4. HOV DIRECT ACCESS

This chapter discusses the process and findings for each of the separate HOV direct access studies undertaken for the Puget Sound HOV Pre-Design Studies project, as well as the HOV direct access analysis conducted as part of the *SR 5: Mounts Road Interchange to Port of Tacoma Road Interchange HOV Project* for the WSDOT Olympic Region. More detail on all of these efforts can be found in the respective reports prepared for each of the studies.

Except for segments on I-405 and SR 520, HOV lanes in the Puget Sound Region are typically located on the inside. Inside HOV lanes are more desirable for longer distance carpool and transit travel, but their location requires buses and other HOVs entering or exiting the freeway from right-side ramps to weave across multiple lanes in order to do so. It is expected that all regional freeway HOV lanes will ultimately be located on the inside in the future.

The HOV Pre-Design studies examined the need for HOV direct access or other special treatments to access regional HOV lanes. HOV direct access ramps are ramps that connect directly into an HOV lane, avoiding the need for vehicles to cross traffic to get into and out of the lane. Examples of direct access ramps include the "drop ramp," where the ramps "drop" down from the middle of an overpass; and the "T-ramp," a separate bridge that passes over one side of the freeway to get to the median, then drops down to meet the HOV lane.

A flyer stop—a place where buses can get out of traffic, pick up and drop off passengers, then return to the HOV lane with little delay—is another type of direct access. Since buses do not have to leave the freeway with these facilities, they allow a transit service that functions somewhere between light rail and traditional express bus service (see "Riding the HOV Expressway" below). The design analysis studies summarized below examined direct access to inside HOV lanes in a defined corridor or corridors.

4.1. STUDY PROCESS

The project was divided into two phases. During Phase I, eleven separate "tasks" examined access needs in specific corridors, design alternatives at specific interchanges, and other specific questions. The results of each of these Phase I tasks were presented in a 16 page edition of the project newsletter, titled the "Digest," in May 1995. The steps of the study process are depicted in the flow chart in Figure 4-1.

Each of the tasks examining direct access needs used a three-step process outlined in the *Methodology Report*, April, 1994. First, a "universe" of alternatives was developed to consider all potential locations for direct access ramps. The second step reduced this "universe" to a manageable number by screening out flawed locations. Finally, the remaining alternatives were subject to an evaluation of "measures of effectiveness," and a recommended set of facilities was chosen. Each task advisory group was involved in all of these steps.

Phase II put all the pieces together and evaluated them as a complete system. For each of the projects recommended during Phase I, the cost and travel time benefits were recalculated and revised. Another "measures of effectiveness" evaluation was used to determine which projects would add the most to a complete HOV system, and which should be built first.

To narrow down the variety of alternatives, "Measures of Effectiveness" (MOEs) were used to evaluate and screen the direct access alternatives, HOV Lanes and the freeway-to-freeway connection alternatives. The MOEs were broadly defined at the initial screening during Phase I and defined in more detail during Phase II.

The primary MOEs used in the final analyses measured travel time savings for transit and carpools with three or more persons, as well as cost and cost-effectiveness. Detailed analysis quantified these values and they were then represented with simplified bullets to aid in presentation and comprehension. A qualitative assessment was made of the benefit to implementing regional transit service and to improving the operation of the freeway system.

4.2. ALTERNATIVES CONSIDERED

4.2.1. Pierce County

Direct access and flyer stop locations were analyzed throughout the I-5 corridor in Pierce County as part of the *SR 5: Mounts Road Interchange to Port of Tacoma Road Interchange HOV Project* conducted for the WSDOT Olympic Region. The evaluation process and results were combined with locations in King and Snohomish Counties and documented in *HOV Direct Access Recommendations,* March 1995. Initial locations for potential application were identified through meetings with Pierce Transit and WSDOT, Olympic Region, as follows:

Direct Access

- Fort Lewis Interchange
- SR 512 Interchange (Union Street Overpass)
- S. 84th Street Interchange
- S. 48th Street Overpass

- SR 16 Interchange
- Tacoma Dome "D" Street Overpass
- Tacoma Dome Flyover to Existing Park-and-Ride Lot
- Tacoma Dome Tunnel Option

Flyer Stops

- Mounts Road Interchange
- DuPont Interchange

- Fort Lewis Interchange
- SR 512 Interchange (Union Street Overpass)
- S. 48th Street Overpass

The following alternatives were eliminated during preliminary screening:

- S. 84th Street Interchange Direct Access
- SR 16 Interchange Direct Access
- DuPont Interchange Flyer Stop
- Fort Lewis Interchange Flyer Stop
- SR 512 Interchange (Union Street Overpass) Flyer Stop
- S. 48th Street Overpass Flyer Stop

The remaining alternatives were evaluated on a variety of measures of effectiveness, resulting in an overall recommended priority rating for future implementation of high, medium, or low. The results of this analysis are shown in Table 4-1.

