have if the dual-powered bus does not work?
- An expanded circulation system is needed as part of the project.
- What are the effects of the project on growth, especially in the International District?

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- What is the regional effect of the project on transportation?
- What are the construction impacts?

8.1.3 Organization of the Comments and Responses

All letters, cards and transcripts of the public hearings have been reviewed. Substantive comments have been identified, classified into one of 15 different subject areas and numbered consecutively. Because there was some overlap and repetition in many comments, similar comments were consolidated and paraphased. As a result, the comments that appear in this chapter are often not the precise words found in the letter or oral testimony. This has been done to reduce duplication and in no way was intended to obscure the substance of a comment. Copies of original letters, together with a cross-index of comments are available for public inspection at Metro and the libraries listed in Appendix C. Also available are copies of the complete transcripts of the draft EIS public hearing. The 15 subject areas covered in this chapter include:

Other Alternatives (pages 8-6 to 8-12)
Stations/Operations (pages 8-12 to 8-16)
Transportation (pages 8-16 to 8-23)
Circulation System (pages 8-23 to 8-27)
Dual-Power Vehicles (pages 8-27 to 8-30)
Land Use (pages 8-30 to 8-36)
Relocations/Housing and Business (pages 8-36 to 8-38)
Noise and Vibration (pages 8-38 to 8-39)
Air Quality (pages 8-39 to 8-41)
Water Quality (page 8-41)
Construction (pages 8-41 to 8-43)
Costs and Financing (pages 8-43 to 8-46)
Historic, Cultural, Archaeological, Parklands, Resources (pages 8-46 to 8-48)
Public Participation (page 8-49)
Miscellaneous (pages 8-49 to 8-51)

Table 8-1 identifies those who provided testimony or written comments on the draft EIS. Where agencies or organizations are listed, the spokesperson is also indicated. If a comment did not require a response this is indicated by "comment noted."

TABLE 8-1

GROUPS AND INDIVIDUALS WHO COMMENTED ON THE DRAFT EIS FOR THE DOWNTOWN SEATTLE TRANSIT PROJECT

Federal Agencies

1. Department of Transportation (DOT), Washington, D.C., Eugene L. Lehr -- Dual-Power Vehicles 1.1
2. Environmental Protection Agency (EPA), Region X, Robert S. Burd -- Land Use 2.3; Noise and Vibration 2.1, 2.2
3. Department of Health and Human Services, John I. Nelson — Comment noted
4. Department of Interior (DOI), Bruce Blanchard -- Historic 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7

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5. Advisory Council on Historic Preservation (ACHP), Robert Fink -- Historic 5.1, 5.2, 5.3, 5.4, 5.5

6. National Oceanic and Atmospheric Administration (NOAA), Joyce M. Wood -- Miscellaneous 6.1, 6.2

7. General Services Administration (GSA), John T. Myers -- Comment noted

State Agencies

8. Department of Ecology (DOE), Barbara J. Ritchie -- Comment noted

9. Department of Transportation (WSDOT), M.D. Tranum -- Transportation 9.1, 9.2

10. Department of Natural Resources (DNR), Donald R. Theoe -- Comment noted

King County

11. Office of Budget and Program Development, Shelly Yapp -- Comment noted

City of Seattle

12. Pike Place Merchants Association, John Turnbull - Circulation System 12.1, 12.2

13. Fire Department, Robert L. Swartout -- Other Alternatives 13.1, 13.2, 13.3, 13.4; Transportation, 13.5

14. Bicycle Advisory Board, Gordon Burch -- Transportation 14.1, 14.2

15. International Special Review District (ISRD), William Chew -- Other Alternatives 15.9; Transportation 15.6, 15.7; Circulation System 15.8; Land Use 15.1, 15.3, 15.4, 15.5; Air Quality 15.10, 15.11; Public Participation 15.12; Miscellaneous 15.2, 15.12, 15.13

City of Bellevue

16. Office of Environmental Coordination, Nancy A. Tucker -- Comment noted -- general support for the Tunnel Alternatives

Regional Agencies

17. Puget Sound Council of Governments (PSCOG), Jim Williams -- Stations/Operations 17.2, 17.3; Transportation 17.11, 17.12, 17.13, 17.14; Dual-Powered Vehicles 17.1, 17.5, 17.6, 17.7, 17.10, 17.23, 17.24; Land Use 17.8; Air Quality 17.15, 17.16, 17.17; Costs and Financing 17.__, 17.20, 17.22; Historical 17.18; Miscellaneous 17.4, 17.19.

18. Puget Sound Air Pollution Control Agency (PSAPCA), Arthur R. Dammkoehler -- Comment noted

19. Port of Seattle, Lynn Taylor -- Transportation 19.1; Circulation System 19.2; Water Quality 19.3

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Civic Interest Groups

20. Citizens' Transit Advisory Committee (CTAC), Larry Fogdall — Other Alternatives 20.1, 20.3, 20.4; Transportation 20.5, 20.10; Circulation System 20.8, 20.9; Land Use 20.7; Costs and Financing 20.6; Public Participation 20.2, 20.11

21. International District Improvement Association (Inter-Im), Robert N. Santos —Other Alternatives 21.12; Stations/Operations 21.17; Transportation 21.10, 21.11, 21.19; Circulation System 21.9; Land Use 21.1, 21.2; Relocations/Housing and Business 21.3, 21.4; Noise and Vibration 21.7, 21.15, 21.16; Air Quality 21.8, 21.14; Costs and Financing 21.13; Miscellaneous 21.5, 21.6, 21.18

22. Elderly and Handicapped Transit Advisory Committee (EHTAC), George B. Turner — Other Alternatives 22.1, Stations/Operations 22.2, Public Participation 22.3

23. Allied Arts of Seattle, Henry Aronson and Steve Bowman — Stations/Operations 23.6, 23.13, 23.14, 23.15; Transportation 23.5; Land use 23.3, 23.4; Construction 23.1, 23.2, 23.12; Costs and Financing 23.7, 23.8, 23.9, 23.10, 23.11

24. League of Women Voters, Nancy Bagley — Other Alternatives 24.1; Transporation 24.3; Construction 24.4; Costs and Financing 24.2; Public Participation 24.5

25. Downtown Neighborhood Alliance (DNA), John V. Fox — Other Alternatives 25.18; Stations/Operations 25.11; Transportation 25.12, 25.15, 25.17, 25.19; Land Use 25.1, 25.2, 25.3, 25.4, 25.6, 25.8, 25.9, 25.10, 25.20; Air Quality 25.14; Costs and Financing 25.5, 25.7, 25.13; Public Participation 25.16

26. Transit Alliance, Barbara Zepeda and Steven Benn — Other Alternatives 26.4, 26.7, 26.8; Transportation 26.2, 26.5, 26.9; Dual-Power Vehicles 26.6; Land Use 26.1; Costs and Financing 26.3

27. Washington Association of Railroad Passengers (WARP), Hans S. Mueller — Other Alternatives 27.1; Stations/Operations 27.2

28. Center on Contemporary Art (COCA), Kathrine Marczuk — Stations/Operations 28.1

29. Students for a Better Transit, Scott Higbee and Scott Sidell — Other Alternatives 29.1; Stations/Operation 29.2; Land Use 29.3

Others

30. George Benson — Other Alternatives 30.1

31. Donald Myers — Other Alternatives 31.1

32. Wright Runstad & Company, Douglas E. Norberg — Stations/Operations 32.2; Construction 32.1, 32.3, 32.4

33. E&E Meats, Edward Banchero — Relocations/Housing and Business 33.1

34. Maynard Investment Company, Ralph Banchero — Relocations/Housing and Business 34.1

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35. The Central Building, Barry A. Johnson -- Relocations/Housing and Business 35.1, 35.2

36. Allen Northwest, Inc., Bruce C. Allen -- Costs and Financing 36.1

37. Jan Mohamed -- Relocations/Housing and Business 37.3, 37.3; Historical 37.3

38. Tom Martin and Associates, Thomas J. Martin -- Other Alternatives 38.1, 38.7, 38.10; Stations/Operations 38.2, 38.3, 38.5; Circulation System 38.4; Construction 38.6, 38.8; Historical 38.9

39. Peter T. Hurley -- Comments noted -- general opposition to the Tunnel Alternative

40. Harbor Properties, Inc., Zoltan Szigethy -- Stations/Operations 40.1; Circulation System 40.2

41. Constance M. Paulson -- Comment noted

42. Human Being -- Comment noted

43. Stephen C. Heller -- Comment noted - general oppostion to the Tunnel Alternative

44. Jack Brautigan/Kevin Elliot Milam -- Comment noted

45. Kjed Lorentzer -- Other Alternatives 45.1

46. Evan Hundley -- Miscellaneous 46.1

47. Syd Rogers -- Stations/Operations 47.3; Transportation 47.4; Land Use 47.1, 47.2

8.2 Comments and Responses by Subject Area

8.2.1 Other Alternatives

Comment 13.1: "Additional wires would make the operation of aerial ladders impossible." (Fire Department)

Response: The preferred alternative includes overhead trolley wires on Third Avenue similar to the existing wires. Other alternatives had included more overhead wires, with some wires located closer to the curb and therefore closer to buildings than the existing wires. The Seattle Fire Department had commented that these wires closer to buildings would hinder ladder operations.

The preferred alternative does not inlcude these wires located closer to the buildings. On Pine Street, however, there will be a set of eastbound wires in addition to the existing westbound wires, but these wires will be located as far as possiblke from the buildings on the south side of the street.

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Comment 13.2: "The island or median configuration would make emergency "wrong direction" operation of fire trucks difficult if general traffic is allowed on the Third Avenue portion of the mall." (Fire Department)

Response: The Metro Council preferred alternative identified Nov. 3, 1983, does not include double trolley wire or islands/medians on Third Avenue. Fire trucks would have difficulty operating on Third Avenue if medians had been included as part of the design.

Comment 13.3: The fire department objects to double trolley lines required in both directions on Third Avenue and westbound on Pine Street with the close-in Transit Centers.

Response: The preferred alternative of the Metro Council, identified Nov. 3, 1983, does not include either double trolley wire or islands/medians on Third Avenue. One additional set of trolley wires would be added on Pine Street.

Comment 13.4: Page 4-14 of the draft EIS "refers to Figure 2-16 and states that a mall with islands configuration would not adversely affect emergency vehicle circulation on Third Avenue." This is not correct. (Fire Department)

Response: Emergency vehicles would be constrained by the mall with islands because of restrictions to negotiate into the opposite lane when moving through traffic.

Comment 15.9: Further information on the mini-station at Union Station is requested. (International Special Review District)

Response: The preferred alternative project element to be located at Union Station site is not a mini-station as described in the close-in terminals alternative but a tunnel station. It serves the function of allowing passenger access to tunnel transit service. It will be located at track level between the existing Union Station Building and Fifth Avenue South. It will have pedestrian access to South Jackson Street providing connections to the circulator routes and existing transit routes on South Jackson Street.

Comment 20.1: "The final EIS should address the Metro Council's preferred alternative (the Third Avenue tunnel with surface improvements) in any comparison between alternatives." This was lacking in the draft. (Citizens' Transit Advisory Committee)

Response: The preferred alternative selected by the Metro Council is a variation of the Third Avenue and Pine Street tunnel discussed in the draft EIS. Additional details and comparison (Chapter 2) on the preferred alternative as it has evolved during preliminary engineering is provided in the final EIS.

Comment 20.3: Concern was expressed over "the negative impacts of those alternatives involving a terminal concept" (CTAC)

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Response: The preferred alternative would not include peripheral terminals.

Comment 20.4: The lower cost TSM Alternative (South Jackson Street - Yesler Way busway) suggested by CTAC should be compared with the higher cost TSM alternatives in the draft EIS. (CTAC)

Response: Some form of the CTAC - suggested South Jackson Street - Yesler Way busway was included in each alternative in order to comply with project objective number 5 shown on pp 1-13 of the draft EIS, "Preserve the opportunity to phase the expansion of the metropolitan transit system so that mid term actions can be taken while longer term solutions are being planned." The rail convertible busway was included to allow rail convertibility in the future.

Comment 21.12: There are 10 action alternatives discussed but there is no discussion of how various technologies and alternatives could be combined to provide realistic alternatives. One of these, for example, is a transit only mall using dual mode technology. (International District Improvement Association)

Response: The preferred alternative is a combination of several alternatives. The transit only mall using dual mode technology is a variation of the Transit Mall alternative described in detail in the draft EIS. The three primary weaknesses in alternative are:

1. Major impact on general traffic circulation and access by removing one two-way CBD street from general traffic use
2. Lack of long-term transit capacity
3. Greater diesel odor and noise impacts than the preferred alternative.

The all-electric version of the transit mall would likely have lower capacity than the diesel version as a result of the complicated four-track overhead trolley wire and the loading island or median configuration which would be required by the trolley overhead wire arrangement. Also see objections to loading islands/medians and four-track overhead wire by Seattle Fire Department.

Comment 22.1: Since transfers discourage transit use, especially by the elderly and handicapped community, "maximum through service in the downtown area should be maintained." (EHTAC)

Response: Dual-power vehicles were selected for use in the tunnel because they do not require transfers. Refer also to comment 26.8.

Comment 24.1: The draft EIS fails to define adequately what is meant by a "mall." (League of Women Voters)

Response: The Mall in the draft EIS, as an independent alternative, or in combination with another alternative would be a street designed to emphasize transit and pedestrian use. General traffic would be prohibited entirely or allowed on the street at specified off-peak times.

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The Metro Council's preferred alternative does not include a mall. However it would include some transit and pedestrian features (surface improvements) such as wider sidewalks on Third Avenue and Pine Street. General traffic would use these streets at all times.

Comment 25.18: "It is also important for the final EIS to include an environmental assessment of a limited growth alternative for downtown Seattle that would include only 60 percent of the growth anticipated in the downtown transit project. How will travel times, transit costs, levels of congestion, etc., be affected by the year 1990 and 2000 under a limited growth option and under each transit alternative?" (Downtown Neighborhood Alliance)

Response: A limited growth alternative for downtown Seattle was not studied because the City of Seattle, with its Land Use and Transportation Plan, has adopted policies which stipulate that growth be allowed and encouraged.

Comment 26.4: "Why not try more aggressive surface TSM?" (Transit Alliance)

Response: The Transportation System Management alternatives and the Non-intercept Mall alternative analyzed in the draft EIS would provide short-term improvements in transit speeds and capacity in the CBD, but both would essentially reallocate surface street capacity among competing modes, including those uses which cannot be replaced by transit, such as truck loading.

The tunnel element of the preferred alternative would add a new street or right-of-way for transit. Therefore, it increases the overall capacity of the transportation system.

Comment 26.7: "Cars are excluded from every shopping mall, so why not from part of the CBD?" (Transit Alliance)

Response: The preferred alternative would not be a shopping mall. The preferred alternative calls for only surface improvements and continuing general traffic use.

Comment 26.8: A twin-terminal plan is opposed because of the inconvenient, inefficient, and confusing transfers, and because diesel buses would still come most of the way into Seattle. However, a single centralized and well-supervised terminal would greatly improve comfort, convenience, and safety for passengers who must wait or transfer, especially in the off-hours. (Transit Alliance)

Response: Dual-power vehicles in the tunnel do not require transfers. There would be three stations located along the alignment and an additional station at either end.

Comment 27.1: Convertibility to rail should be included. (Washington Association of Railroad Passengers)

Response: The CBD project would be for a "bus" facility with convertibility possible. Refer also to the response 38.1.

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Comment 29.1: "Light transit rail should be instituted now instead of going through the phase of a bus transit system." (Students for a Better Transit)

Response: The downtown transit tunnel is being designed for possible future conversion to light-rail transit which includes the possibility of fixed guideway, buses or other vehicles. Tunnel cross-sections, curvature, grade and clearances are being designed to accommodate a range of existing light-rail vehicles. Patronage and cost estimates show that within the time horizon of the Downtown Seattle Transit Project, a bus system would be the most cost-effective way to provide public transit service in the Seattle area. Metro and the Puget Sound Council of Governments have recently begun work on the Multi-Corridor Project to examine bus and light-rail transit needs to the year 2020. The results of this project, which would be completed in 1986, may include recommendations including light-rail as a cost-effective option.

Comment 30.1: How did the separation of the Waterfront Street Car from the Downtown Seattle Transit Project occur? (George Benson)

Response: Extension of the Waterfront Streetcar to provide access between the tunnel south station and the existing streetcar line would be developed independently of the Downtown Seattle Transit Project. A separate environmental assessment would be conducted for the extension.

The primary reason for proceeding with the streetcar extension as an independent project was to resolve the issue of ownership of the Waterfront Streetcar. At the time the extension was proposed by Metro, the streetcar was owned by the City of Seattle. An agreement to transfer ownership to Metro was considered appropriate before proceeding with the extension. Execution of a transfer agreement between the City of Seattle and Metro in 1985 would simplify extension of the Waterfront Streetcar.

Development of alternative alignments and assessment of environmental impacts for the Waterfront Streetcar extension is now in progress. The proposed schedule calls for construction to be completed by mid-1987. At that time, the Waterfront Streetcar operations would be coordinated with the rest of the downtown circulation system.

Comment 31.1: The Tunnel should extend to Metro's base east of the Seattle Center. (The commentor provided additional information contained in the Comment Letters' Technical Appendix.) (Donald Myers)

Response: The downtown tunnel alignment was chosen to facilitate its initial operation as a bus facility, its ultimate operation as a rail tunnel, and to conform with land use planning for the downtown area.

Diesel buses would bring riders to downtown during the initial operation of the tunnel.* Currently the greatest volume of diesel buses that would enter the tunnel is found at a few freeway ramps, primarily

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connected to I-5 north and I-90 south. The tunnel has been located to connect directly to these ramps.

Later, the tunnel may be connected to a regional rail system. The downtown tunnel alignment has been coordinated with the Metro/ PSCOG Multi-Corridor Project a two-year study examining long range bus and rail alternatives. The tunnel alignment would be compatible with the rail alignments selected in that study.

The area around the proposed Ninth Avenue/Pine Street tunnel station is identified as the desirable section of downtown to encourage higher density office expansion in the Land Use and Transportation for Downtown Seattle adopted Sept. 24, 1984, by the Seattle City Council. The tunnel alignment as proposed in the EIS would be compatible with that goal.

*These buses would be routed through the tunnel under electric operation.

Comment 38.1: Rail should be laid in the pavement now so the conversion to rail transit would not require closing the tunnel for construction. (Tom Martin and Associates)

Response: The preliminary engineering consultant has been directed to recommend a strategy for conversion of the tunnel to joint bus-rail operation and rail-only operation, including a recommendation for which rail-related facilities should be built into the tunnel initially. Refer also to the response 27.1 and 29.1.

Comment 38.7: Why is a Third Avenue mall not just as feasible with the tunnel on Fourth as on Third? And why not run the mall east on Pike and west on Pine, with auto traffic allowed on one or two lanes? (Tom Martin and Associates)

Response: The preferred alternative includes surface improvements along Third and Pine.

The alternatives described in the draft EIS were developed to present and evaluate a range of solutions. A mall could be constructed on Third Avenue with a tunnel under Fourth Avenue. Note that the Metro Council's preferred alternative specifies surface improvements rather than a mall. Refer also to response 24.2, 29.1 and Foreword.

Comments 38.10: Can Table 7-1 include columns for Third Avenue Bored Tunnel, Third Avenue Bored Tunnel and Mall, and Fourth Avenue Bored Tunnel and Third Avenue Mall? (Tom Martin and Associates)

Table 7-1 should also include a line III E for the incremental annual cost per additional daily peak period rider when operating at capacity (2003 or later); and a line III F for the same data when rail operation is operating near peak capacity.

Response: The large number of possible combinations of components precludes identifying costs for each combination. The cost of the preferred

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alternative, which would consist of a bored tunnel under Third Avenue and a cut-and-cover tunnel under Pine Street, has been included in Chapter 7.

Because ridership would be at or near capacity by 2000 and EUAC is fixed, line III B provides a good approximation of the incremental annual cost per additional peak-period rider at capacity.

Rail is not considered a reasonable short or mid-range alternative to solving the downtown Seattle transit congestion problem at this time, and is therefore not included in the cost-effectiveness analysis. Rail is a long-range alternative.

Comment 45.1: Because it would be less expensive why not build a monorail similar to the one already in use? (Kjeld Lorentzer)

Response: A monorail or elevated light rail structure through downtown has been considered as part of several projects in the last decade and was studied in identifying and narrowing the alternative for the 1990 Plan and this EIS.

Capacity extensions of the existing monorail system were studied by Metro in 1975 in comparison with other downtown transit alternatives. However, these were not carried forward as elements for further study during the development of Metro's 1990 Comprehensive Plan.

In the late 1970's, the City of Seattle, which owns the Monorail, investigated several monorial extensions in conjunction with the Westlake Mall project. However, a southerly extension of the monorail beyond the Westlake Mall was not among preferred extension options.

Metro established a Downtown Citizens' Advisory Committee in 1979 to help select a transit alternative for the Seattle CBD. In 1980 this Citizen Committee made its recommendation but a monorail extension was not among the list of alternatives to be considered further. As recently as 1982 the Steering Committee of the North Corridor Alternatives Analysis also evaluated an elevated system in downtown Seattle and rejected it. The draft EIS compared the alternatives recommended by the Downtown Citizens' Advisory Committee, along with a No Action alternative, a low-cost alternative and a tunnel alternative added by the Metro Council.

A monorail solution to downtown congestion would be expensive. A monorail was studied with North Corridor analyses for the future, but a tunnel permits an additional street for buses before light-rail development and offers convertibility to LRT.

8.2.2 Stations/Operations

Comment 17.2: The draft EIS does not contain the information needed to compare the preferred alternative with the other alternatives. (PSCOG)

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Response: The draft EIS discusses the impacts of bored tunneling, but this technique is grouped with a Fourth Avenue alignment. The many design and construction approaches reviewed in the draft EIS can be grouped various ways to form many alternatives. For the purposes of the preliminary engineering phase Metro investigated a Third Avenue alignment. The final EIS contains a complete description of the preferred alternative.

Comment 17.3: The alternatives were originally intended to be short to mid-range solutions. The analysis was, therefore, done for a 1990 design year. The preferred solution, however, may not be operational by the 1990 design year. (PSCOG)

Response: The Draft EIS states on page 2-73 that tunnel operation would begin in 1990. Refer to the response to Comment 17.10.

Comment 21.17: It is not clear from the draft EIS whether all diesels currently staged on I.D. streets, would be moved and staged at either a transit base or below grade at the Union Station site. (Inter-Im)

Response: Only those buses using the tunnel would be removed from on-street staging areas in the I.D. All buses entering the tunnel would be staged below street level. Diesel and trolley coaches would continue to operate on surface streets. The 1990 forecast of on-street staging requirements with the tunnel is approximately 95 percent of the 1984 trend forecast without the tunnel staging area. Beyond 1990, when all the dual-power buses have arrived and more routes use the tunnel, many more coaches would be removed from on-street CBD staging.

Comment 22.2: The stations should have level entries (not mid-block entries on a hill) for easier access by the elderly and handicapped. (Elderly and Handicapped Transit Advisory Committee)

Response: With the possible exception of two station access points, all access would be provided through a level entry point. At the station (Third Avenue South) where two non-level entries could occur, level station entrances would exist just across Third Avenue. In addition, elevators would be included in the station design to facilitate use by the elderly and handicapped. There would be an adequate number readily accessible for general use at the street level entrances. EHTAC also suggested design features for the tunnel and surface improvements which are under consideration. (See the Comment Letters Technical Appendix).

Comment 23.6: Allied Arts is concerned that the current budget provides for very minimal station finishes. (Allied Arts)

Response: The finish quality of the stations would be determined during final design. Urban design is a stated project objective, which is one reason for Metro's preferred alternative. Metro plans to enhance the station environment. In addition Metro Council has approved one percent of the 13 total project budget be awarded to the advancement of the arts.

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Comment 23.13: Include the actual points of fare collections. (Allied Arts)

Response: Metro is not proposing any change in fare collection procedures as a result of the tunnel. Fares would not be collected in the tunnel. Passengers would continue to pay their fares upon boarding when traveling to downtown Seattle and upon deboarding when leaving downtown seattle. Tunnel station design would include, as a future option, space for fare vending machines and fare collection before entering the platform area. The primary reason for this space set aside is so that it is preserved as a future option.

Comment 23.14: Include the proposed hours the stations and tunnels would be used. (Allied Arts)

Response: No decision has been reached on the hours of operation. Transit activity, rider convenience, maintenance and operating costs, and security are all under consideration. Stations have been designed so that the system can be shut down and entry can be prohibited. The design would permit the Metro Council flexibility in determining and changing the hours of operation after construction is complete and some operating experience has been gained.

Comment 23.15 Include control and security programs. (Allied Arts)

Response: Security measures were examined as part of the preliminary engineering tasks on station and architectural design criteria and communications systems engineering. Recommendations from these tasks would be considered in final design.

Comment 25.11: "The draft EIS identifies reductions in street congestion, transit travel times (through downtown streets, bus hour cost savings, noise, air pollution, auto-volumes, etc.) that will accompany the downtown tunnel alternative--as opposed to other alternatives, including the no action alternative.

The manner in which these estimates are made and summarized lend the clear impression that with a tunnel, levels of street congestion, operating costs, transit travel times, overall commuter times (bus and auto), noise and air pollution, auto volumes, etc., will be lower than what they are today--that commuters traveling from Bellevue or Redmond to downtown will have an easier and faster trip than they do today. There is a general public impression such a conclusion is valid, even though it is not the case. The draft EIS falsely reinforces this notion." (Downtown Neighborhood Alliance)

Response: Although a downtown tunnel would not have any effect on general traffic congestion in areas outside downtown, such as the Lake Washington bridge corridors, a tunnel would reduce street congestion, operating costs, transit travel times, overall commuter times, noise and air pollution, and auto volumes in downtown, compared to the No Action and other lesser action alternatives. A commuter from Bellevue or Redmond travelling into downtown would experience overall shorter travel time and increased bus schedule reliability

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throughout the system compared to the No Action alternative because the CBD segment of the trip would be faster.

Regional traffic volumes would increase in all three major corridors with all the DSTP alternatives. Peak auto vehicle volumes are expected to increase 3.7 percent in the north corridor, 23.3 percent in the cross-Lake Washington corridor and 6.5 percent in the south corridor between 1980 and 1990.

Comment 27.2: High-level platforms should be investigated. (WARP)

Response: High-level loading and the appropriate guidance and bus-door configurations were investigated as part of the preliminary engineering work. The design consultant has recommended and the Metro Council DSTP subcommittee of the Metro Council has adopted a low platform configuration for the tunnel stations. The consultant performed a study comparing high and low platforms and concluded that boarding times were acceptable for low platforms. Metro's Elderly Handicapped Citizens Advisory Committee and Metro's Citizens' Transit Advisory Committee also recommended low platforms.

Comment 28.1: One percent of the total budget from Metro's new transit development project should be awarded to the advancement of the arts. (Center of Contemporary Arts)

Response: The COCA suggestion that 1 percent of the total project budget be awarded to the advancement of the arts has been approved by the Metro Council. An arts budget of $1.5 million has been recommended for the DSTP. This budget figure represents 1 percent of the estimated construction cost for stations and surface improvements. An art advisory committee has been formed to develop an artist seelection process and seek supplemental funding.

Comment 29.2: "Raised center platforms should be constructed because it seems the construction of one platform is less expensive than the construction of two." (Students for a Better Transit)

Response: Although low platforms are not incompatible, i.e. the tunnel is convertible with the long-range planning for light rail, building would be considered a part of a separate light-rail project. Refer also to the response for Comments 27.2 and 38.3.

Comment 32.2: The draft EIS discusses various "surface transit mall" configurations for Third Avenue. It is unclear, however, whether this surface transit mall on Third Avenue and Pine Street will permit any vehicular traffic other than transit buses. (Wright Runstad and Company)

Response: The preferred alternative would permit mixed traffic on Third Avenue and westbound Pine Street. This alternative would not include a mall.

The Non-intercept Mall described on page 2-24 of the draft EIS was not incorporated into the Metro Council's preferred alternative as

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stated in Resolution #4243. The "street improvements" included in the resolution do not propose exclusive transit streets.

Comment 38.2: To make better use of the tunnel while dual-propulsion buses are being purchased, Metro's trolleys should be operated in the tunnel. (Tom Martin and Associates)

Response: The Metro Council's preferred alternative, described in Resolution #4243, is an electric-powered bus tunnel. Metro has initiated the bid process for the first order of dual-power coaches to operate in the downtown bus tunnel. 236 coaches are requested. This number is approximately one half the number needed to operate in the tunnel at its projected capacity -- 145 buses per hour, per direction.

These vehicles are expected to arrive in 1988 and 1989 (with the exception of a small number of pre production vehicles which could arrive in 1987). By 1990 the tunnel would effectively operate with approximately 80 buses/peak hour/direction which is more than half the tunnel capacity. Additional routes would be added to the tunnel as more dual-power vehicles are delivered.

Routes assigned to the tunnel were selected using criteria which included approach feasibility making routes with direct access to the tunnel, via the Pine Street reversible I-5 ramp, I-90 bus ramp and Union Pacific busway very attractive to operate in the tunnel. Local trolley routes would operate on surface streets and be an integral part of the CBD circulation system.

Comment 38.3: The tunnel capacity would be doubled using high platforms at stations. (Tom Martin and Associates)

Response: High and low platforms were studied as part of preliminary engineering. The consultant's work shows a difference in dwell time of less than one second. This assumes a low-platform bus with three right-hand doors and a high-platform bus with two doors and no wheelchair lift operation. Center and side platforms were also examined as part of the study. Low-side platforms were recommended.

The Metro Council's DSTP subcommittee has concurred. One criteria was that low platforms would not preclude use of the existing trolleybuses in the tunnel, as you suggested.

Convertibility to light-rail technology has been incorporated into the preliminary engineering and close coordination with the Metro/PSCOG Multi-Corridor study is being maintained. This issue was reviewed by The Citizens' Transit Advisory Committee (CTAC) and Elderly and Handicapped Transit Advisory Committee (EHTAC) with a recommendation for low-side platforms.

Comment 38.5: Metro should consider cross-tunnels, for access to both tracks (or a center station) from either side of the street. This may mean the main tunnels are deeper, but should have minor effect on cost of boring and ease of operation. Metro

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should also provide ready access from the Westlake Station to the Monorail, and from the Union Station to the Kingdome with pedestrian walkways. (Tom Martin and Associates)

Response: To provide access to both directions of travel, mezzanines will be provided at each station. In addition to providing access to major retailers at Westlake Station, efforts are underway to provide access between the station and the relocated terminus of the monorail. No special access is being proposed between the Union Station station and the Kingdome.

Comment 40.1: One of the three intermediate stations should be centered on University Street because University provides the principal east-west pedestrian connection between the central business district and the waterfront. This connection exists now, but it will be enhanced upon the completion of the Harbor Steps project. (Harbor Properties, Inc,)

Response: There is a station proposed near University Street. The Third Avenue north station would be centered on University Street with one station entrance proposed for the northeast corner of and another for the northwest corner in the proposed Marathon development.

Comment 47.3: "Subways are a danger." (Syd Rogers)

Response: Control and security programs are being considered as part of the project. Refer also to the response 23.12.

8.2.3 Transportation

Comment 9.1: "The Centrac Associates study that was conducted to analyze the practicality of switching the use of the Cherry Street/Columbia Street ramp and the Pike Street/Pine Street ramp has not been referenced in the DEIS." (Washington State Department of Transportation)

Response: Discussion of the I-5 reversible lanes and their use in relationship to this project is included in the traffic impact section, Section 4 and in the project description.

The Centrac Associates study you refer to was performed as part of the draft EIS analysis. It focused specifically on traffic impacts of the HOV lane and ramp revision summarized on page 2-22 of the draft EIS. Readers may obtain a copy by requesting the document "Technical Report: Recommended Alternative I-5 Reversible HOV Ramp" from Metro.

A summary of the findings of the analysis follows:

Commuters would see the following changes to the I-5 reversible roadway: the existing bus-carpool lane on the east side of the roadway would revert to general traffic use, as would the Columbia Street-Cherry Street ramp which is also currently reserved for buses and carpools. Therefore, general auto traffic would have direct access to

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the southern parts of the CBD from the I-5 reversible roadway which is not now available.

In exchange, the I-5 reversible roadway ramp to Pike/Pine streets would be reserved for bus carpool use. The freeway lane connected to that ramp would be reserved for bus-carpool use. This lane is the second lane from the west, south of the Ship Canal bridge. Advance warning signs would be placed at the appropriate locations to help drivers choose the correct lane and exit closest to their destinations. The Pike/Pine ramp would be rebuilt to allow bus access directly in to the transit tunnel portal at Ninth and Pine. Carpools would exit to Pike Street.

Congestion on the freeway is not expected to change significantly as a result of the rearrangement of the bus-carpool lane and ramps, since the number of lanes on the freeway and ramps connecting to the freeway which are available for general traffic use are not changed.

The preferred alternative has been discussed with WSDOT District 1 staff and Metro's preliminary engineering design consultant has made presentations to WSDOT regarding the design, operation and construction cost and right-of-way implications of the Pike/Pine ramp modifications.

Comment 9.2: Discussion with the Washington State Department of Transportation (WSDOT) concerning such topics as operational feasibility, design, funding and the determination of lead agency for construction of the freeway ramps should occur. (WSDOT)

Response: A process to coordinate these and other issues during the preliminary engineering process has been established through the office of the WSDOT District 1 Planning and Public Transportation Engineer.

Comment 13.5: The fire department would like to be consulted on the placement of the overhead wires. (Fire Department)

Response: The fire department has been and would continue to be consulted during the design process.

Comment 14.1: The Seattle Bicycle Advisory Board would like to maintain bicycle access through the proposed mall along Third Avenue and Pike/Pine. (Bicycle Advisory Board)

Response: The Metro Council's preferred alternative does not include a mall. However, it does include some transit and pedestrian features (surface improvements) such as wider sidewalks on Third Avenue and Pine Street. General traffic would use these streets at all times. Surface improvements along Third Avenue and Pine Street would enhance transportation and pedestrian circulation, but would not prohibit bicycles.

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Comment 14.3: Bicycle parking would encourage intermodal transportation, increasing Metro ridership. Exclusion of such parking especially at the termini, would result in unnecessary congestion and pedestrian hazards. (Bicycle Advisory Board)

Response: Bicycle parking facilities could be included at the two end stations.

Comment 15.6: The draft EIS indicates there will be a loss of 237 spaces with the preferred alternative. The draft EIS fails to mention that the I.D. Parking Study written in 1981, was developed under a different set of assumptions. (International Special Review District)

Response: Table 4-11 in the draft EIS shows off-street parking impacts on the International District by alternative. The table shows a loss of 237 spaces for the Third Avenue tunnel alternative. Figure 2-37 of the draft EIS shows possible tunnel approaches through the International District. This figure shows that considerable area between Fourth and Fifth avenues, south of Yesler, would be taken for these alignments.

Tunnel design has progressed since Figure 2-37 was developed and the alignment would be located farther west than originally proposed. The plan shows the tunnel turning northwest behind the Downtowner Apartments, then going under South Main Street and a small parking lot on the north side of South Main.

Metro plans to bore the tunnel between Union Station and Third Avenue and Yesler Way. By boring the tunnel no surface disruption of the parking lots bounded by Fifth Avenue South, Fourth Avenue South and South Main Street and South Washington Street would be required.

The block to the north, bounded by Yesler, Fourth Avenue South, Fifth Avenue South and South Main would not be affected, so no parking in that block would be lost.

Comment 15.7: "The cumulative impacts and relationships of all transportation systems. . .should be discussed in the DEIS." (ISRD)

Response: Numbers used in the LUTP and background reports included cumulative impacts such as the I-90 access projections, Ryerson Base, Central Base and the Kingdome. These were included in the existing conditions and future projections for air, noise, traffic, etc. Buses on the streets s well as the tunnel were taken into account for air, noise and transportation.

Comment 17.11: "The year identified as the year capacity is reached with a tunnel has not been confirmed by the North Corridor Alternatives Analysis." (Puget Sound Council of Governments)

Response: The preferred alternative was not one of those that was considered in the North Corridor Alternative Analysis (NCAA). NCAA alternatives served only the north corridor. The Downtown Seattle Transit Project

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is "regional" and serves all corridors, therefore the NCAA would not confirm tunnel capacity.