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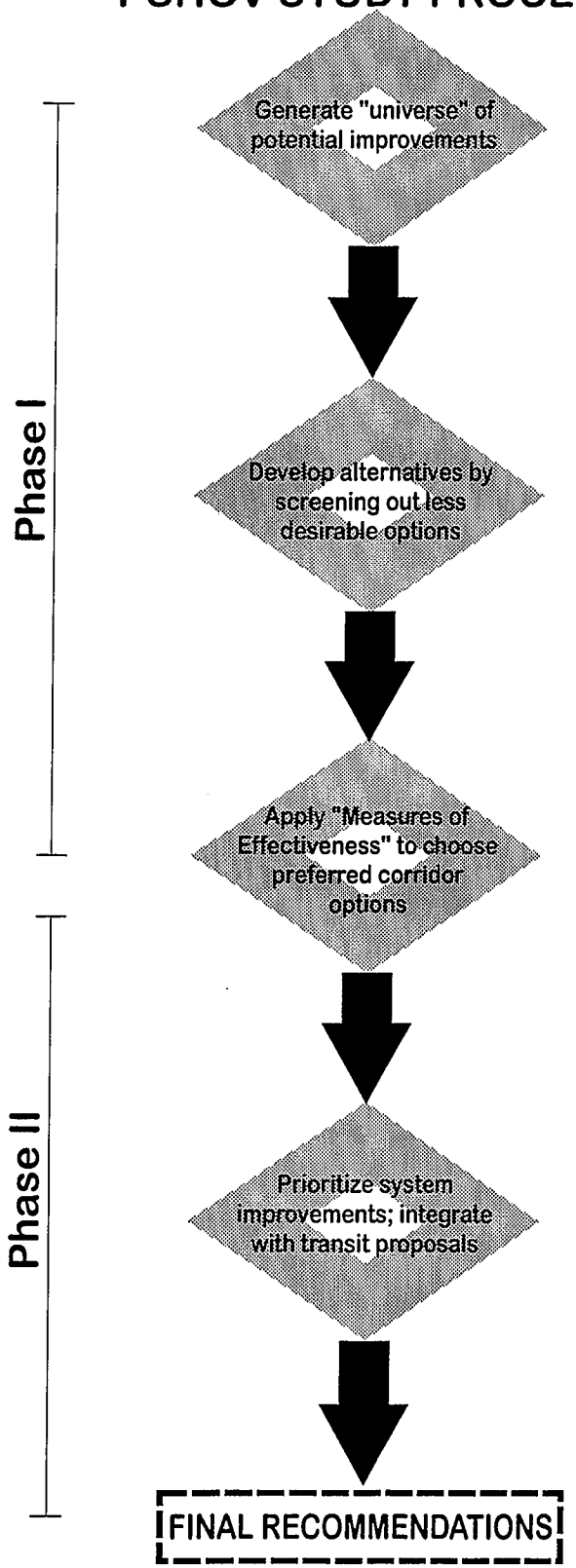