Comment 17.12: "The transfer analysis for the tunnel alternative assumes that the line-haul vehicles will operate through the tunnel." The requirement to transfer would be the same as the mall alternative with the peripheral terminals if diesel buses were not allowed in the tunnel and the dual-propulsion bus did not appear feasible. (PSCOG)

Response: In light of the identified preferred alternative, and due to the operational feasibility and availability of dual-power buses, transfers would not be required. The line-haul vehicles would be allowed to enter the tunnel.

Comment 17.13: No analysis is presented for the Level-of-Service tables in Section 4.1.4 of the draft EIS. (PSCOG)

Response: As stated on pp. 5-6 of the draft EIS, "The overall general traffic circulation would not be significantly affected by any alternative," therefore, the LOS would not be significantly affected by any alternative for general traffic.

Comment 17.14: "The general traffic speed data show that all but two alternatives are within a 0.2-mph range, and between the high and low speeds there is only a 53-second difference in travel time for a p.m. peak hour trip all the way through downtown from Yesler to Stewart on Fourth Avenue." (PSCOG)

Response: This is correct. It is stated on pp. 5-6 of the draft EIS, "The overall general traffic circulation would not be significantly affected by any alternative." Transit and pedestrian congestion would be substantially reduced and travel time and schedule reliability improved.

Comment 17.21: Preliminary engineering needs to examine the operational characteristics of the downtown tunnel with the dual-propulsion technology. (PSCOG)

Response: The operational characteristics of the downtown tunnel and stations with the dual-power technology was evaluated during preliminary engineering and further discussion included in the project description in Chapter 2 of the final EIS.

Comment 19.1: Existing and future truck volumes for the alternatives should be discussed. (Port of Seattle)

Response: Truck impacts are discussed in Section 4.1.12, "Movement of Goods" in the draft EIS. This section discusses the elimination or relocation of truck-load zones and truck-routing restrictions associated with each alternative. Discussion of "Movement of Goods" is also in the final EIS for the preferred alternative.

Comment 20.5: Any of the major alternatives should address how the particular alternative will deal with the overall automobile congestion, pedestrian movement and access by emergency vehicles and service and goods deliveries. (CTAC)

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Response: Automobile impacts, pedestrian flows and emergency vehicles were addressed for each alternative in the draft EIS and the preferred alternative final EIS in Chapter 4. While this project is a transit project, when feasible the impacts of automobile and pedestrian congestion would be corrected and incorporated into the surface improvements. Surface improvements, for example, would include better automobile flow since the tunnel would absorb many surface transit vehicles.

Comment 20.10: The bypass route network should be retained as part of this project. (CTAC)

Response: The bypass route network has been retained. CBD bypass routes are routes which do not serve downtown Seattle, but serve riders who might pass through downtown Seattle if these routes were not available. Currently there are over 25 CBD bypass routes in the Metro system. Also refer to response #19.2.

Comment 21.10: The draft EIS recognizes the loss of parking in the I.D., but fails to provide any mitigation. Local planners predict an I.D. parking crisis in the near future. (Inter-Im)

Response: The preferred alternative would not take any parking in the I.D.

Comment 21.11: "Convenient locations near the end tunnel stations to pick up and drop off passengers," a mitigating measure, could create additional parking demand and traffic congestion for the I.D. There is a failure to properly discuss projected traffic impacts i.e. traffic patterns during construction, the additional construction trucks, staging, etc. (Inter-Im)

Response: It is stated on pp. 5-6 of the draft EIS, "The overall general traffic circulation would not be significantly affected by any alternative." The details of the traffic impacts can be found in Chapter 4. Additional discussion can also be found on construction impacts in Chapter 4 based on additional work during preliminary engineering. Refer to the response for 15.4.

Comment 21.19: The I.D. parking statistics are inaccurate. (Inter-Im)

Response: Refer to the response for 21.10.

Comment 23.5: What will the traffic impacts be in the International District? What will be the impacts of the staging area in the International District? (Allied Arts)

Response: Traffic impacts are discussed for the project, including the I.D., in Chapter 4 of the draft and final EIS. In general there would be fewer buses on the streets during tunnel operation because of the direct I-5/I-90 connection; there would be unavoidable impacts during construction. Tunnel bus staging for the tunnel vehicles would occur below grade at Union Station.

Comment 24.3: Where do bicycles fit into this plan? (League of Women Voters)

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Response: Section 4.1.11, "Bicycles," includes the statement that, "Bicycles using the street would be affected to the same extent as the automobiles under all alternatives." For the preferred alternative, no adverse impacts to bicyclists are involved. Possible benefits, such as bicycle parking at the end stations, are being considered.

Comment 25.12: The final EIS should quantify to what extent overall commuter times will increase for both bus and auto over the current condition and under all alternatives. If travel time is decreased within the downtown, how much will travel times increase from Bellevue getting to the downtown? In comparison to today's condition, how much longer will it take the bus and auto commuter (with a tunnel) to get from the Eastside to their destination in downtown. How long will the rush hour last (over today's conditions)?

Will travel times within downtown actually fall below existing travel times and even if they do, how much additional travel time is added at the other end due to increased difficulties for buses getting through congestion on the bridges and at the I-5, 520, and other major intersections? How long will it take for auto commuters commuting from the Eastside under a tunnel as compared to today? (Downtown Neighborhood Alliance)

Response: Table 2-5 on page 2-84 of the draft EIS compares overall bus-hours of service for the entire Metro system among all the action alternatives and the No Action alternative. It includes both tunnel and non-tunnel routes and the time that buses spend in the CBD tunnel as well as on the surface outside downtown.

Overall, bus-hours are reduced for all the action alternatives compared to the No Action alternative. The tunnel alternatives show the greatest reduction in hours.

It is important to understand that all the alternatives assume that the Puget Sound Regional Transportation System Plan and Metro's Mid-Range Program in areas outside downtown Seattle would be implemented (even the No Action DSTP alternative assumes this). These plans include several regional transit centers and related projects in the north and south corridors and corridors across the Lake Washington which would either separate buses and other HOV from general peak-hour traffic congestion or give buses and HOV preferential treatment such as ramp-metering on freeways. Therefore, to a large extent, transit service on the regional freeway system would not be affected by general traffic congestion as much as it is at present. See Section 3.2, page 3-13 of the draft EIS, specifically, "Interstate 5 and Interstate 90 Seattle Access Project," and Figure 2-10 on page 2-23 for examples of transit preferential treatment on the freeway system.

Chapter 4 of the draft EIS describes average travel times for transit riders under all of the alternatives. This can be compared to existing conditions of 21.1 minutes. These travel-time improvements come from improved bus speeds at the downtown portion of a trip and are averages of the times for all trips that travel to or through downtown.

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Tunnel routes coming from I-90 and I-5 would have direct access to the tunnel.

For the length of rush hour as compared to today's conditions, see the response to Comment 25.18.

Comment 25.15: Even with the tunnel how much longer will bridge tie-ups last in 1990 and the year 2000? (DNA)

Response: General traffic impacts inside the downtown area are shown in Section 4.1.4 General Traffic.

General traffic impacts outside the downtown would be essentially identical for all the alternatives, since all the alternatives have very nearly the same bus volumes travelling during the peak periods on all the regional highways.

Regional traffic volumes would increase in all three major corridors with all the DSTP alternatives. Peak auto vehicle volumes are expected to increase 3.7 percent in the north corridor, 23.3 percent in the Lake Washington corridor and 6.5 percent in the south corridor between 1980 and 1990. Therefore, it is reasonable to expect that periods of peak congestion for general traffic would lengthen, and the bus and other HOV-reserved lanes in these corridors contained in both the adopted PSCOG and Metro transportation plans would be increasingly important. The length by which these peak periods extend is difficult to predict because it would depend on how commuters respond to this congestion, i.e. by switching to buses, carpools, or vanpools or by traveling at different times or different routes.

Comment 25.17: As long as the City and Metro choose to accommodate accelerated office development in downtown, we would continue to have increased traffic and transportation difficulties with all its attendant costs. (DNA)

Response: In a process separate from the transit project, the Seattle City Council adopted land-use and transportation policies for downtown Seattle that apply to growth and the transit project on Sept. 24, 1984. Refer to the transportation/circulation analysis in Chapter 4 of the final EIS. Compared to the No Action alternative and other alternatives the Tunnel alternative would offer the greatest improvement in Level-of-Service (LOS) and the least deterioration for the studied intersections. Implementation of the transit project would decrease the potential traffic and transit difficulties that would result if the No Action alternative was selected.

Comment 25.19: What portion of the region's commuters travel downtown and what portion of the region's commuters travel through downtown? (These figures should calculate on the basis of that portion of all commuters who take the bus and auto in the region.)

Response: The available ridership data does not allow a response which disaggregates the data in the specific manner requested in this question. Data

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that is available (from the "Downtown Seattle Transit Project Technical Report: Travel Forecasting") show that in 1980, the average number of daily transit riders traveling to the downtown area was 113,780. The number of persons travelling in automobiles to the downtown area in 1980 averaged 366,510 daily (assuming an average occupancy of 1.46 persons per auto). Available data also shows that in 1980 the number of transit daily through trips was 22,100. This data is not available to show the number of commuters traveling through the downtown.

Comment 26.2: "What is the tunnel-vs-surface ratio, by vehicle count and by passenger count, for rushhour and for all hours?" (Transit Alliance)

Response: Bus, auto and ridership volumes are presented in Chapter 4, Section 4.2 Long Term Impacts. Based upon this information, in the year 2000 the ratio of tunnel buses to surface buses is 1:1.4 during the peak hour and 1:2.0 during the midday. The ratio of tunnel riders to surface riders is 1:1.1 during the peak hour.

Comment 26.5: There are several apparent discrepancies. Table 4-2 seems to imply either that a tunnel would remove large numbers of diesel buses from the surface by running them underground (unacceptable to the City of Seattle) or that dual-mode buses (not counted as CBD diesels -- if they work) would be purchased for the tunnel plan, but not for TSM/Non-intercept Mall. The Tunnel thus seems relatively better than it is. The inferences about general traffic speeds agree only partly with Table 4-9, on which they are based. (Transit Alliance)

Response: Table 4-2 states that large numbers of diesel buses would be removed from the surface because dual-power buses running as trolleys in the tunnel would provide service. The dual-power buses would be purchased for the tunnel plan, but could be used for the TSM/Non-Intercept Mall.

The inferences made on page 4-13 of the draft EIS regarding general traffic speeds agree with the speeds shown in Table 4-9. The author of this comment letter did not identify other specific inferences about general traffic speed which he/she believes to be inconsistent.

Comment 26.9: Something must be done to relieve existing traffic congestion not only in the Seattle CBD), but what is this project part of? (Transit Alliance)

Response: The project implements Metro's 1990 Plan, which is part of Metro's Comprehensive Plan for Public Transportation Service. The Metro Council's preferred alternative is incorporated into the PSCOG's Regional Transportation System Plan, the City of Seattle's LUTP, King County Growth and Development Guide, and Metro's Mid-Range Program as an element of the Metro/PSCOG Multi-Corridor Transit Study, a two-year study looking at long-range rail and bus alternatives in all the major regional travel corridors.

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8.2.4 Circulation System

Comment 12.1: A circulation system with connection routes through Pioneer Square, First Avenue, The Market and the Denny Regrade is important. (Pike Place Merchants' Association)

Response: For a description of the circulation system see Chapter 2. The system would include a First Avenue circulator route which would directly connect the Pike Place Market with the Denny Regrade, Pioneer Square, International District and Union Station. In addition, routes 10 and 12 would be moved from Third Avenue to First Avenue, providing an east/west link connecting the market with First Hill and the North office core.

Comment 12.2: The east-west connections of Pike, Pine and Yesler streets are important access considerations. (Pike Place Merchants' Association)

Response: The importance of Pike and Pine streets and Yesler Way to east-west access is recognized. Pine Street would be changed to two-way transit operations providing a link between the market and the retail core; and offering greater options for bus zones along First Avenue that could serve the market.

Comment 15.8: A circulation system is important to the I.D. Two proposals which the Board would like to include the following:

"a. Create a continuous loop by extending the transit circulator system up Jackson Street to 12th Avenue to First Hill and then the retail core.

b. Or create a special shuttle circulator system connecting the I.D. (along Jackson Street up to Maynard Avenue), Pioneer Square, The Waterfront, Pike Market, the retail core and the convention center." (ISRD)

Response: The circulation system (see Project Description in Chapter 2) would include a First Avenue circulator and trolley routes 7, 14, 1 and 13 which would directly serve the International District. These routes would directly connect the I.D. with Capitol Hill, the Denny Regrade, Pike Place Market, Pioneer Square, retail core, office core and convention center. Connections to First Hill can be made with approximate headway arrival time between buses of three minutes for a bus from the I.D. and approximately nine minutes to transfer to the First Hill route. The approximate frequency of route operation is shown in Table 2-1.

Comment 19.2: Alternatives seem to ignore east/west transit linkages. A more complete discription of the downtown circulation system and the CBD bypass should be included. (Port of Seattle)

Response: The preferred alternative includes a base circulation system expanded from that considered in the draft EIS. The system shown in Chapter 2 illustrates the specific routes which would provide east/west access in the CBD.

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Trolley routes 10 and 12 would be moved from Third to First Avenue to provide increased east/west circulation and serve the Pine Street and Madison Street corridors. The First Hill circulator would connect the ferry dock and southern waterfront to First Hill. The First Avenue circulator would connect the International District with the waterfront and the Regrade area.

CBD bypass routes are routes which do not serve downtown Seattle, but serve riders who might pass through downtown Seattle if these routes were not available. Currently there are over 25 CBD bypass routes in the Metro system.

FALL 1984 "CBD BYPASS"* ROUTES

ATTRACTION: DUWAMISH INDUSTRIAL

Route	Neighborhoods Served
34	West Seattle, White Center
38	Madrona, Beacon Hill
40	Wedgwood, U-District
49	West Seattle, White Center
52	Ballard, Fremont
245	South Kirkland, Bellevue, Mercer Island
246	Issaquah, Eastgate
970	Lynnwood, Mountlake Terrace
980	Kingsgate, Kirkland

ATTRACTION: FIRST HILL

Route	Neighborhoods Served
60	Capitol Hill, Beacon Hill

Route (does not serve downtown Seattle, but serves riders who might pass through downtown if this route were not available.

ATTRACTION: UNIVERSITY DISTRICT

Route	Neighborhoods Served
30	Wallingford, Laurelhurst
43	Ballard, Wallingford, Montlake, Capitol Hill
46	Ballard, Wallingford
77	Beacon Hill, Columbia City
133	Burien
167	Kent, Renton
205	Mercer Island
244	Issaquah, Bellevue
252	Eastgate, Crossroads, Bellevue
275	Kingsgate, Kirkland
48	Beacon Hill, Columbia City, Greenlake, Loyal Heights

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ATTRACTION: RENTON

Route	Neighborhoods Served
240	Bellevue, Factoria
241	Kenmore, Juanita, Kirkland, Bellevue
247	Redmond, Overlake, Eastgate
340	Shoreline, Bothell, Kingsgate, Bellevue
982	Burien, White Center

In addition to these, there are two other types of bypass routes: (1) routes which serve some of the same neighborhoods as CBD bypass routes, but also serve the CBD and; (2) routes which connect two or more neighborhoods or communities, which would not otherwise be served, i.e. through the CBD or via transfers.

Comment 20.8: The circulation system should have early implementation as an important construction mitigation measures. (CTAC)

Response: CBD traffic and transit would be rerouted during construction. Several traffic/transit routing schemes are discussed in Chapter 4. Preliminary Engineering tasks include development of a detailed Maintenance-of-Traffic Plan with the ultimate goal of selecting the best construction approach and routing scheme. At that time a decision would be made if any elements of the circulation system would help mitigate traffic impacts.

Comment 20.9: In discussing the major alternatives the final EIS should more clearly identify the impact the alternatives would have on improving circulation patterns as well as the flow of transit. (CTAC)

Response: The circulation system is described as part of the project description in Chapter 2 and the general traffic impacts discussion in Chapter 4.

Comment 21.9: The circulation system enhances transit for commuters but provides little benefit for the transit dependent residents of the ID. (Inter-Im)

Response: The circulation system (see Project Description in Chapter 2) would include a First Avenue circulator, trolley routes 7, 14, 1 and 13 and proposed trolley route 15/18 north which would directly serve the International District. These routes would directly connect the ID with Capitol Hill, the Denny Regrade, Pike Place Market, Pioneer Square, the retail core, the office core and convention center. Connections to First Hill can be made with approximate headway time of three minutes between buses for a bus from the ID and approximate waiting time of nine minutes to transfer to the First Hill route. The approximate frequency of route operation is shown in Table 2-1.

Comment 38.4: None of the circulation maps show adequate consideration of access to the Waterfront, access to the Denny Regrade, access to the Seattle Center and Kingdome, access to the ferries, Greyhound, and Trailways; even Amtrak and Airport access should be better defined. The existing access, including Waterfront

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Trolley, Monorail, and buses through the Regrade are also ignored. (Tom Martin and Associates)

Response: The preferred alternative described in Chapter 2 includes an expanded base circulation system over that shown in the draft EIS. This enhances and highlights specific routes in the CBD in addition to all of the regular service on existing streets. Refer to response number 15.8 and 19.2.

Comment 40.2: The preferred alternative's downtown circulation system should not be limited to trollybus movements on Pine Street/Third Avenue and Boren Avenue/ James Street/First Avenue and Western loop to Madison Street (as portrayed in Figure 2-35), but include a third east-west connector from First Avenue to the Freeway on Seneca or University Streets. (Harbor Properties, Inc.)

Response: Route #2 serves Third Avenue and the freeway. Expansion of the circulation system and additional circulator needs beyond 1990 would be examined as part of the Transit Service Incentive Agreement between the City and Metro. Also refer to response 37.6.

8.2.5 Dual-Power Vehicles

Comment 1.1: "It would be helpful if the final EIS indicates that dual propulsion buses will be used in connection with the preferred electric only transit tunnel alternative." (DOT, Washington, D.C.)

Response: Discussion of dual-power vehicles is included in the final EIS as part of the project description in Chapter 2.

Comment 17.1: The draft EIS needs to provide more discussion of the dual-power bus. In addition all questions regarding feasibility of the dual-power bus should be answered before a final decision is made on the project. (PSCOG)

Response: For a discussion of the characteristics of the dual-power bus see the project description. In addition Metro has considered the operational feasibility in its planning process and environmental analysis.

Metro's experience with diesel and electric vehicles, the successful operation of dual-power fleets in revenue operation in several European cities, the revenue operation of a demonstration vehicle in revenue service in Seattle during 1982-83 and the results of the artic trolley/dual-power bus procurement process in 1984, leave little doubt that dual-power buses are operationally feasible. However, since any new fleet of buses goes through a shake-down period during which minor problems may be encountered and because of the critical nature of fleet availability to the success of the project, Metro has included special provisions in its procurement strategy for these dual-power buses.

The bid document would require that the successful manufacturer deliver the dual-power buses in two batches. The first seven would be delivered in mid-1987, at which time they would be placed in revenue

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service. The routes selected would allow the vehicles to operate under conditions similar to that which would be experienced when the tunnel is operational; diesel for a portion of the trip, electric in the downtown area. The remaining quantity of dual-power vehicles would be delivered starting in 1988 through late 1989.

The period between the first delivery of a small number in 1987 and the production of the remaining vehicles in 1988-89, would allow careful testing and any desired modifications before full production. This would allow for minor changes to be made to the vehicles without the significant extra cost of two bid processes or delays in delivery.

This special provision is in addition to those normally included in Metro's vehicle procurement process. These steps include:

- o Careful preparation of detailed specifications of the vehicle before call for bids
- o Reviewing specifications with manufacturers during the bid process and modifying them to incorporate improvements suggested by the manufacturers
- o Careful review of technical proposals received at the conclusion of the bid process to ensure that the vehicles proposed are well-engineered and meet Metro requirements
- o After bid award, but before prototype production, conducting a careful review of the manufacturer's final engineering drawings and components
- o After review, the manufacturer would build a prototype of the production vehicle which would be carefully inspected and tested before moving to full production, and
- o At all times during the production of the vehicle a Metro employee, expert in manufacturing processes would be present in the plant to inspect all stages of the vehicle production.

These careful procurement practices would result in the manufacture and delivery of safe and reliable equipment.

Comment 17.5: The analysis of the dual-propulsion bus technology is omitted. (PSCOG)

Response: Additional discussion of the dual-power vehicles is included in the final EIS. Also see the response for 17.1.

Comment 17.6: An area of controversy not included in the summary is the operational feasibility and ability to have a dual-power fleet at sufficient capacity to be utilized in the tunnel when it opens. (PSCOG)

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Response: The draft EIS states on page 2-73 that tunnel operation would begin in 1990. In that year the tunnel would effectively operate with approximately 80 buses/peak-hour/direction, which would be more than half the tunnel cpacity. As indicated in Chapter 4, the tunnel could not operate at full capacity in 1990 because delivery of the full order of dual-power buses for the tunnel could not be completed until 1995. Therefore, service on some tunnel-assigned routes would have to be provided by diesel buses on surface streets until 1995. These routes would be added to the tunnel as more dual-power vehicles are delivered. Refer to response for comment 17.7.

Comment 17.7: An alternative strategy should be developed in case the dual-mode vehicles fail. This should be included as an area of controversy in the summary. (PSCOG)

Response: Metro has considered dual-power availability. In April 1983 Metro received technical proposals and price bids from two American bus manufacturers to supply articulated trolleys and dual-power coaches. Metro wants these vehicles to support the existing and the proposed expansion of the overhead trolley system. The Metro Council decided to purchase articulated trolleys based on a staff analysis of benefits and cost of using the two types of vehicles in a standard trolley application (all normal service being on fully wired routes). However, the technical and price information obtained in these proposals demonstrates the feasibility of the dual-power technology. As a result of the bids it is known that:

- o Dual-power buses are available from American manufacturers.
- o Even when ordering small quantities (in this case a minimum order of 58 coaches) the cost estimates used in the financial analysis for the DSTP are realistic.
- o Manufacturers have the confidence in the reliability of dual power vehicles which permit them to provide a warranty, thereby committing their reputation and financial future.

In addition, the dual-powered vehicle proposed by the low bidder demonstrated that the technical components which make up the vehicle, and the way in which these components are combined, raised no unique problems. In simple terms the dual-power vehicle was composed of a conventional diesel engine driving the center axle and a conventional electric motor driving the third axle. Other than some additional driver controls and automatic trolley pole raising equipment, no unusual components were involved.

At this time Metro is preparing bid requests for the first order of dual-powered coaches to serve in the downtown bus tunnel. 236 coaches are requested. This number is approximately one-half the number needed to operate in the tunnel at its projected capacity -- 145 buses per hour, per direction.

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The initial 236 vehicles are expected to arrive in 1988 and 1989 (with the exception of a small number of pre production vehicles which could arrive in 1987. The determination of the number of buses was made by considering:

- o Ridership/productivity projections which determine total number of buses expected to be in the downtown tunnel at any one time.
- o Estimated vehicle capacity of the total package of improvements included in the DSTP project.
- o An appropriate balance of service on the surface and in the tunnel, which would optimize overall service quality.
- o Balancing those needs with Metro's ongoing fleet acquisition schedule.

The overall fleet acquisition schedule, as developed using these considerations, actually reduced the total number of vehicles purchased during the 1980s over what would have been required under other alternatives. While subject to refinement based on actual changes in the factors identified above, it is currently anticipated that an equal number of dual-power coaches would be ordered in the early 1990s. This would result in a dual-power fleet of the proper size to meet the projected demands for tunnel operation through the year 2000, by 1995.

Comment 17.10: The operational character of these technologies in the tunnel are not interchangeable as assumed in the DEIS. (PSCOG)

Response: Currently plans are to operate dual-power buses in the tunnel under electric power.

Comment 17.23: A process needs to be developed to assure that the dual-power technology is operational at the time the tunnel is complete. (PSCOG)

Response: For a discussion of the characteristics of the dual-power bus see the project description. In addition Metro has considered the operational feasibility in its planning process. Also see response 17.1.

Comment 17.24: "Since the preferred alternative prescribes an electric technology in the tunnel, the final EIS should include a development strategy which describes the best alternative technologies and operating plans for use of the tunnel should the dual-propulsion technology prove to not be feasible." (PSCOG)

Response: For a discussion of the characteristics of the dual-power bus see the project description. In addition see responses 17.10 and 17.7.

Comment 26.6: "What if the dual-mode plan doesn't work?"

Response: Metro has considered the feasibility of the dual-power bus in its planning process. Also see responses 17.1 and 17.7.

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8.2.6 Land Use

Comment 2.3: The final EIS should include a plan for all land acquired for construction staging and any environmental impact associated with this plan. (Environmental Protection Agency)

Response: Construction staging would occur at each of the portal stations on property that woud ultimately be used for the portal station and staging areas. Also the site of the proposed Westlake Park would be used before it is developed as a park.

Comment 15.1: Figure 3-1 (in the draft EIS) incorrectly identifies the boundaries of the International Special Review District. (International Special Review District)

Response: Figure 3-1 in Section 3 has been amended.

Comment 15.3: The draft EIS "only touches upon land use impacts in a superficial manner and should be discussed in greater detail." (ISRD)

Response: Land use is controlled by zoning and community plans. Use is subject to I.D. regulations.

Comment 15.4: The possibility of more people parking adjacent to a mini-terminal at Union Station and the resulting impacts should have identified mitigating measures to negate the potential disruption of land use. (ISRD)

Response: The preferred alternative does not include the mini-terminal which your comment refers to. A passenger station at the portal of the transit tunnel is proposed at Union Station.

The transit ridership analysis for tunnel routes indicates only about three percent of tunnel riders would use the Union Station stop to board or alight. A significant volume of park-and-ride activity at that station is not likely to occur since free parking is available at Metro park-and-ride lots outside the area while parking the in I.D. is largely privately-owned accessory parking or time-limited, on-street parking. There are no planned changes in the Metro free-ride zone so that free transit service from the International District to the office center should not attract more people than it does now.

Comment 15.5: General design and planning guidelines should be developed to provide a framework for future development. (ISRD)

Response: One of the City of Seattle's contribution to preliminary engineering would be development of an urban design plan for the Union Station corridor (Task E, City/Metro Agreement). This comment letter would be considered in putting together this plan. Future development would be guided by plans, policies and zoning.

Comment 17.8: The extent to which underground development should be allowed in connection with underground stations should be included in the areas of controversy in the summary. (PSCOG)

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Response: There would not be any significant development of underground retail and service activities as part of this project as noted in the project description. The Seattle City Council adopted Development Guidelines on retail below street level on Sept. 24, 1984. These guidelines apply to downtown station development. Individual retail shopping using larger than 250 square feet per establishment would not be permitted below street level.

Comment 20.10: The DSTP should ensure maximum compatibility with other major projects given the planning information currently available. (CTAC)

Response: The DSTP would be compatible with other major projects. Compatibility of plans was discussed in Chapter 5 in the draft EIS and final EIS.

Comment 21.1: The Draft EIS states that a major project is required to accommodate the growth of downtown. But it goes on to say that this growth would only occur if appropriate transit projects occur. This seems to be a circular argument - "let's do a major project to keep us with the growth that this major project will create." Since this is a mid-range project, it should also participate in planned controlled growth rather than acquiescing to the "bigger is better" fallacy. (Inter-Im)

Response: The Downtown Seattle Transit Project would support and facilitate the projected growth of downtown over the mid, and to a larger extent, long-range. Projected downtown growth to 1990 would likely occur regardless of the action alternative implemented. This reflects the years remaining until 1990, the long lead time required for major projects and the number of projects past or in the permit approval process. Beyond 1990, downtown transit service would have a greater ability to serve downtown. It is unlikely that a major transit project would, of itself, create growth. Downtown growth is generated by a multitude of local, regional, state and national, social, economic and other factors. If the limited capacity of the existing transit system is maintained, it would likely produce greater auto use and congestion and may act as a deterrent to downtown growth. The Seattle City Council adopted land-use and transportation policies for downtown Seattle that apply to growth and the transit project on Sept. 24, 1984. Adopted were specific policies and guidelines on the development of an electric-only transit tunnel, surface improvements and a transit circulation system. The Land Use and Transportation Plan recognizes that major capital improvements are needed to increase the capacity of the transit system to accommodate growth in peak-hour travel within downtown. The transit project preferred alternative is consistent with the downtown plan and supportive of its implementation.

Comment 21.2: A major project such as the alternatives proposed by the DEIS, would greatly impact the land use patterns of the International District. This project will increase assessed property values of the adjacent properties. Such an increase creates higher taxes and subsequently higher rents which in turn forces small businesses out. The I.D. may become a vacant shell or an area filled with large businesses, that is not compatible with the District's character. (Inter-Im)

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Response: Land use is controlled by zoning and community plans and is subject to I.D. regulations.

Comment 23.3: What will be the regional effects generated by the project? (Allied Arts)

Response: Growth in the region would probably occur regardless of actions taken for downtown Seattle. The transit project action alternatives would support and facilitate downtown growth and development. The project would not affect the overall amount of growth though it could affect growth distribution. Probably downtown growth is affected by many factors, one of which is improved transit capacity. Generally, the transit project alternatives that accommodate planned growth downtown and in county activity centers and redirect it elsewhere within the region, produce less overall vehicular travel in the region and serve a higher share of the work trips with transit.

Comment 23.4: Will the increased transit capacity provide stimulus for growth in the City? (Allied Arts)

Response: Increased transit capacity would facilitate planned growth in the city, primarily in the downtown. The preferred alternative would increase the capacity of the transit system to accommodate growth in peak-hour travel and significantly improve the attractiveness of transit as a means of travel within downtown. City growth is stimulated by a host of national, regional and local factors. Improvements to transit capacity could be perceived as a stimulant to City and downtown growth. Lack of improvements to transit capacity would inhibit growth where capacity restraints occur and direct a larger portion of travel demand to be served by modes of travel other than transit. Potentially increased congestion would likewise increase travel inconvenience and decrease the quality of life.

Comment 25.1: The assessment of options considered in this EIS, including the no action alternative is based on an assumption that downtown will continue to be the focal point of most of the region's office development - that Seattle by the year 2000, will see a minimum of 15 million square feet of office space added to its skyline. The City does, however, face the possibility that it will not see the magnitude of office growth anticipated in this EIS. (Downtown Neighborhood Alliance)

Response: Metro's plans respond to and are consistent with City policy on growth for the CBD. Growth in the CBD, even at the City's projected and desired level, takes only 10-15 percent of the total, county wide projected employment growth. As a multi-centered development approach is implemented (through transit centers as outlined in the 1990 Comprehensive Plan) there is more than adequate employment growth to require both transit centers/activity centers and a vital, active Seattle CBD.

The assessment of options in the final EIS considers the transit travel needs of downtown Seattle with 143,000 jobs in 1990. It is based on

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the assumption that downtown would continue to be the preeminent center of commerce in the region.

Comment 25.2: A limited growth option also is an alternative that is considered in the City's draft EIS for its new downtown land use plan. Under this option, Seattle would limit the amount of downtown office development to 60 percent of what is projected when growth controls are not imposed. (DNA)

Response: The City of Seattle studied a limited growth alternative to the EIS for the Downtown Land Use and Transportation Plan. This alternative was analyzed with other alternatives that anticipated more growth. The projected amount of new office space for the limited growth alternative is 5.7 million square feet by 2000, or approximately 40 percent of projected office development with the downtown plan's no action alternative (LUTP Final EIS, Table 12, August 1984). In adopting the Downtown Plan Framework (9/24/84), the City Council considered and rejected the limited growth alternative.

Comment 25.3: An investment of only 48 million dollars for development of a downtown mall (identified in Metro's EIS as the TSM option), would, under a limited growth option, provide more than adequate transit capacity well beyond the year 2000. (DNA)

Response: Comment acknowledged. The Seattle City Council adopted the alternative on September 24, 1984. Adopted were policies and guidelines for land use and transportation, including specific recommendation for an electric-only tunnel and other components contained in the preferred alternative.

Comment 25.4: The draft EIS also neglects to include any assessment of the regional consequences accompanying a 400 million dollar investment in a downtown tunnel. (DNA)

Response: The project's connections to regional highways and the HOV system serve the interests of the regional transportion system. The project is consistent with adopted regional plans for land use and transportation. In addition, it is highly unlikely that the funds for the downtown project would otherwise be available for other projects, based on federal, state and local budgets and funding sources and the environmental impacts of any such redistribution would be speculative.

Comment 25.6: Lacking adequate resources for transit in the rest of the region, there will be no incentive to get out of the automobile. There will not be adequate transit service in the county that would promote and concentrate residential growth along or near that service. This is a condition that can only contribute to residential sprawl and continued dependence on the automobile. A final decision to build a downtown tunnel will irrevocably commit the region to this kind of future. (DNA)

Response: The preferred alternative would provide more attractive transit service in downtown Seattle than presently exists. Table 4-17 shows that the tunnel alternative would attract five million additional riders to the Metro system each year, compared to the No Action alternative.

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Without a high-capacity transit facility in downtown Seattle, travel times may increase to the point where people are discouraged from using transit into downtown because of long travel times bus, schedule unreliability and traffic congestion on city streets. The tunnel alternative preserves options for the future because it can serve as the key CBD link for possible light-rail transit serving outlying areas of King County.

Comment 25.8: This EIS must also identify and assess the implications of a poly-centered approach to transit and land use planning - an approach which assumes that a portion of Seattle's office development will be reconcentrated and directed to currently underutilized commercial areas in the rest of the region.

A discussion of this alternative in the draft EIS should include an assessment of the cost savings associated with a poly-centered approach to growth that encourages job creation in commercial areas on the Eastside and close to where people live. (DNA)

(In addition the Downtown Neighborhood Alliance has provided a lengthy discussion of a poly-centric approach to transit. See the Comment Letters' Technical Appendix.)

Response: The 1990 Plan recognized the value of a poly-centered approach to growth. To support this approach, the 1990 Plan included a system of transit center to link activity centers throughout the system.

Transit congestion in downtown Seattle was also recognized in the 1990 plan as a major problem. This EIS is a project-specific EIS addressing alternative solutions to Seattle regional transit congestion and their impact. Refer to Metro's comprehensive 1990 Plan - for additional discussion of the regional transit system plans.

Comment 25.9: The EIS incorrectly states that a downtown transit tunnel alternative is in conformance with regional transit goals. (DNA)

Response: Regional transit goals are still being met with a multi-model approach; however, speeds on those routes using downtown facilities hinder the entire regional system. The downtown project was one part of the regional transit system planned for and adopted as part of the 1990 Plan for a regional transit system.

Comment 25.10: Metro has a responsibility to identify alternatives for Seattle and the region that do not presuppose the Manhattanization of Seattle's skyline or residential sprawl in the county. It means identifying the costs of the current approaches to planning and it means seeking the implementation of alternatives that support more equitable and cost effective solutions. This EIS fails to reflect any of these goals. (DNA)

Response: Metro responds to growth as managed by land use plans.

Comment 25.20: Under a limited growth option for downtown, how could transit planning and land use planning move the region to a poly-centered approach to commercial growth and what are the costs and benefits under such a senario? To

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provide some understanding of how such a transition could be made and has been made elsewhere, an attachment was included with the letter and is included in the Comment Letters Appendix. (DNA)

Response: The preferred alternative is consistent with land-use policies of the City of Seattle and King County. Because Metro has no land-use regulatory authority, it cannot independently promulgate alternative regional development concepts. The tunnel alternative does, however, support Metro's adopted program of developing better transit service among regional and community transit centers in activity centers other than downtown.

Comment 26.1: "Given the unfinished condition of local and regional growth policies, and the variability of any growth trends, why does the DEIS assume one pattern of development, instead of a range of plausible alternatives?" (Transit Alliance)

Response: The transit project EIS considers the transit travel needs of downtown Seattle with an employment of 146,000 persons. In a separate process, the City of Seattle studied several alternatives with a range of development patterns in the EIS in the Downtown Land Use and Transportation Plan. These alternatives included a limited growth alternative.

Comment 29.3: "Small businesses should be incorporated in a mezzanine-level mall down Third Avenue above the transit area itself." (Students for a Better Transit)

Response: Mezzanine-level retail uses are subject to policies adopted by the city of Seattle, which discourage such uses except under certain conditions. Metro Council will be asked to adopt policies on the nature and extent of retail activity in the tunnel stations.

Comment 47.1: People seem to be moving east (Bellevue) instead of west, therefore, the growth does not seem evident. (Syd Rogers)

Response: East side growth has been considered in Metro's long-range planning including implementation of the Bellevue transit center. Refer also to response for comments 25.3 and 26.1.