Project Flow Chart
Puget Sound HOV Pre-Design Studies
Final Report
FIGURE 4-1

Table 4-1
Summary Evaluation of Pierce County HOV Direct Access Alternatives

Direct HOV Access Alternative	Primary MOEs												Other MOEs												RECOMMENDED
	3+ HOV Travel Time Savings	Transit Travel Time Savings	3+ HOV Accessibility	Transit System Connectivity	Transit System Operations	Cost	Cost Effectiveness	Impact on General Purpose Operations	Safety	Potential Legal Concerns	Local Agency Support	Potential for Public Controversy	HOV Travel Time Reliability	Mode Shift Inducement	Person Throughput	Constructability	Human/Neighborhood Impacts	Land Use Patterns	Enforceability	Aesthetics	Energy Consumption	Air Quality Impacts	Noise Impacts	Water Quality Impacts	
Fort Lewis	◑	◑	◔	◑	◕	◕	◕	◔	◔	◑	◑	◕	◑	◑	◑	◔	◑	◑	◕	◑	◑	◑	◑	◑	
SR 512 (Union Ave.)	◑	◕	◑	●	◐	◔	◕	●	◕	●	●	◕	●	◕	◕	◔	◕	◕	◑	◔	◕	◕	◑	◔	✓
S 48th Street	◕	◕	◑	●	◐	◑	◕	◕	◑	◕	◕	◑	●	◕	◕	◔	◕	●	◑	◔	◕	◕	◑	◔	✓
Tacoma Dome "D" Street (pedestrian bridge only)	◑	◕	◕	●	◕	◑	◕	◑	◑	◑	◑	◔	◕	◕	◑	◔	◕	◕	◑	◔	◑	◑	◑	◔	**
Tacoma Dome "D" Street (with parking garage)	◑	◕	◕	●	◕	○*	○*	◑	◑	◑	◑	◔	◕	◕	◑	◔	◕	◕	◑	◔	◑	◑	◑	◔	**
Tacoma Dome Flyover Ramp	◔	◕	◔	●	◐	◑	◕	◕	◕	○	◔	◕	●	◕	◕	○	◑	◕	●	◔	◕	◕	◑	◔	
Tacoma Dome Tunnel	◔	◕	◔	●	◐	○	○	◕	◕	◔	◕	◑	●	◕	◕	○	◑	◕	●	◑	◕	◕	◑	◑	✓

Legend

Least Effective ◄——► Most Effective

○ ◔ ◑ ◕ ●

*Cost, Cost Effectiveness, and the Overall Rating for the Tacoma Dome "D" Street with Parking Garage Alternative may rate higher if additional funding sources for the parking garage become available to help reduce the cost to WSDOT. This analysis also does not capture any potential value which would be gained through the provision of additional parking spaces at this location.

**These options would only be considered if the Tunnel Option at "G" Street was deemed infeasible through more detailed future studies.

The direct access options at the Tacoma Dome (tunnel option), SR 512 and South 48th Street received the highest priority rating of all alternatives in the study area. These alternatives would provide high transit travel time savings and reliability, benefit transit system connectivity and operations, and have high cost effectiveness. These alternatives directly serve existing park-and-ride lots, providing convenient access for both transit and carpools.

If the Tacoma Dome Tunnel option were to prove not feasible with further study, then the Tacoma Dome "D" Street Overpass location should be considered. It would also provide benefits in transit system connectivity, HOV accessibility, travel time savings and reliability, mode shift inducement, cost effectiveness, low human/neighborhood impacts, and fit well into existing land use patterns.

SR 512 INTERCHANGE (UNION AVENUE OVERPASS)

This alternative would provide direct access for carpools and buses using the Lakewood park-and-ride lot located southwest of the SR 512 interchange, as well as the Lakewood vicinity. Access would be provided through the use of drop ramps to and from the proposed northbound and southbound SR 5 HOV lanes from the Union Avenue overpass. The alternative would require the construction of a new signal on Union Avenue to accommodate the left-hand turning movements to and from the HOV ramps.

Features

- Provides direct access for carpools and buses using the Lakewood park-and-ride lot located southwest of the SR 512 interchange, as well as the Lakewood vicinity.
- New signal on Union Avenue to accommodate the left-hand turning movements to and from the HOV ramps.
- Cost: $25.65 million.

Trade-Offs and Considerations

- Profiles of direct access ramps need to be thoroughly checked in order to confirm that they can be constructed with enough clearance under adjacent structures.

Phase II Refinements and Final Recommendations

- Recommended

S 48TH STREET OVERPASS

This alternative would provide direct access for carpools destined for the Tacoma Mall or nearby residential areas and for buses serving the Tacoma Mall Transit Center located on S 48th Street adjacent to the entrance of the mall. Access would be provided through the use of drop ramps connecting the proposed northbound and southbound SR 5 HOV lanes with the S 48th Street overpass. This area of SR 5 does not have a median; the proposed direct access would require the widening of SR 5 to accommodate the drop ramps and merging areas. This alternative would require the construction of a new signal on S 48th Street to accommodate the left-hand turns to and from the HOV ramps.

Features

- Provides direct access for carpools destined for the Tacoma Mall or nearby residential areas and for buses serving the Tacoma Mall Transit Center located on S 48th Street adjacent to the entrance of the mall.
- New signal on S 48th Street to accommodate the left-hand turns to and from the HOV ramps.
- Cost: $13.33 million.

Trade-Offs and Considerations

- This area of SR 5 does not have a median, the proposed direct access would require the widening of SR 5 to accommodate the drop ramps and merging areas.