Comment 47.2: The Project will hurt small merchants because there will be underground access into only major stores. (Syd Rogers)

Response: There could be underground access to major department stores; however, there would also be surface improvements to Third Avenue and Pine Street and an improved circulation system downtown.

8.2.7 Relocations/Housing and Business

Comment 21.3: The DEIS fails to show mitigating measures for the "disruptive acquisition" of Union Station, such as working with the community public and private agencies and businesses. (Inter-Im)

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Response: While at the time of writing the draft EIS it appeared that use of the Union Station corridor might reduce the availability of land designated for housing. Subsequent preliminary engineering has not supported this statement. The land needed for the project in the Union Station corridor is below grade. Therefore, once construction is completed, the surface would be available for development.

Metro would coordinate design and construction with ID Boards and interest groups.

Comment 21.4: Since there is a shortage of adequate low income housing in downtown Seattle how can the draft EIS state that displaced individuals "could be relocated to existing housing supply without significantly diminishing the supply of units for other low income persons." (Inter-Im)

Response: Metro's Relocation Program plan estimates that 14 residents would be displaced and 16 housing units taken at the Best Apartments with the implementation of the preferred alternative. Four artists in residence at the proposed north portal staging area would also be displaced, resulting in a total residential displacement of 18 persons. Similarly, the four artist's units would be demolished, resulting in a loss of 20 units. Even if substitute housing is found for displaced residents, the low income housing supply would be reduced by a minimum of 16 units. Based on an estimated 1982 low-income housing stock of 7,311 units (LUTP, August 1984), the preferred alternative would reduce the low-income housing supply by 0.22 percent. Metro would contribute approximately the cost of replacing 16 housing units lost at the Best Apartments to the City.

Comments 33.1 and 34.1: Maynard Investment Company would like to explore the possible options of joint development between the public sector and ourselves. (E&E Meats, Maynard Investment Company))

Response: The DSTP land acquisition team contacted Maynard Investment Co. to explore the possible options for joint use on the property owned by that company and needed for this project.

Comment 35.1: Access to that corridor from the Central Building's Third Avenue storefronts, as shown in the EIS, would have a negative impact on the aesthetics of the building and on the retail spaces involved. (The Central Building)

Response: The preferred alternative does not require the use of the Central Building for access. Building access for the close-in terminal was from inside in order to minimize impacts on streetscape and preserve exterior architectural value.

Comment 35.2: Figure 2-30, which shows the retail tenants of the Central Building, should be amended from north to south as follows: Federal Express (north corner), Frugalman's (one bay), Andrew's Hallmark (two bays), House of Goodies (as shown), Central Building Entry (as shown), Octavo Travel (as shown), Kits Cameras (one bay), Vacant (one bay), G.O. Guys Drugs (two bays on south corner). (The Central Building)

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Response: Correct.

Comment 37.3: Jan Mohamed is in the process of applying for building permits to develop the Tashiro-Kaplan buildings. He would like to meet with Metro. (Jan Mohamed)

Response: Metro is aware and has been meeting with Jan Mohamed. On Nov. 2, 1984, Mr. Medley and Mr. Kalberer of Metro and Mr. Elliott of Metro's consultant, Parsons, Brinkerhoff, Quade and Douglas, met with Mr. Mohamed to discuss the project. Metro would continue to keep Mr. Mohamed informed about the impacts of the project on the Kaplan-Tashiro buildings.

8.2.8 Noise and Vibration

Comment 2.1: The nature and extent of construction noise impacts of the Non-intercept Mall, Mall with Transit Centers and Tunnel Alternatives should be described. The extent to which these impacts can be mitigated should be explained. (EPA)

Response: The text has been amended to further explain the nature and extent of construction noise impacts of the Tunnel alternative and the extent to which these impacts can be mitigated. Should another alternative be considered, additional studies would be done and additional information provided. Incorporating these mitigating measures eliminates significant unavoidable adverse impacts.

Comment 2.2: The unavoidable adverse impacts section does not include mitigation measures for bringing transit operation noise levels to acceptable levels for all alternatives. In addition all recommendations for noise mitigation should be included in project. (EPA)

Response: Metro has initiated a noise reduction program. For new buses, Metro procurement specifications demand quieter buses than specified by EPA. For the existing fleet the program is addressing the most cost-effective retrofit solutions to bus noise.

In addition to addressing the noise source, noise impacts due to this project could be mitigated by constructing noise barriers, where beneficial and feasible, by extending the tunnel portal south to Union Station and providing a lid over the north and south stations and staging areas. Since the impacts can be mitigated they are not considered unavoidable.

Comment 21.7: The DEIS fails to discuss the maximum cumulative impacts of air quality, noise and vibration. For example, "the residents of the Downtowner Apartments would contend with the noise, air pollution and vibration of the trains to the west, all the tunnel construction impacts on the east and staged diesel buses all around." (Inter-Im)

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Response: The air quality, noise and vibration impacts are based on existing conditions and traffic projections which include non-project vehicles; therefore, cumulative impacts have been evaluated.

Construction noise and dust impacts to residents of the Downtowner Apartments are acknowledged unavoidable adverse impacts. Chapter 5 of the final EIS discusses these impacts.

Comment 21.15: To mitigate noise from diesel buses during construction, the DEIS proposes to put buses on neighboring streets. This increases air pollution and creates traffic/pedestrian problems for our elderly and handicapped residents. (Inter-Im)

Response: The draft EIS states that noise increases on neighboring streets during construction could be minimized by dispersing the buses among as many neighboring streets as possible. Besides minimizing noise impacts, distributing the buses would minimize local traffic congestion and therefore exhaust emissions.

Comment 21.16: At the Jackson and Maynard testing station, why is the noise level different for the Fourth Avenue and Third Avenue tunnels? (Inter-Im)

Response: This was a typographical error in the technical report. Both tunnels would produce the same noise impact (67 dBA) at Jackson and Maynard.

8.2.9 Air Quality

Comment 15.10: The lid above the transit access right-of-way at the south station does not seem to be sufficient as a mitigating measure. "The entire staging area for bus vehicles would be uncovered creating an air pollution condition detrimental to residents of the ID. As air pollution is dispersed into the air from the staging area, southwesterly winds will blow particles into the core of the International District." (ISRD)

Response: The proposed lid would extend from Airport Way South to near Union Station and would cover the staging areas where buses would switch to and from diesel power. The presence of a lid has no effect however on exhaust emission rates. Unless an exhaust stack were constructed, the lid would not necessarily reduce the small predicted air pollution impacts. Design of the staging areas would be designed to maximize the amount of time buses are under electric operation, therefore minimizing diesel emissions.

Comment 15.11: "A proposal is being considered to re-route the waterfront railroad lines to the existing underground tunnel which will create additional air pollution impacts in conjunction with Metro's proposal." (ISRD)

Response: As part of an effort to revitalize the waterfront the City of Seattle is considering re-routing the waterfront railroad traffic through the existing Burlington Northern tunnel. This would bring additional

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engine exhaust to the area, but its impact on local air quality would be very minor.

Comment 17.15: The DEIS identifies ventilation stacks as needed with the diesel buses and their impacts on the streetscapes. The electric tunnel does not require ventilation stacks. (PSCOG)

Response: Although the air vented from an electric-bus tunnel would be clean compared with that from a diesel-bus tunnel, ventilation drafts of some size may protrude above ground. They would not need to be as high as those for a diesel bus tunnel, however.

Comment 17.16: "It is stated that the electric bus tunnel would mean more diesel bus traffic on city streets, and diesel exhaust odor may be more apparent at the street level. If the dual-propulsion bus is found feasible for operation in the electric transit tunnel, there would not be more diesel bus traffic on city streets." (PSCOG)

Response: Compared with the diesel-bus tunnel, a tunnel with dual-power buses operating in it would mean more diesel buses on city streets in 1990 because the preferred alternative would not operate at full potential in 1990. Diesel buses operating on the surface would substitute for future dual-power tunnel routes. There would still be fewer diesel buses than with No Action, however. Dual-power buses for the tunnel would be delivered through 1995.

Comment 17.17: "It is not clear why the Union Station site with Station produces less particulate matter than Union Station site with Terminal." (PSCOG)

Response: Slightly lower particle emissions result from the station options because the dual-power buses spend part of their time at Union Station in the electric mode.

Comment 21.8: A full structural lid with air scrubber vents would be a more appropriate protection against air pollution and vibrations. (Inter-Im)

Response: The preferred alternative described in Chapter 2 would include a lid. Ventilation of the station and staging area would be provided if required, but "scrubbing" of exhaust air would not be warranted or feasible due to low pollutant concentrations.

Comment 21.14: In the draft EIS why is the CO level less with the I-90 in Table 5-6? (Inter-Im)

Response: CO concentration at Fourth and Jackson would be slightly less with I-90 because buses would have an exclusive ramp from the freeway to Union Station. Buses would not have to use Fourth or Fifth avenues to reach ramps leading to and from the station area. Besides lessening general traffic congestion on surface streets, bus emissions would be removed to track level.

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Comment 25.14: How much additional noise, air pollution will accompany three hour peak periods associated with increased auto congestion on the bridges by the year 1990 and 2000. (DNA)

Response: Noise and air pollution levels on the Lake Washington bridges in the years 1990 and 2000 are issues beyond the scope of this EIS. One would expect, however, that improvements to downtown Seattle's transit problems would attract more riders than No Action. Increased operating efficiency in Seattle's CBD could also enable Metro to offer more service outside downtown Seattle.

8.2.10 Water Quality

Comment 19.3: Storm drainage impacts need greater discussion. If the storm drainage proposed had an impact on Terminal 46 it would "affect an important equipment maintenance facility and restrict access and utilization of the Port terminal." (Port of Seattle)

Response: Metro shares the Port's concern about the accumulation of toxicants in the sediments at storm-drain outfalls and the subsequent problems of dredging and disposal of those sediments. Properly-designed source controls and maintenance practices can help to alleviate potential water quality problems. Any outfall would be designed to avoid Terminal 46. Refer to Section 5.10.

8.2.11 Construction

Comment 23.1: The draft EIS does not clearly address how Metro proposes to handle traffic during construction. (Allied Arts)

Response: Refer to Section 4.3 on implementation strategy. Construction methods and construction traffic strategies are also defined in Chapters 2 and 4.

Comment 23.2: A substantial portion of the project will utilize "cut and cover" construction techniques, closing 3rd Avenue as a through street for at least three years. How would the impact be mitigated? (Allied Arts)

Response: A large portion of the alignment would be cut-and-cover: all of Pine Street and portions of Third Avenue where stations would be located. Construction techniques and traffic mitigating measures, expanded during preliminary engineering, can be found in Chapter 4.

Comment 23.12: Include the explanation of implementation and timing for the surface improvements. (Allied Arts)

Response: A detailed construction implementation strategy can be found in Chapter 2 under the construction discussion.

Comment 24.4: In the draft EIS there are many construction and disruption questions. (League of Women Voters)

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Response: Please refer to the document's extensive discussion on construction.

Comment 32.1: There is an absence in the draft EIS of a discussion about the construction of a bored tunnel under Third Avenue. (Wright Runstad and Company)

Response: Comment acknowledged. The method of tunnel construction using boring techniques has been the focus of the preliminary engineering design consultant. On September 12, 1984 the project oversight subcommittee of the Metro Council affirmed that this method would be used for construction of the tunnel under Third Avenue between stations. Refer to Chapter 2 for a description of the alternative construction strategies, and chapters 4 and 5 for their impacts.

Comment 32.3: The construction impacts on vehicular access routes to downtown buildings are not discussed in the DEIS. (Wright Runstad and Company)

Response: Refer to Chapter 4 for a description of the alternative construction traffic strategies and an analysis of their traffic impacts.

Comment 32.4: It should be clarified in the final EIS whether the block bounded by Second and Third Avenues, and Seneca and University Streets would also be required in the event the bored tunnel is adopted. Alternative construction staging sites should also be discussed. (Wright Runstad and Company)

Response: The property described is not being considered as a construction staging area for the Third Avenue bored tunnel, the preferred alternative. The major construction staging sites would be at the end stations, in the Union Station train yard and in the Pine/Terry Avenue area and at the Westlake. Others could be identified in final design.

Comment 38.6: Why not bore the tunnel and mine the stations under Third Avenue to minimize cost and surface disruption? (Tom Martin and Associates)

Response: A bored tunnel on Third Avenue has been selected as part of the preferred alternative although Pine Street and the stations would be cut-and-cover because soil and utility conditions combine to make station mining unfeasible. For construction techniques, see the project description.

Comment 38.8: Why must the pavement be torn up and replaced when simply extending the curb would widen sidewalks with much less disruption, moving trolley routes for the detour would be expensive? (Tom Martin and Associates)

Response: The engineering consultant for the project has determined that in any locations where sidewalks are to be widened substantially, the street cross- section should be reprofiled in order to maintain proper street crown (both sides slope down moderately from center) and sidewalk profile (slope uniformly down from building line to curb) for best drainage.

Therefore it appears that removing and replacing pavement is a necessary part of the project. This would also allow installation of a

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improved street surface than currently exists on Third Avenue and Pine Street.

It also appears advisable to remove or, at least, de-energize the overhead trolley wires at certain times and places along the alignment for two reasons. First, some tall construction equipment such as cranes might contact the wire and cause serious injury to construction workers. Second, such equipment might damage or even knock down the overhead wire. This would result in a complete shutdown of that segment of the trolley system until the overhead is repaired. For these reasons, it would likely be necessary to reroute trolleys in some areas during construction.

8.2.12 Costs and Financing

Comment 17.9: The DEIS incorrectly states:

"1. . . . As part of the North Corridor Alternatives Analysis, cash flow analyses were prepared showing both sequential implementation of various Downtown Seattle Transit Project alternative capital demands with more ambitious long term projects." (PSCOG)

Response: Sequential cash-flow analysis was not performed as part of the North Corridor Alternatives Analysis. The text has been corrected in the final EIS.

Comment 17.20: Does the analysis of tunnel financing include the cost of purchasing the full fleet of dual-power buses? (PSCOG)

Response: The financial analysis summarized in the draft EIS in Tables 7-4 and 7-5 include the cost of diesel buses but not the incremental cost of the dual-power buses. The financial analysis displayed in Chapter 7 of the final EIS includes the cost of dual-power buses.

Comment 17.22: The cost-effectiveness and the system implications of the dual-power technology needs to be examined in the preliminary engineering. (PSCOG)

Response: The cost-effectiveness and system implications of dual-power bus technology have been examined and it has been concluded that dual-power buses are both feasible and cost-effective.

Comment 20.6: The final EIS should be accompanied by a detailed funding plan. (CTAC)

Response: UMTA would require a detailed funding plan with Metro's grant application, which would be submitted after the final EIS is issued, but before any Metro Council decision to proceed with further phases of the project.

Comment 21.13: Is there a constitutional "lending of credit" problem in paying business to benefit from transit stations? (Inter-Im)

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Response: Metro is aware of the "lending of credit" issue.

Comment 23.7, 23.10 and 23.22: To fully understand the economic and budgetary realities of the project, it would be helpful to have budget data and cost estimates for the entire project. (Allied Arts)

Response: Costs described in the draft EIS were believed accurate to within 10 or 20 percent, but represent costs for specific alternatives. The preferred alternative described in the final EIS has evolved during preliminary engineering. It would continue to be refined during final design and costs will fluctuate accordingly.

Comment 23.8: Include the budget and cost estimates for the restoration cost for surface improvements. (Allied Arts)

Response: The cost estimate for surface construction is $15.3 million (inflated) dollars for the restoration and improvements to the street and sidewalks along the alignment from Yesler Way to Boren Avenue. This cost estimate does not separate restoration costs and improvement costs.

Comment 23.9: Include the budget and cost estimates for improvement/enhancement portions for the budget for surface improvements. (Allied Arts)

Response: Refer to response 23.8.

Comment 24.2: "How much will the preferred alternative actually cost? What are the sources of revenue? How much will this plan cost or save the transit riders in time and money?" (League of Women Voters)

Response: The preliminary engineering, which preceded the final EIS, enabled Metro to refine its preferred alternative and to improve cost estimates. This information is provided in Chapter 7. In addition, Chapter 4 in the final EIS discusses the time savings for the tunnel alternative. Also refer to response #25.18.

Comment 25.5: "There is no recognition in the EIS of the costs accompanying more and more commuters commuting greater and greater distances from the suburbs to downtown." (DNA)

Response: This issue is not addressed because the Downtown Seattle Transit Project EIS addresses the environmental impacts and costs for only one element of the regional transit system. Metro's 1990 Plan evaluated the regional system needs and identified facilities to be constructed to support this system. The 1990 Plan called for constructing transit centers at major activity centers throughout the County, but also identified the need to resolve transit congestion in the Seattle CBD. The EIS for the 1990 Plan evaluated environmental impacts for the regional system. Furthermore, growth patterns are determined by local jurisdictions and the county.

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Comment 25.7: "The draft EIS must include an assessment of the economic and environmental costs accompanying a shortfall of transit dollars for the rest of the region." (DNA)

Response: As noted in the response to comment 25.8, the EIS for Metro's comprehensive 1990 Plan evaluated environmental impacts associated with a proposed regional transit plan. The Downtown Seattle Transit Project EIS is project-specific and focuses only on solutions to Seattle's CBD transit congestion. Please refer to the 1990 Plan and its EIS for regional impacts and costs.

The construction of a CBD transit solution would not necessarily mean a shortfall of transit dollars for the rest of the region. More efficient bus operation in Seattle's CBD would free operating money which could be used to enhance service outside the CBD. On the federal level, the Urban Mass Transportation Administration evaluates each new project on a case-by-case basis and compares benefits with competing projects. Downtown Seattle transit improvement would not rule out federal funding for other local transit projects.

Comment 25.13: "How much will operation costs go up with a tunnel when overall bus travel times increase (from the Eastside to downtown)?" (DNA)

Response: The tunnel would decrease total travel time (and operating costs) for tunnel buses because of higher average speeds. Travel time on segments of the trip outside of the CBD would be no better or worse than that expected with No Action.

Comment 26.3: "The tunnel would apparently consume more than one-third of Metro's 1990 plan capital budget, for use by a much smaller fraction of total transit customers. What are those ratios?" (Transit Alliance)

Response: The tunnel would consume approximately 40 percent of the capital expenditures proposed in Metro's 1990 Plan. Approximately 88 percent of Metro's passenger trips is on routes which travel through the CBD. Because of travel time savings, however, additional operating money would be available for the entire transit system.

Comment 36.1: The draft EIS has not addressed the economic impacts to neighboring property owners who will be affected by:

a. Loss of vehicular access and circulation

b. Potential near term rental vacancies

b. Uncertainty of stagnating the natural economic growth in the area during planning phase

c. Actual loss in value and taking of property rights

d. Impact of proposed use on subject considering new downtown comprehensive plan

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e. Disruption to tenants during and after construction. (Allen Northwest, Inc.)

Response: a. The draft EIS identified two property configurations: one takes, the other presents, access problems. The preferred alternative would take.

b. Near-term rental vacancies and growth stagnation during planning phases would be unavoidable adverse impacts.

c. Metro does not believe the construction of a transit center or station at the Ninth and Pine site would result in a loss of value for neighboring property owners.

d. As noted in the discussion of plans and policies in Chapter 5, a transit facility at this location would be compatible with the City's proposed land use plan.

e. Section 4.1 of this document outlines several construction scenarios and their likely impacts on tenants near construction areas. Section 4.2 outlines similar effects when the project is operational.

8.2.13 Historic, Cultural, Archaeological and Parkland Resources

Comment 4.1: "The document does not include a proper Section 4(f) evaluation as required by the Department of Transportation Act." (DOI)

Response: Provisions of 4(f) were met since the issuance of the draft EIS.

A discussion of the evaluation to show (1) that there is no feasible and prudent alternative to the use of section 4 (lands) and (2) that all possible planning has been done to minimize harm to section 4(f) lands is documented and summarized in Chapter 6. A technical appendix is also available with more detailed information.

Comment 4.2: Some "buildings which have been determined by the SHPO not be potentially eligible for the National Register of Historic Places have been dropped from further consideration in the Historic Resources section." "The ultimate responsibility for such a determination lies with the lead agencies in consultation with the SHPO." It is recommended that properties be reviewed to insure all properties qualified have been included or record reason why the property does not qualify (independently of the SHPO). (DOI)

Response: Metro's first investigations included less than 40 properties but, after discussions with the state and local historic preservation officers, a total of 75 properties were inventoried during the initial stages of the project. While all properties were tentatively listed Metro concurred with SHPO in deleting some from inventory due to the age of the properties, the results of local surveys, alterations to the properties and first investigations. Seventeen of the 75 properties were determined not eligible for the National Register or have been demolished

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for other projects during the planning. Documentation is available from Metro.

Comment 4.3: The archaeological section "lacks important details necessary to determine the significance of the potential impacts to archaeological resources." (DOI)

Response: A more complete description of archaeological resources and the sampling strategy is documented and summarized in Chapter 6. A technical appendix is also available with more detailed information.

Comment 4.4: The parklands "section does not contain sufficient information to address the impacts. . .which would likely occur as a result of implementation of the various alternatives." (DOI)

Response: There would not be any adverse effects to parklands as documented and summarized in Chapter 6. A technical appendix is also available with more detailed information.

Comment 4.5: The draft EIS did not discuss mitigation plans for the taking of a portion of the projected Terry Street Park. (DOI)

Response: A lid could be constructed over the bus-staging area. This would permit a street park to be built at grade in accordance with the City's plans or separately without a lid. An easement would be maintained for future street park development. The City, as a joint lead agency has included the proposed bus access routes, station, staging area, street park and possible closure of Terry Street in the formulation of its plans for the Terry Street park. Any street park, however, would be a separate project.

Comment 4.6: There was no impact discussion in the draft EIS for the Cherry/Columbia/Fifth Park, Westlake Mall and Street Parks. (DOI)

Response: The impact discussion in the Parkland section of Chapter 6 has been expanded to include Cherry/Columbia/Fifth Park, Westlake Mall and Street Parks. There would not be any adverse effects to parklands.

Comment 4.7: The requirements of Section 4(f) "would be fulfilled only when the Office of the Secretary of Interior comments separately" when a section 4(f) statement is prepared and approved for circulation. (DOI)

Response: The Office of the Secretary of the Department of Interior has commented on the section 4(f) statement separately. A summary is in Chapter 6. The 4(f) documentation is also available as a technical appendix.

Comment 5.1: "It is unclear whether archaeological considerations have been taken into account." (ACHP)

Response: The archaeological concerns have been further addressed and summarized in Chapter 6 as part of the 4(f) and 106 processes. Both an urban

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archaeologist and the Washington HPO have been consulted. A technical appendix is also available with more detailed information.

Comment 5.2: "The selection of an alternative for the undertaking has not been identified"; therefore, an effective evaluation was not possible. (ACHP)

Response: For the final EIS and preliminary engineering a preferred alternative, the Third Avenue Tunnel with surface improvements has been selected. A description of the preferred alternative can be found in Chapter 2.

Comment 5.3: "The points-of-access for the underground system has not been identified"; therefore, an effective evaluation was not possible. (ACHP)

Response: The points-of-access have been identified and included in both Chapter 6 and the Technical Appendix for the 106 Process.

Comment 5.4: "Determinations of effect have not been made in accordance with 36 CFR 800.3. (ACHP)

Response: A determination of the effect has been made for each property since the issuance of the draft EIS, in accordance with 36 CFR 800.3. A summary of the determinations can be found in Chapter 6 and the 106 Technical Appendix available at Metro.

Comment 5.5: There are several alternative approaches to insuring the documentation will be adequate and in compliance with 36 CFR 800. One approach would include all alternatives. A second approach would evaluate the preferred alternative. (ACHP)

Response: Complete documentation on the preferred alternative has been submitted in compliance with 36 CFR 800.13, and a Memorandum of Agreement has been developed in accordance with 36 CFR 800.6.c.

Comment 17.18: The street right-of-way, as stated in the DEIS, would be taken for the Terry Street Park. In addition Terry Avenue would be a major access route to the Ninth and Pine station, therefore, reducing the desirability of developing a park at that location. (PSCOG)

Response: A street park could still be developed on Terry Avenue on a lid at-grade. The City has taken into consideration, in its proposal, the proposed bus access routes, station and staging area. Any street park, however, would be a separate project. See discussion in Chapter 6.

Comment 37.2: Page 6-6 of the draft EIS indicates that both the Kaplan Warehouse and the Tashiro Hardware Building are considered structures of secondary importance in the Pioneer Square District. The owner objects to the designation of these buildings as "secondary importance." (Jan Mohamed)

Response: The term "secondary" importance is used in connection with its designation within Pioneer Square on the National Register. Regardless of this classification the structures are still considered important

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historically and has been treated as such by the project office. These properties were also evaluated in the 4(f) and 106 processes.

Comment 38.19: Is there a practical way to preserve landmarks such as the Yuen Lui Studio? (Tom Martin and Associates)

Response: It is not practical to preserve Yuen Lui studio. Yuen Lui studio has had substantial changes in the past two years to its original design.

8.2.14 Public Participation

Comment 20.2: Public hearings and information process should be continued during preliminary engineering and approval of the final EIS. (CTAC)

Response: Metro would continue the public information process during this and future phases of the project.

Comment 20.11: CTAC should continue to be involved through the implementation of this project. (CTAC)

Response: CTAC, as well as the public, would continue to be involved.

Comment 22.3: EHTAC "recommends that a technical review team specialized in evaluating accessibility be retained by metro to provide input at critical milestones of the project."

Response: EHTAC would continue to be involved.

Comment 24.5: Metro should "hold more public hearings when additional information is available and before plans become finalized." (League of Women Voters)

Reponse: No further public hearings are required but Metro has continued to hold public meetings.

8.2.15 Miscellaneous

Comment 6.1: A section 404 permit would be required. (NOAA)

Response: The required Section 404 permit has been added to Permit section.

Comment 6.2: If any geodatic control monument is located in the project area National Ocean Service (NOS) requires not less than 90 days' notification in advance. Funding for this project should include the cost of any relocation required for NOS monuments. (NOAA)

Response: If any geodetic control survey monuments are located in the project area and are subject to change, Metro would give National Ocean Service (NOS) 90 days' notification to plan for their relocation. It is not anticipated that any monuments would be distrubed.

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Comment 15.2 and 21.5: The ISRD Certificate of Approval requirement should be added to Appendix J - List of All Required Permits and Licenses, City of Seattle. (ISRD, Inter-Im)

Response: International Special Review District Certificate of Approval has been added to list of all required permits and licenses.

Comment 15.12: "The population for Census Tract 91 (International District) 1980 seems to be very low - 879 persons. After checking with the Department of Community Development, they stated that for Census Tract 91 in 1980, there was a population of 1127 persons." (ISRD)

Response: The 1980 Census Tract 91 population within the downtown study area is 877 persons, based on block statistics from the 1980 Census of Population and Housing. Due to the incongruity of the boundaries of the downtown study area and census tract boundaries, population data for Census Tract 91 is only shown for the portion of the tract west of I-5 (LUTP, October 1983).

Comment 15.13 and 21.18: What is a non-structural lid? (ISRD, Inter-Im)

Response: The term "non structural lid" was intended to indicate a roof structure which would provide weather protection and noise baffle, but would not be capable of supporting construction of the building above.

Comment 17.4: The summary "states that the primary decision to be made is to select the best alternative analyzed in the EIS. This is not correct. The adoption of the preferred alternative and decisions made subsequent to that action have excluded from selection any of the alternatives analyzed in the EIS." (PSCOG)

Response: Although Metro Council selected an electric-only transit tunnel with a circulation system and surface improvements as its preferred alternative, it also stated that identifying a preferred alternative neither limits the choice of reasonable alternatives available nor represents a decision to authorize or construct a particular alternative. Metro Council needed to select a preference for preliminary engineering. Neither the Urban Mass Transportation Administration nor the Metro Council has selected an alternative for implementation.

Comment 17.19: The discussion on equity addresses who benefits from the transit alternatives from the standpoint of the non-commuter. It is the commuter however, that receives the greatest benefit. An analysis of who benefits from the tunnel would show that it is the suburban rider that receives the greater benefit. This analysis should be included in subsequent evaluation for equity. (PSCOG)

Response: The comment refers to potentially differential benefit to the four classes of transit riders: suburban commuters, suburban non-commuters, city commuters and city non-commuters. All classes of transit riders would benefit from improved on-time performance and schedule reliability, identified as the primary passenger concern and from shorter travel times. Refer to Table 4-16, page 4-9, for travel time savings.

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All citizens would benefit from reduced street and sidewalk congestion, reduced noise impacts and improved air quality.

An improved and expanded downtown circulation system is an integral part of the preferred alternative, providing more frequent and more extensive service to downtown transit users. Refer to page 2-33ff for a detailed description.

Comment 21.6: The draft EIS fails to discuss the cumulative impacts of this project, the I-90 access, the Kingdome and the I-5 freeway claiming "independent utility." (Inter-Im)

Response: Although the downtown project does have "independent utility," the analysis of the project and its impacts takes into account the framework of other existing and proposed projects such as the I-90 access, regional transportation plans. For example, the transportation section includes the projected traffic from the I-90 accessa nd other major development proposed at this time.

Comment 25.16: "No analysis of environmental impacts outside the downtown is included." (DNA)

Response: The project EIS covers impacts where impacts would occur. Most impacts would occur in the "downtown" area generally bounded by Denny Way on the north, I-5 on the east, I-90 on the south and Puget Sound on the west.

Comment 37.1: Amend Metro's records to list Jan Mohamed as the owner of the Tashiro/Kaplan buildings. (Donald Myers)

Response: The text has been amended.

Comment 46.1: A contingency plan should be addressed in the EIS. (Evan Hundley)

Response: The EIS for the Downtown Seattle Transit Project has examined four main alternatives with numerous sub-options ranging from the preferred Tunnel alternative to minor TSM measures that could be implemented on a drastically-reduced budget. If federal funds are not available to build the preferred alternative, the analysis done for the other reduced-scale alternatives could help local public officials decide.

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APPENDICES

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APPENDIX B

LIST OF PREPARERS

PRIMARY CONTRIBUTING AGENCIES

Urban Mass Transportation Administration

Ken Mowll
Terry Ebersole
M. Colleen Weule

Metro

Environmental Planning:

Eric Hansen
Susan Killen
Andy Ruotsala

Project Office:

Joe Beck
David Kalberer
Kathy Koss
Tim Healy
Jim Jacobson
Bill Medley
Susan Sanchez
Gregg Schweers
Tim White

Information Services:

Sue Chin

Word Processing:

Cynthia Turbak
Debbie Davis
Linda Balagot
Nancy Myer
Jan Foster
Dennis Trapp

Printing:

Lu Buchanan

Budget Office:

Joshua Smith

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State Office of Archaeology and Historic Preservation

Jacob Thomas
Robert Whitlam

City of Seattle

Land Use and Transportation Project:

Ron Borowski

Engineering Department:

Robert Chandler
Mark Clemmens

Department of Community Development:

John Chaney
Karen Gordon
Ellen Miller-Wolfe
Richard Smith
Jim Dare

PRIMARY CONTRIBUTING CONSULTANTS

CH_2M Hill - Seattle

Jim Braman, Project Manager,Energy
David Baker, Noise and Vibration
Mike Mariano, Transportation, Utilities
Ed Powell, Air Quality
Signe Gilson, Utilities, Compatibility with Plans and Policies
Mike Matichich, Economics, Cost-effectiveness
Dean Hobson, Transportation

Subconsultants to CH_2M Hill

Barton-Aschman Associates, Inc., Transportation
Skidmore, Owings and Merrill, Urban Design
Centrac Associates, Inc., Traffic
Patricia Jean Chemnick, Displacement, Relocation and Neighborhoods
Ing and Associates, Parklands, Ecosystems, and Natural Resources
Shannan and Wilson, Inc., Soils
Carta, Inc., Historic and Cultural Resources, Visual and Aesthetic
Skilling, Helle, Christiansen and Robertson, Inc., Engineering
Earth Technology Corporation, Air Quality
Michael C. Kaye, Noise and Vibration
Raymond Kaiser Engineers Inc., Engineering
Shirley Cortois, Historic and Cultural Resources

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LIST OF PREPARERS (continued)

PBQ&D - Seattle

Paul Gibert, Principal-in-Charge
Bill Barnes, Project Director
Ed Elliott, Deputy Project Director
George Krambles, Transit Operations
Mel Stein, Manager - Project Control
Earl Ireton, Manager - Systems Engineering
K.K. See-Tho, Manager, Engineering
Van Lee, Noise and Acoustics
Imants Koupe, Manager Engineering Support
David Hoeh, Environmental Coordination

Subconsultants to PBQ&D

Centrac Associates, Inc. Traffic
Patricia Jean Chemnicle, Relocation Plan
Earth Technology Corporation, Archaeoloty
Shirley Cortois, Historic and Cultural Resources
TRA, Urban Planning and Design, Architecture
Robert Shinbo Associates, Urban Planning and Design, Architecture
Elaine Day La Tourelle, Urban Planning and Design, Architecture
Norton Corrosion Ltd.
Morrison-Knudsen
ABKJ, Foundations and Underpinning
URS, Utilities

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LIST OF FINAL EIS RECIPIENTS

Federal Agencies

- Urban Mass Transportation Administration, Region X
- Department of Transportation, Region X
- Environmental Protection Agency, Region X
- Department of Health and Human Services
- Department of Housing and Urban Development
- Department of the Interior, Fish and Wildlife Service
- Federal Highway Administration
- Department of Commerce, Economic Development Administration
- Department of Postal Service
- Advisory Council on Historic Preservation
- Coast Guard
- National Oceanic and Atmospheric Administration
- National Marine Fisheries Service
- Department of Agriculture
- Department of Energy
- Federal Emergency Management Agency
- Office of Management and Budget
- Interstate Commerce Commission
- General Services Administration
- Army Corps of Engineers

State Agencies

- Office of the Governor
- Department of Ecology (2)
- Department of Transportation (2)
- Planning and Community Affairs Agency
- Department of Fisheries
- Utilities and Transportation Commission
- Office of Archaeology and Historic Preservation
- Department of Social and Health Services
- Department of Commerce and Economic Development
- Department of Game
- Department of Natural Resources
- Ecological Commission
- Energy Office

King County

- Office of Budget and Program Development (4)
- Office of the County Executive
- Arts Commission

City of Seattle

- Office of the Mayor
- City Council

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City of Seattle (continued)

- o Police Department
- o Department of Engineering
- o City Light
- o Land Use and Transportation Project
- o SEPA Public Information Center
- o Department of Community Development
- o Department of Construction and Land Use
- o Fire Department
- o Department of Parks and Recreation
- o City Planning Commission
- o Water Department
- o Sewer Utility
- o Arts Commission
- o Design Commission
- o Office of Urban Conservation
- o Seattle-King County Public Health Department

City of Bellevue

- o Office of Environmental Coordination

Regional Agencies

- o Puget Sound Council of Governments (2)
- o Metro Council (38)
- o Puget Sound Air Pollution Control Agency
- o Port of Seattle
- o Puget Sound Water Quality Authority
- o Pierce Community Transit
- o Everett Transit

Libraries

- o Seattle Public Library, Documents Librarian (5)
- o University of Washington Government Documents Center
- o King County Library, Central Reference System (3)
- o Bellevue Library
- o Shoreline Library
- o Federal Way Library
- o Burien Library
- o Kent Library
- o Municipal Reference Library
- o Metro Library

Media

- o Seattle Times
- o Seattle Post-Intelligencer
- o Daily Journal of Commerce
- o Daily Journal American
- o The Medium Newspaper
- o The Facts Newspaper

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- Robinson Newspapers
- Valley Newspapers
- International Examiner
- Seattle Chinese Post
- KIRO-TV
- KOMO-TV
- KING-TV

Civic Interest Groups

- Citizens' Transit Advisory Committee
- Washington Environmental Council
- Downtown Advisory Committee
- Policy Advisory Committee
- International District Improvement Association (Inter-Im)
- Elderly and Handicapped Transit Advisory Committee
- Downtown Seattle Association
- Seattle Municipal League
- Mayor's Council for Elderly
- International Special Review District Board
- Cascade Community Council
- International District Housing Alliance
- Scientists/Citizens Organized on Policy Issues (SCOPI)
- Seattle Chamber of Commerce
- Allied Arts of Seattle
- League of Women Voters
- Downtown Neighborhood Alliance
- Yesler Terrace Community Council
- First Hill Community Council
- Pioneer Square Community Council
- Pike Place Market Commission
- Cascade Bicycle Club
- Students for a Better Transit
- Transit Alliance
- Washington Association of Railroad Passengers
- Center on Contemporary Art

Others

- Washington Natural Gas
- Pacific Northwest Bell
- R & E Cycle Repair
- Seattle Steam Company
- Western Union
- Burlington Northern Inc.
- Tomio & Kenzo Moriguchi
- Union Pacific Corp.
- Dojac Corp.
- Miller Pendleton
- Richard Clotfelter, et al.