Phase II Refinements and Final Recommendations

- Recommended

FORT LEWIS

This alternative would provide direct access for carpools and buses using the proposed HOV lanes, as well as access for a proposed major park-and-ride and shuttle bus/transit center adjacent to the southwest area of the interchange which is being investigated by the Fort. Direct access ramps at this location are not warranted without the construction of these new facilities; however, this alternative would become a high priority recommendation with the development and effective utilization of these facilities. Access would be provided through the use of drop ramps to the Division Drive underpass serving proposed HOV lanes to the north. Access would only be provided to and from the north since the SR 5 HOV lane will end at the DuPont interchange, one exit south of the Fort Lewis interchange. The alternative would require the construction of a new signal on Division Drive to accommodate the movements to and from the HOV ramps.

Features

- Provides direct access for carpools buses destined for a potential major park-and-ride and shuttle bus/transit center adjacent to the southwest area of the interchange which is being investigated by the Fort.
- Cost: $ 7.35 million.

Trade-Offs and Considerations

- Direct access ramps at this location are not warranted without the construction of the proposed major park-and-ride and shuttle bus/transit center.

Phase II Refinements and Final Recommendations

- Not recommended

TACOMA DOME

The preferred alternative for this interchange was the tunnel option which would connect the inside HOV lane with the Tacoma Dome are and the Pierce Transit Intermodal center via a tunnel from SR 5 to "G" Street. This option was relatively expensive ($31 million) and the funding availability was uncertain. As a result, a second concept which would provide direct

access to the Tacoma Dome via "D" Street was chosen as an alternate. A description for both alternatives is provided below.

Tunnel Option: In the tunnel option, access to the Tacoma Dome park-and-ride facility and the proposed multi-modal station for buses and carpools would be provided through the use of a tunnel connecting the proposed northbound and southbound SR 5 HOV lanes to the Tacoma Dome area. The tunnel would have portals located in the median of SR 5 between the "L" and "D" Street overpasses and north of the Tacoma Dome parking area connecting to "G" Street.

Features

- Provides access to the Tacoma Dome park-and-ride facility and the proposed multi-modal station for buses and carpools.
- The tunnel would have portals located in the median of SR 5 between the "L" and "D" Street overpasses and north of the Tacoma Dome parking area connecting to "G" Street.
- Cost: $35.00 million.

Trade-Offs and Considerations

- Potential right-of-way impacts to Wiley Avenue and the Tacoma Dome parking lot need to be thoroughly investigated.

Phase II Refinements and Final Recommendations

- Recommended pending further engineering studies.

"D" Street with Pedestrian Bridge Option: This alternative would provide direct access for carpools and buses using the Tacoma Dome park-and-ride facility as well as the proposed Pierce Transit Tacoma Dome multimodal station. Access would be provided through the use of drop ramps connecting the proposed northbound and southbound SR 5 HOV lanes with the McKinley/"D" Street overpass. A new signal would be required on "D" Street to accommodate the movements to and from the HOV ramps. In order to mitigate concerns regarding the pedestrian and vehicular traffic conflicts during Tacoma Dome events, a pair of pedestrian bridges connecting the parking lots west of the Dome to the main entrance are also included.

Features

- Provides direct access for carpools and buses using the Tacoma Dome park-and-ride facility as well as the proposed Pierce Transit Tacoma Dome multimodal station.
- New signal on "D" Street to accommodate the movements to and from the HOV ramps.
- In order to mitigate concerns regarding the pedestrian and vehicular traffic conflicts during Tacoma Dome events, a pair of pedestrian bridges connecting the parking lots west of the Dome to the main entrance are also included.
- Cost: $11 to $13 million.

Trade-Offs and Considerations

- Provides a relatively indirect route to the proposed Tacoma Dome Multi-modal station, although it is still significantly more direct than using Portland Avenue or SR 705 general purpose interchanges.

- This alternative would only be recommended if the tunnel option to "G" Street was determined infeasible in future studies.