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LIST OF FINAL EIS RECIPIENTS (continued)

- North Pacific Mortgage Company
- Brooke A. Barnes
- Myrtle Woldson
- Michael E. Stansbury
- Alan Wayte, Esq.
- Mike E. Brandeberry
- Wright Runstad & Company
- Diamond Parking Inc.
- Samuel Tobin
- Martin Selig
- Cassieford Company
- Maynard Investment Company Inc.
- Mayme L. Lui
- George Chevigny
- Seattle Trust & Savings Bank
- Jerry L. Ivy
- Terry Avenue Assoc.
- Myron Doty
- Kimberley Inc.
- Bob Rogers & Assoc.
- Carma Developers
- Mall Inc.
- Central Building Associates
- Jerry A. Costacos
- Vance Corporation
- E. M. Greenwood
- Jan Mohamed
- Robert Deering
- Chevco
- Cloes Trust
- 912 Assoc.
- CHG International
- Philbrick
- Astor Hotel
- Frederick & Nelson
- Kamloops
- O'Shea Estate
- Nordstrom
- Bon Marche
- Marathon
- J. Georges
- Don Winter
- Unico
- Plymouth Housing Group
- Yukon Investment
- Howard Seig
- Bartell's
- Union Pacific Railroad
- J. K. Gill's Bookstore

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APPENDIX D

GLOSSARY

Articulated Bus: A transit coach capable of bending in the middle. The proposed dual-powered buses proposed for operation in the tunnel would be articulated coaches.

Atmospheric Stability: A measure of the capacity of the ambient air to disperse air pollutants, unstable air dispersing them more readily than stable air. (Pasquill stability designations A through F refer to increasingly stable air.)

Averaging Time (also, exposure time): The duration of exposure to a given concentration of an air contaminant, specified in ambient air quality standards, e.g. the two national CO standards of 10 mg/m3 and 40 mg/m3 specify averaging times of eight hours and one hour.

Average Daily Traffic (ADT): The total volume of traffic during a given time period divided by the number of days in that time period.

Average Weekday Traffic (AWDT): The total volume of traffic during the five days, Monday through Friday, divided by five.

Background Concentration: The air pollutant level that would exist at a site in the absence of air pollution sources in the neighborhood of the site. (Different from Modeled Concentration.)

BTU: British Thermal Unit. An energy unit equal to the quantity of heat required to raise the temperature of one pound of water one degree Fahrenheit. One therm equals 100,000 BTU.

CO: Carbon monoxide. A colorless, odorless, tasteless gas and one of the criteria air pollutants released from automobile exhaust.

Concentration (also, level): A measure of the amount of an air pollutant in the ambient air, having the units of mass per volume.

Construction Energy: In transportation analysis, the energy used to build stations, terminals, roadbeds, trackbeds, vehicles and other equipment and facilities. Construction energy includes the energy content of materials and the energy used to haul and place them.

Contraflow Transit Lanes: Contraflow transit lanes are lanes in which transit vheicles move in a separate, exclusive lane headed in the opposite direction from the general traffic flow. The opposite of this is a with-flow transit lane.

Corridor: A route or restricted path connecting two locations such as I-5 and the Third and Pine alignment.

Criteria Air Pollutants: Those air pollutants which have been recognized by the EPA as potentially harmful and for which standards have been set to protect the public health and welfare. The criteria air pollutants are carbon monoxide, sulfur dioxide, particulate, nitrogen dioxide, ozone, hydrocarbons and lead.

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dBA: The sound level obtained through use of A-weighting characteristics specified by the American National Standards Institute (ANSI) Standard S1.4-1971. The unit of measure is the decibel (dB) commonly referred to as dBA when A-weighting is used.

Elasticity: In economic analysis, the sensitivity of the demand or supply of a commodity to changes in another variable, e.g. the price elasticity of gasoline is the ratio of the percent change in consumption to percent change in price.

Emission: A release of contaminants into the ambient air.

Endangered Species: According to the Federal Endangered Species Act of 1973, endangered species are any species in danger of extinction throughout all or a significant portion of its range, other than a species of Class Insecta determined by the Secretary of the Interior to constitute a pest whose protection under the provisions of this act would present an overwhelming and overriding risk to man.

Energy: The capability of doing work. Forms of energy include kinetic, potential, thermal electromagnetic and nuclear. One form of energy may be converted to another, e.g. in hydroelectric plants, the conversion is from potential to kinetic to electromagnetic energy.

Equity: The incidence and fairness of the distribution of costs and impacts among population subgroups.

HC Hydrocarbons: Any of a vast family of compounds containing carbon and hydrogen in various combinations. They are precursors to the production of photo chemical oxidants.

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

Homeless: As used in the EIS this term describes city residents who do not have a permanent place to live -- from alcoholics to street people to the jobless and very poor.

HOV High Occupancy Vehicle: HOV' include buses, vanpools and carpools. HOV lanes are intended to give preference to vehicles carrying several occupants per vehicle, instead of just one.

Indirect Energy: All energy inputs for the construction, operation and maintenance of a system, exclusive of propulsion energy and parasitic loads within vehicles.

Induced Trips: Trips generated because of the construction of a new transportation facility (different from shifted trips).

Joint Use: In the context of this project, joint use refers to the location of transit station access in existing or proposed developments or the provision for construction of private development above the transit facility.

KW Kilowatt: A unit of power.

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KWH Kilowatt hour: A unit of energy (usually electrical energy).

Ldn: The day/night average sound level.

Leq Equivalent Sound Level: The equivalent sound level is a single value of sound level for any desired duration which includes all of the time-varying sound energy in the measurement period.

Leq(h): The hourly value of Leq.

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 comprising of vehicles that travel on steel tracks and powered by electricity.

Load Factor: The average ratio of passengers to seats during some specified period of operation of a public transit route.

Local Improvement District (LID): An assessment mechanism authorized by the state legislature to fund a variety of improvements. Assessments are levied on property owner the based on the benefits the owner would receive as a result of the improvement.

Microgram Per Cubic Meter (abbreviated ug/m3 or mcg/m3): A unit of concentration equal to one thousandth of a gram per cubic meter.

Mini-Stations: A small station with the ability to load and unload passengers without intercepting diesel buses.

Minority Groups: As defined by Metro, this includes Blacks, Hispanics and all other racial/ethnic groups other than Caucasian.

Modeled Concentration: An air pollutant level, excluding the background level, predicted by a model (see background concentration).

Mode Split: Forecast of the proportion of total person-trips that would use each of the various modes of transportation that include buses and cars.

National Ambient Air Quality Standards (NAAQS): A federal limit on levels of atmosphere contamination necessary to protect the public from adverse effects on health (primary standards) and welfare (secondary standards).

National Historic Preservation Act of 1966: The act which established the National Register and State Preservation programs, and set forth guidelines and regulations for grant programs and environmental review of projects involving federal funding.

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

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Nonattainment Area: An area designated by the EPA as presently violating the National Ambient Air Quality Standards, based upon archival air quality data.

NOx (Oxides of nitrogen -- nitrogen oxide and nitrogen dioxide): The pollutants released during high temperature combustion of fossil fuels, e.g. by diesel engines.

Operational Energy: The energy used for vehicle propulsion, facilities and maintenance for a specified period, usually one year.

Ozone: A gas consisting of three oxygen atoms formed in reactions of non-methane hydrocarbons and nitrogen oxides in the presence of sunlight. One of the criteria air pollutants.

Park-and-Ride Lot: A lot that provides all-day parking for a varying number of cars. Park-and-ride lots would be located near the fringe areas of the transit system where feeder bus service is sparse or nonexistent.

Passenger Mile: An amount of travel equivalent to one passenger traveling one mile.

Payback Period (also, breakeven period): The period found by dividing the construction energy consumption of a project by the forecast annual operational energy savings attributable to the project. Savings are measured against baseline energy consumption, and are the net savings (losses) in propulsion, savings (losses) in maintenance and savings (losses) in facilities.

Peak Hour: The 60-minute period in a typical weekday which accommodates the largest number of automobile or transit patrons.

Photochemical Oxidants (Smog): Gaseous pollutants formed from reactions of HC and NOx in the presence of sunlight, e.g. ozone.

Runoff: The rainwater which directly leaves an area in surface drainage as opposed to the amount that seeps out as groundwater.

Section 4(f) Land: Section 4(f) of the Department of Transportation Act applies to any publicly-owned land from a public park, recreational area or wildlife and waterfowl refuge or any land from an historic site used by the project.

Section 106: A portion of the National Historic Preservation Act of 1966 which establishes a review procedure of cultural resources that may be affected by projects receiving federal funds.

Sensitive Receptor: A local area or site which supports activities easily disrupted by audio or visual intrusions or distractions, such as a park, historic landmark or residential neighborhood.

Signal Preemption: Traffic signal options which modify normal signal phasing for preferential treatment of emergency vehicles.

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SIP: State Implementation Plan. A plan required of each state by the Clean Air Act that describes how the state will attain and maintain the National Ambient Air Quality Standards.

Staging Area: A holding area where transit vehicles wait until they can depart this location in a specific scheduled sequence.

Station: A small transit center with a capability of intercepting 90 buses per hour.

Terminal: A large transit center with a capacity of intercepting 150 diesel buses per hour.

Threatened Species: According to the Federal Endangered Species Act of 1973, any species which is likely to become an endangered species within the foreseeable future, throughout all or a significant portion of its range.

Total Suspended Particulate (TSP): Air pollutants which consist of solid particles (dust, lead, salts, etc.) suspended in the atmosphere. A criteria air pollutant.

Transit Center: An off-street station with shelter where a large number of buses and passengers can be brought together with safety and convenience.

Transportation Mode: A form of transportation, e.g. automobile, bus, light-rail transit, commuter rail, pedestrian, bicycle.

Trip Demand: The number and type (public or private origin and destination) of trips measured or calculated in a specified area having a given land development pattern. Trip demand also depends on prevailing economic, behavioral and attitudinal conditions.

Trip Length: The number of miles per trip. This is usually an average number for a specified trip type, area and analysis year.

TSM Transportation System Management: Strategies for improving the efficiency of existing roads and highways without major new capital investment.

Use of Section 4(f) Land: According to regulations of the U.S. Department of Transportation, use of Section 4(f) land is: 1) acquisition of title or easement to land, or 2) in unusual circumstances, serious indirect impacts, such as a severe increase in noise, visual intrusion or access obstruction.

Vehicle Mile: An amount of travel equivalent to one vehicle traveling one mile.

Vehicle Occupancy: The number of persons per vehicle. Usually, an average number for a specified trip type, area and analysis year.

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Wetlands: Wetlands are areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, under normal conditions, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes and similar areas.

With-flow Transit Lanes: With-flow transit lanes are transit lanes traveling in the same direction as lanes for general auto traffic. The opposite of this is a contra flow transit lane in which transit vehicles would move in a separate, exclusive lane on the opposite side of the street and headed in the opposite direction from the general traffic flow.

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APPENDIX E

ACRONYMS

ACHP	Advisory Council on Historic Preservation
bBTu	billion British Thermal Units
B & O	Business and Occupation tax
BM	Metropolitan Business zone
CBD	Central Business District (Seattle)
CG	General Commercial zone
CH_2M Hill	Consulting firm for the project
CM	Metropolitan Commercial zone
CO	Carbon monoxide
CSO	Combined Sewer Overflow
CT	Census tract
DAP	Downtown Alternative Plan
dBA	Sound level weighting
DOT	Department of Transportation
DSA	Downtown Seattle Association
DSDA	Downtown Seattle Development Association
DSTP	Downtown Seattle Transit Project
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
FHWA	Federal Highway Administration
HBO	Home-Based Other
HBW	Home-Based Work
HOV	High Occupancy Vehicle
HPO	Housing Preservation Ordinance
ID	International District
I-5	Interstate 5
IG	General Industrial zone
I/M	Vehicle Inspection and Maintenance Program
I-90	Interstate 90
ISRD	International Special Review District
Ldn	Day-night sound level

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Leq	Equivalent sound level
LID	Local Improvement District
LOS	Level-of-Service
LUTP	Land Use and Transportation Project
M	Manufacturing zone
Metro	Municipality of Metropolitan Seattle
MOA	Memorandum of Agreement
NA	Not applicable
N HB	Non-Home Based
NO_x	Nitrogen Oxides
O_x	Photochemical Oxidants
OSHA	Federal Occupation Safety and Health Administration
PAL	Point Area Line Air Quality Model
PPM	Parts Per Million
PSAPCA	Puget Sound Air Pollution Control Agency
PSCOG	Puget Sound Council of Governments
RM-MD	Multiple Residential Mixed Density
SED	Seattle Engineering Department
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SO_x	Sulfur Oxides
SRD	Special Review District
SRO	Single Room Occupancy
TCM	Transportation Control Measures
TNOP	Transit Network Optimization System
TSM	Transportation System Management
TSP	Total Suspended Particles
ug/m^3	Micrograms per cubic meter
UMTA	Urban Mass Transportation Administration

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WISHA	Washington Industrial Safety and Health Act
WOT	Without general traffic
WSDOE	Washington State Department of Ecology
WSDOT	Washington State Department of Transportation
W/T	With general traffic

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APPENDIX G

LIST OF AGENCIES CONSULTED

The following agencies have been consulted during the course of the Downtown Seattle Transit Project.

Federal

Environmental Protection Agency
Federal Highway Administration
Urban Mass Transportation Administration
Housing and Urban Development
Department of Interior
Advisory Council on Historic Preservation

State

Department of Transportation
Office of Archaeology and Historic Preservation

King County

Department of Public Health

City of Seattle

Department of Engineering
Department of Community Development
Office of Urban Conservation
Land Use and Transportation Project
Parks and Recreation
Sewer Utility
Department of Construction and Land Use
Landmarks Preservation Board
International Special Review District
Pioneer Square Historic Preservation District
Fire Department
Police Department
Water Department
City Light
Design Commission

Regional

Puget Sound Council of Governments
Puget Sound Air Pollution Control Agency

Other Organizations

Citizens groups through the Public Participation Program

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APPENDIX H

AVAILABILITY OF EIS TO THE PUBLIC

Copies of this final EIS are available at Metro's accounting office on the seventh floor of the Exchange Building, 821 Second Avenue, Seattle 98104 or by calling the Environmental Planning Division at (206) 447-6613. There is an ____ charge for the document to cover printing costs. Persons ordering copies by mail must also pay a postage charge.

Copies of this document are available for public review at the following locations:

Government Agencies

- Metro Library, Exchange Building, Sixth Floor, 821 Second Avenue, Seattle
- City of Seattle, SEPA Public Information Center, 408 Municipal Building, Seattle
- Puget Sound Council of Governments, 216 First Avenue South, Seattle
- Urban Mass Transportation Administration, Region X, 3142 Federal Building, 915 Second Avenue, Seattle
- Urban Mass Transportation Administration, 400 Seventh Street Southwest, Washington, D.C. - Room 9301

Libraries

- Municipal Reference, 307 Municipal Building, Seattle
- Seattle Public libraries (available through any branch)
- University of Washington Government Documents Center, Suzallo Library, Seattle
- King County (available through any branch)
- Bellevue, 11501 Main Street, Bellevue
- Shoreline, 345 Northeast 175th, Seattle
- Federal Way, 848 South 320th, Federal Way
- Burien, 14700 Sixth Southwest, Seattle
- Kent, 232 South Fourth, Kent

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APPENDIX I

LIST OF ALL REQUIRED PERMITS AND LICENSES

The following permits and licenses are required for each action alternative unless indicated otherwise. After preliminary engineering and development of specific details of the project, additional licenses and permits may be identified.

City of Seattle

Master Use Permit
Building Permit
Street Use Permit
Demolition Permit
Grading Permit
Electrical Permit
Mechanical Permit
Utilities Permit
Franchise Permit
Shoreline Permit
International Review District Approval
Pioneer Square Preservation Board
Landmarks Preservation Board

Corps of Engineers

Department of Army Permit
404 Permit

State Department of Fisheries

Hydraulics Project Permit

Washington State Department of Transportation

Use Permit

Miscellaneous

Burlington Northern, Inc. - Pipeline Permit, Application for Private Crossing
Easements and Agreements for Utility Relocation
Hauling and Dumping Permits From Appropriate Jurisdictions

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APPENDIX J

4(f)/106 INVENTORY
DOWNTOWN SEATTLE TRANSIT PROJECT
(*Determined eligible or on the National Register
****Within Pioneer Square Historic District see #45 description)**

* **1. Union Station
Fourth Avenue and King Street

*2. Downtowner Apartments (New Richmond Hotel)
308 Fourth Avenue South

*3. Burlington Northern Tunnel (Great Northern Railroad Tunnel)
Beneath Seattle Central Business District, south portal just south of Washington Street at Fourth Avenue South

* **4. Hotel Union
200 Third Avenue

* **5. Kaplan Building
300-314 South Washington, 127 Prefontaine Place South

* **6. Tashiro Hardware Building
101-113 Prefontaine Place South

* **7. Prefontaine Building
100-108 Prefontaine Place South

* **8. Yesler Way Bridge
Dilling Way between Third and Fourth avenues

* **9. Frye Hotel
215 Yesler Way

* **10. Prefontaine Place Park
Third Avenue and Yesler Way

* **11. City Hall Park
Fourth Avenue and Yesler Way, Third Avenue and Jefferson Street

* **12. King County Courthouse (County-City Building)
Third Avenue and James Street

* **13. Morrison Hotel
501-517 Third Avenue

* **14. Smith Tower
506 Second Avenue

* **15. Collins Building
520 Second Avenue

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* **16. Hotel Drexel
519-525 Third Avenue

*17. Lyon Building
607 Third Avenue

* **18. Hartford Building
600 Second Avenue

* **19. Alaska Building
618 Second Avenue

*20. Arctic Building
306 Cherry Street

*21. Dexter Horton Building
710 Second Avenue

*22. Foster & Marshall Building (Seattle National Bank)
205 Columbia Street

*23. Chamber of Commerce Building
219 Columbia Street

*24. Central Building
810 Third Avenue

*25. Pacific Telephone & Telegraph Building
Third Avenue and Seneca Street

*26. Seattle Trust (Boston Company Building)
804 Second Avenue

*27. Rainier Bank Building (Baillargeon Building)
1100 Second Avenue

*28. Seattle Tower (Northern Life Tower)
1214-1222 Third Avenue

*29. Northhold Inn
214 University Street

*30. Brooklyn Building (Hadfield Building)
1222 Second Avenue

*31. Ethelton Hotel (Bogardus-Elliott Building)
1317 Third Avenue

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*32. Hotel Fairview (Hotel Bybee)
1321 Third Avenue

*33. Embassy Theatre(Mann Building)
1411 Third Avenue

*34. Joseph Vance Building
1402 Third Avenue

*35. Melbourne Tower (Republic Building)
1511 Third Avenue

*36. Fischer Studio Building
1519 Third Avenue

*37. Olympic Tower (United Shopping Tower)
217 Pine Street

*38. Westlake Park
Fourth Avenue and Pine Street

*39. Sixth and Pine Building (Shafer Building)
515 Pine Street

*40. Decatur Building
1521 Sixth Avenue

*41. Camlin Hotel
1619 Ninth Avenue

*42. Payne Apartments (Earlington Apartments)
1521 Seventh Avenue

*43. Paramount Theatre
901 Pine Street

*44. Olive Tower
1624 Boren Avenue

* **45. Pioneer Square Historic District

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Determined Eligible - Considered for Fourth Avenue Alignment Only

*46. Northern Securities Building (Seaboard Building)
1506 Westlake Avenue

*47. Liggett Building (Fourth and Pike Building)
1424 Fourth Avenue

*48. Joshua Green Building
1425 Fourth Avenue

*49. Holland Building (Equitable Building)
1415-1417 Fourth Avenue

*50. 1411 Fourth Avenue Building
1411 Fourth Avenue

*51. Great Northern Building (Pacific First Federal Saving Bank)
1400 Fourth Avenue

*52. Cobb Medical-Dental Arts Building
1305 Fourth Avenue

*53. Old National Bank
1119 Fourth Avenue

*54. Y.M.C.A. Buildings
Fourth Avenue, between Madison and Marion streets

*55. Leamington Hotel-Apartments (Pacific Hotel)
315-323 Marion Street

*56. Ben Bridge Jewelers Clock
409 Pike Street

*57. Carroll's Jewelers Clock
1427 Fourth Avenue

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Inventoried and Determined Not Eligible for the National Register

58. Hotel Rector (St. Charles Hotel)
619 Third Avenue

59. Grand Opera House (Cherry Street Parking Garage)
213 Cherry Street

60. McDowall Building (Jones Building)
1331 Third Avenue

61. Kress Store
211-215 Pike Street

62. F. W. Woolworth Store
301 Pike Street

63. The Bon Marche Department Store
1601 Third Avenue

64. Frederick & Nelson Department Store
Fifth Avenue and Pine Street

65. Roosevelt Hotel
Seventh Avenue and Pine Street

66. Pande Cameron Building
815 Pine Street

67. Hillcrest Hotel (Pacific Plaza Hotel)
400 Spring Street

68. Hong Kong and Shanghai Banking Corporation Clock
705 Third AVenue

69. University Building (Walker Building)
Second Avenue and University Street

70. Marion Building
818 Second Avenue

71. 1110 Fourth Avenue Building
1110 Fourth Avenue

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Not on Project Alignment
No Determination Made

72. Savoy Hotel
1214 Second Avenue

73. Zedick Clock
1529 Fourth Avenue

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Demolished for Other Projects

74. United Pacific (Leary Building)
1000 second Avenue

75. Hippodrome (Majestic Theatre)
1012 Second Avenue

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APPENDIX K

METRO COUNCIL PREFERRED ALTERNATIVE RESOLUTION

Exhibit A of Metro Council Resolution No. 4243 describes the preferred alternative for the Downtown Seattle Transit Project:

1. Electric-only Transit Tunnel

   An electric-only transit tunnel is to be constructed under the following conditions:

   a. Pine Street and Third Avenue will be the preferred alignment.

   b. Minimum of five stations, with consideration given to additional stations and precise station location and configuration as part of the preliminary engineering work.

   c. Underground construction methods determined during preliminary engineering to be cost-effective and minimum disruption to downtown activity.

   d. Fully convertible to rail transit.

   e. Fully accessible to the elderly and handicapped.

   f. No construction activity shall take place until the Metro Council finds, by formal action, that dual-power technology is a viable, workable technology; or alternatively, that the Metro Council accepts a different electric technology.

   g. Sensitive to urban design. Design should utilize elements that are unique to the Seattle area, provide connections to buildings adjacent to stations and take advantage of grade differentials for access to station areas.

   h. Engineering work shall proceed immediately to determine if there is a fatal flaw with the Third Avenue alignment with respect to its crossing the Burlington Northern Railroad tunnel. Based on the findings of this work, if the Third Avenue alignment is not feasible, the Metro Council shall determine whether Fourth Avenue or another alignment should be the preferred north-south alignment before additional engineering work is undertaken.

2. Circulation System

   An adequate electric downtown Seattle internal circulation system shall be made an integral part of the regional transit system. Prior to adoption of a final environmental impact statement, the Metro Council shall adopt an agreement with the City of Seattle defining a base and long-range circulation system and appropriate mechanism by which

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service beyond the base system will be added. The following elements shall be considered as part of the base system:

a. An off-peak Third Avenue and Pine Street independent circulator route.

b. A peak period First Hill (Boren Avenue) independent circulator route.

c. A restructuring of existing trolley routes 10 and 12 to improve First Avenue to First Hill east-west service.

d. Waterfront Streetcar extension.

e. Improved signage and rider information for better internal circulation, particularly from the Central Business District to the Denny Regrade.

3. Surface Improvements

Improvements to streets and sidewalks on Pine and Third Avenue to facilitate surface-level transit service and improvements to assure adequate pedestrian access to the electric tunnel shall be made integral elements of the regional transit system. Metro and the City of Seattle shall work together to define specific improvements to be included in the project prior to the adoption by Metro Council of a final environmental impact statement.

4. Construction Mitigation

During preliminary engineering, appropriate actions will be identified to facilitate transit operations and general traffic movement during tunnel construction. Such actions will be considered temporary and will be discontinued upon project completion.

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APPENDIX L

PUBLIC PARTICIPATION

The Downtown Seattle Transit Project EIS is part of a long and detailed planning and project development process which began with identifying the CBD as the priority area. This process occurred during MetroTRANSITion, the multi-year, systemwide planning effort conducted in the mid-1970s that produced a broad, 10-year capital and operating plan for the entire Metro system. During MetroTRANSITion Phase IV, the Downtown Transit Advisory Committee recommended that Metro and the City of Seattle immediately implement a mid-range downtown Seattle transit project and pursue longer-range solutions through an UMTA-sponsored alternatives analysis. The Metro Council adopted a specific and affordable mid-range 1990 capital plan that included a reduced-scale, mid-range downtown Seattle transit project. To this end Metro and the City of Seattle are jointly pursuing a mid-range solution to regional and downtown transit problems through the UMTA-sponsored Downtown Seattle Transit Project.

Three advisory groups helped develop, define and screen the possible alternatives. The Downtown Advisory Committee was composed of citizens concerned about urban issues and the various downtown districts, including neighborhoods and the retail core. The Policy Advisory Committee was composed of locally elected officials, citizens and members of the downtown Seattle business community. The Technical Advisory Committee included more than a dozen technical staff from federal, state, regional and local agencies to ensure interagency coordination. The state Department of Transportation, Puget Sound Council of Governments, King County and others have also participated.

At the same time, the Puget Sound Council of Governments and Metro are examining longer-range transit solutions in the Multi-corridor Project. That study is focusing on long-term regional system but also includes solutions for the downtown area.

Role Of The Scoping Process In Refining The Alternatives

On Dec. 14, 1981, Metro, the City of Seattle and UMTA sponsored two scoping meetings to hear from citizens and organizations on the range of alternatives and issues to be considered in the Downtown Seattle Transit Project draft EIS. More than 50 individuals representing over 15 organizations attended these meetings. In addition, two refinements were made in the project scope. In both instances the proposed changes and request for comments were disseminated to all participants in the scoping meetings and to an extensive list of individuals and organizations interested in the Downtown Seattle Transit Project.

The following table identifies the major issues raised during the scoping process and describes how the project was refined to respond to these concerns.

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ACTIONS TAKEN IN THE DOWNTOWN SEATTLE TRANSIT PROJECT AS A RESULT OF THE SCOPING PROCESS

ISSUED RAISED	RESULT
Transfers in transit centers	1. Transfer impact sensitivity analysis was included in project work program. 2. When results shown to council, Close-in transit centers, then tunnel were added to alternatives. 3. Tunnel chosen as preferred alternative partly as result of transfer impact on riders.
Hardship of transit center transfers on wheelchair users	1. Transit center designs modified to reduce level changes required. 2. Operations analysis conducted to determine impact on peak-period high volume bus operations.
Large expenditure of funds	1. TSM alternatives were included and cost-effectiveness analysis done to present long-term, cost-effectiveness data to public and decision makers.
Incompatibility of transit centers with long-term solutions	1. Transit centers were designed to function as much as possible as stations on future guideway system, but analysis showed them to be largely redundant if a guideway system is built. 2. Ultimately, the council's introduction of the Tunnel alternative and its selection as preferred alternative was based partly on this concern and the ability of the tunnel to compliment any future long-term solution.

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ACTIONS TAKEN IN THE DOWNTOWN SEATTLE TRANSIT PROJECT AS A RESULT OF THE SCOPING PROCESS

ISSUED RAISED	RESULT
Advocated LRT system	1. LRT was not introduced into the project as an alternative because the adopted Comprehensive Transit Plan called for an all-bus system in the 1980s. 2. All alternatives were designed to be compatible with future guideway systems such as LRT, with varying degrees of resulting redundancy. 3. When North Corridor Alternatives Analysis began, the two projects were coordinated at staff and policy levels to ensure compatibility.
Diesel fumes and noise	1. Several all-electric bus mall alternatives and thorough detailed analysis of the air quality and noise impacts of all alternatives were included.
Advocate low-cost diesel-bus mall	1. Two diesel-bus mall options and one diesel-bus contraflow lane option are included in this analysis.
International District opposed transit center at Union Station	1. While Union Station was not dropped as a transit center location, other locations were examined and land-use impacts were strongly weighed in the decision-making process.
Coordinate Washington State DOT I-90 connection	1. This coordination was accomplished with Airport Way designated as the informal boundary between the two projects and a series of meeting to ensure compatibility of time and design.

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ACTIONS TAKEN IN THE DOWNTOWN SEATTLE TRANSIT PROJECT AS A RESULT OF THE SCOPING PROCESS

ISSUED RAISED	RESULT
	2. The appropriate extensions for the I-90 busway north of Airport Way were defined to be part of all Downtown Seattle Transit Project action alternatives.
Funding might not be available for both long-range and short-range solutions	2. Partly as a result of this analysis, the Metro Council authorized inclusion in this study of a Tunnel alternative, previously considered only as future longer-range alternative.

Comments Received on the Draft EIS

The draft EIS public comment and review process was the culmination of Metro's initial planning and studying of the alternatives for the Downtown Seattle Transit Project. This was only one of the aspects of public participation in the Downtown Seattle Transit Project's development and design.

Publication of the draft EIS was announced in the Federal Register on March 23, 1984. During the week of March 19, notices (encompassing the official "Notice of Intent to Hold Public Hearings") appeared in metropolitan, community and ethnic newspapers serving the Puget Sound region. These notices included the time, date and place of the public hearing on April 25, 1984 and notified the public of the availability of the draft EIS.

By the close of the public hearings, approximately 225 copies of the draft EIS had been distributed.

Nineteen letters commenting on the draft EIS were received from public officials and governments agencies and 25 letters were received from private individuals and organizations. Over 40 persons attended the public hearing. Transcripts of the testimony were prepared by court reporters and are available at Metro.

Although most people limited themselves to simple statements of support or opposition to the project, some raised particular issues or concerns. Chapter 8 identifies the speakers and responds to issues identified in letters and public testimony.

Contacts with Civic Organizations

To initiate and maintain public awareness of the Downtown Seattle Transit Project, meetings have been held with numerous civic and community organizations, such as chambers of commerce, professional groups, preservation and development organizations,

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historic districts, ethnic organizations, property owner associations, design commissions, arts groups, etc.

These organizations indicated that they want to be kept informed of its progress until final design decisions are made and the necessary funding committed. Some have expressed their support of the project with formal resolutions.

Contacts with Business and Commercial Interests

The private sector has been contacted through the Seattle Chamber of Commerce, the Downtown Seattle Association, and other business organizations. Individual property owners, developers and merchants have also been directly contacted. These organizations and individuals have been thoroughly briefed on the current status and the projected development of the project. The organization and individuals have identified their priorities to the Downtown Seattle Transit Project staff.

Contacts with Government Staffs and Elected Officials

Metro staff has continued to provide updated information and briefings to federal, state and local elected officials interested or involved in the eventual decisions on this project. These include city council members, county council members, state legislators and U.S. congressional representatives. Elected officials and/or their representatives also have attended public hearings.

Coordination with the Media

Several information briefings have been held with media representatives to ensure accurate media coverage of the project. Regional newspapers and electronic media have been regularly contacted. The media has provided continuous coverage since the preferred alternative was adopted November 1983.

Public Information and Communication

Metro has provided information to the Central Business District and the metropolitan community.

Metro has published and distributed a newsletter on the Downtown Seattle Transit Project since 1981. The newsletter provides current information on the project. Between 3,000 to 4,000 copies of each issue are mailed to governmental agencies, civic and service organizations, businesses and the public.

Project updates, covering one or two subjects, are also issued when needed. A news release is issued to radio stations, and newspapers in the Seattle-King County area for each major development.

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APPENDIX M

RELOCATION ASSISTANCE

Metro also has adopted policies to guide implementation of its relocation services. These policies are published and available from Metro.

The nearly 50 individuals interviewed to prepare this Relocation Program Plan received copies of Metro's Relocation Services brochure and the name of someone to contact if they have questions. In addition to the information presented in this Plan, more detailed, personal data that was collected has been given to Metro to assist them in implementation of the relocation program.

Following is an outline of the steps involved in implementing the relocation program:

1. Metro will establish a Relocation Office (probably within its own downtown administrative offices) where personnel will concentrate on the relocation needs of the residents and businesses displaced by this project;

2. Metro will either hire a consultant or assign sufficient fulltime staff to work only on this relocation program;

3. When the first offer is made to purchase property, Metro relocation agents will:

    a. contact the eligible people and advise them of the availability of and procedures for obtaining assistance and payments;

    b. through direct, personal interviews, determine each individuals' specific relocation needs;

    c. assist residents who are eligible in applying for subsidized housing;

    d. if necessary and appropriate, assist residents in entering an appropriate treatment program so they can qualify as handicapped for subsidized housing;

    e. provide current and continuing information on the availability, prices, and location of comparable rental housing units and commercial properties.

    f. assure that, within a reasonable period of time prior to displacement, there will be available comparable decent, safe, and sanitary replacement housing, meeting approved standards, and equal in number to the number of, and available to eligible people who will be displaced;

    h. assist any eligible person displaced from a business in obtaining and becoming established in a suitable replacement location;

    i. supply to eligible displaced persons information concerning Federal and local housing programs, programs administered by the Small Business Administration and other Federal, State or local programs offering assistance to displaced people (Metro has been give brochures on several programs that were discovered during the course of developing this report);

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j. provide other advisory services to eligible persons, such as counseling and referrals with regard to housing, financing, employment training, health, welfare, and other assistance in order to minimize hardships;

k. assist each eligible person in completing any required application and forms;

4. Metro will inform all people who are expected to be displaced about the eviction policies to be pursued in carrying out the project;

5. Metro will insure adequate inspection of all relocation housing resources utilized by displaced people prior to and subsequent to occupancy by such people;

6. Metro will provide any services required to ensure that the relocation process does not result in different or separate treatment on account of race, color, religion, national origin, sex, or source of income;

7. Metro will establish and maintain a formal grievance procedures for use by displaced people seeking administrative review of agency determinations in connection with relocation payments and/or the adequacy of replacement housing.

In addition to Metro's services, displaced businesses may be eligible for assistance from Small Business Administrative (SBA) programs. The 503 Program provides long-term, below market-rate loans for fixed assets (eg. purchasing a building or equipment). The 7A Program provides loan guarantees for leasehold improvements and allows the payments to be stretched out for 5-7 years. Metro agents will advise affected businesses of these programs. Metro personnel and the City of Seattle's Department of Community Development can also provide technical assistance in applying for these and appropriate private loans.

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APPENDIX N

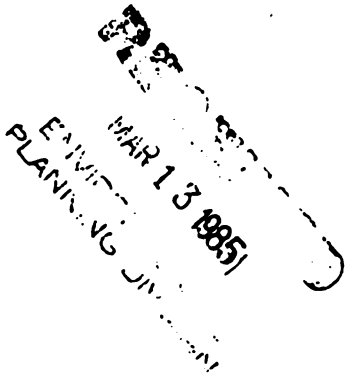
WSDOT

JOHN SPELLMAN
Governor

DUANE BERENTSON
Secretary

STATE OF WASHINGTON
DEPARTMENT OF TRANSPORTATION
Office of District Administrator • KF-01, 6431 Corson Ave So., C-8141 0 • Seattle, Washington 98108

March 5, 1985



Mr. Eric Hansen
Environmental Planning Division
Municipality of Metropolitan Seattle
821 Second Avenue
Seattle, WA 98104

Dear Mr. Hansen:

I am writing to consent to your request of December 28, 1984 for us to be a cooperating agency on the Downtown Seattle Transit Project EIS. As a cooperating agency we will want to see that the project's impacts on WSDOT right-of-way and state highway traffic is addressed in the EIS to a level that will meet our future environmental documentation requirements with respect to the project. To meet these needs please work with Jerry Schutz of my staff.

I hope that this arrangement will prove mutually beneficial. On future projects where we may cooperate I hope that we can begin the cooperating process at the time of environmental scoping.

Sincerely,

M. D. TRANUM, P.E.
Public Trans. & Planning Engineer

MDT:le

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