4.2.2. South King County

This section includes results for the I-5 corridor between the Pierce/King County line and downtown Seattle in King County. The process for developing and evaluating access alternatives in this study area included both specific locations and system-level corridor analysis. Stakeholders were a key element in the development and evaluation of alternatives throughout the project. Additionally, informal one-on-one meetings were held with the City of Tukwila and the City of Federal Way. Five working papers were prepared, as follows:

- *Working Paper #1* outlined the existing conditions.
- *Working Paper #2* identified a "universe of options" for direct access locations, as well as concepts for new HOV routes within the study area.
- *Working Paper #3* reviewed future no-build conditions and provided an initial fatal flaw screening.
- *Working Paper #4* applied qualitative MOEs to the remaining alternatives. The corridor was separated into two segments, each serving different functions. The area to the north of SR 516 was identified as primarily delivering and distributing HOVs into and out of the Seattle CBD; the evaluation of this area focused on the efficiency of the corridor to deliver transit and HOVs into the CBD. A primary focus of direct access in this segment was on connections between I-5 and the E-3 busway. This facility currently extends from the downtown bus tunnel south to Spokane Street along 5th Avenue. The area to the south of SR 516 was identified primarily as a transit and HOV collection system; the evaluation focused on selection of direct access locations.
- *Working Paper #5* provided a final quantitative screening and preliminary prioritization of alternatives.

A summary of the *Final Task Report* is provided below; the reader is referred to the finalized document, *South King County to Seattle Corridor HOV Study, Task Report,* CH2M Hill, Bellevue, WA, May 1995, for further detail.

DEVELOPMENT AND EVALUATION OF ALTERNATIVES

A wide range of improvement alternatives were developed to examine direct access HOV treatments in the corridor. From this "universe" of possible alternatives, successive steps of evaluation were conducted to advance the feasible and most cost-effective direct-access treatments.

Within the realm of potential direct-access improvements, two broad classes of alternatives were identified in the South King County Corridor. These were corridor concept alternatives and locational alternative concepts. Corridor concept alternatives are generally defined as HOV operations and routing throughout the corridor that may consist of segments of HOV lanes with

several HOV access improvements. A locational alternative is defined as an HOV access solution for a specific location.

CORRIDOR CONCEPTS

Working Papers 2 and 3 described potential HOV treatments to several routes as alternatives to or in addition to HOV lanes on I-5. The South King County corridor was further delineated into north and south sections, with the south section serving as a collection system and the north section as a distribution system. In the south section of the corridor, I-5 currently provides the only significant HOV facility for transit and HOVs traveling north and south through the study area. Median HOV lanes are either currently opened to traffic or planned for the entire length of I-5 in the study area. Transit service utilizing the HOV lanes is provided by Metro and Pierce Transit, with either express bus service to and from downtown Seattle (then continuing as local service), or with routes that get on and off several closely spaced interchanges.

In the north section, there are several limited access and arterial options for serving as routes for distribution of trips to downtown Seattle. One route, currently under study, is SR 509 with extensions to I-5 south of Sea-Tac Airport. This route would serve as a logical alternate to I-5, since it is underutilized and the northern section would provide direct access to downtown. Alternatives for various extensions of SR 509 were evaluated. The opportunity to connect transit trips to the E-3 Busway extension was the impetus for creating several corridor concepts. The corridor concepts to connect to the E-3 Busway and serve the north portion of the corridor were also developed into the following categories for alignments:

- SR 509 Alignments
- SR 599/SR 99 Alignments
- Arterial Street Alignments
- New Non-arterial Alignments

Evaluation of these corridor concepts was twofold–first, to compare competing routes within the four categories, and secondly, to compare alignment categories with each other in the north portion of the study area.

Screening of Corridor Concept Alternatives

A number of corridor concept alternatives were initially developed for each of the four alignment categories. Examples of corridor concepts for the SR 509 alignment ranged from use of existing arterials for HOV access connections from I-5 to the existing SR 509 terminus at S. 188th Street, to use of SR 509 extension alternative alignments as either HOV or transit-only facilities. SR 599/SR 99 alternatives varied by degree of HOV preferential treatment (i.e., from mixed flow operations to additional lanes and direct access). Arterial street alignments from I-5 to the E-3 Busway included such alternatives as East Marginal Way, Airport Way, Industrial Way, as well as others. New non-arterial alignments included the "Transitway" alignment that was considered by Metro in the regional transit planning process.

In the screening process, the competing concepts for the four alignments were first evaluated against one another to judge their adequacy in serving as connections to the E-3 Busway. An abbreviated list of MOEs was used to perform this first screening consisting of:

- Transit accessibility
- Carpool accessibility
- Impact on General Purpose Operation
- Safety
- Cost
- Catchment Area Serviceability

Next, the four alignment categories were compared using the following MOEs:

- Transit Accessibility
- Carpool Accessibility
- Cost Effectiveness
- Safety

This screening for corridor concepts resulted in the conclusion that the SR 509 extension alignment operated as a transit-only facility and the I-5 to E-3 Busway arterial alignment should be evaluated further. The results of this work are documented in Working Paper 4.

Evaluation of Corridor Concept Alternative

Measures of effectiveness for the detailed evaluation were selected from the numerous MOEs provided in the *Methodology Report*, April 1994. For the South King County Corridor, MOEs were selected to apply to the locational alternatives and for the corridor concepts. Some MOEs were evaluated with quantifiable MOEs and others are being reviewed qualitatively, using available information and data, e.g., for the environmental sensitivity MOE, sensitive areas and environmental documents were reviewed; however, the MOE rating is based on a qualitative rating.

Results of Corridor Concept Evaluation

The corridor concept that relies upon I-5 access to the E-3 Busway using an arterial street alignment was selected. This concept was found to provide more effective direct transit access (i.e., shorter transit distance) at much lower cost and with lesser environmental impacts.

The SR 509 corridor concepts were also rejected because the cost of the alternative was significantly higher than I-5 corridor concepts ($20 to $80 million higher), and did not result in significant time savings or other transportation benefits, relative to the cost to construct approximately 3 miles of two transit-only lanes from I-5 to existing SR 509 at S 188th Street. The relative priority of this concept alternative probably would change if it is combined with or included in an SR 509 extension project currently under investigation in the SR 509/South Access Road Study/EIS.

LOCATIONAL ALTERNATIVES

Locational alternatives, as the definitions suggest, are direct access HOV options that serve a particular location within the study corridor. Locational alternatives were identified throughout the corridor, from the vicinity of SR 18 in the south to the West Seattle Freeway in the north. Approximately 60 different alternatives were identified, located both at the vicinity of existing freeway interchanges and also where no freeway access is currently provided. Working Paper 4 provides a list of all of the alternatives and treatments considered throughout the study.

A universe of alternatives was developed to cover as broad a base as possible of potential projects. Each locational alternative was subject to refinement during evaluation.

Screening of Locational Alternatives

Three evaluation steps were applied to screen and prioritize the long list of locational alternatives: fatal-flaw screening, first-level MOE evaluation, and second-level MOE evaluation. The fatal-flaw screening and first-level MOE evaluation were used to reduce the number of alternatives down to a limited number for the detailed second-level MOE evaluation.

Initially, the locational alternatives were evaluated for fatal flaws. An abbreviated listing of MOEs was used to evaluate for fatal flaws. It included geometric feasibility, functional adequacy, safety, public acceptability, and financial viability. If a locational alternative was found to have a fatal flaw for any one of the criteria, the alternative was dropped. A summary of the fatal flaw screening is provided in Working Paper 3.

Subsequent to the fatal flaw screening, alternatives were subjected to a first-level MOE evaluation using an expanded list of qualitative criteria. The MOEs used for the first-level MOE evaluation are listed below:

- Transit Accessibility
- Carpool Accessibility
- Impact on General Purpose Operation
- Safety
- Cost
- Catchment Area Serviceability

The results of the first-level MOE evaluation are documented in Working Paper 4. As a result of the first-level MOE evaluation, the number of locational alternatives was screened down to 17 for more detailed evaluation.

Evaluation of Locational Alternatives

For the second-level MOE evaluation, several quantitative MOEs were introduced to provide more detailed information concerning travel time savings and project construction costs. Additional qualitative evaluation criteria also were applied at this level. The second-level MOE evaluation also provided the basis for recommending alternatives for further design development and for preparing priorities for project advancement.

The surviving alternatives were developed to a scale and level of detail that would allow estimating quantities for cost estimating and to verify that the alternatives could be implemented. Alternatives were overlaid on aerial photographs to provide a perspective of adjacent development and to further ensure design feasibility. These refined alternatives are provided in Working Paper 5 for the surviving alternatives. Uniform cost estimates were prepared using a cost estimating procedure that is consistent between all Pre-Design study tasks.

Costs for the I-5 corridor concepts assumed that the cost of I-5 median HOV lanes was already funded. Costs for the SR 509 corridor only included the costs for extension of two transit-only lanes to I-5 and connection to the E-3 Busway. The cost of south access to the airport was not

considered as part of the corridor; however, the designs prepared as part of these working papers demonstrated that this access could be achieved.

Results of Locational Alternatives Evaluation

MOEs were applied to the locational alternatives in the south portion of the corridor. Based upon the second-level MOE evaluation, the highest priority HOV treatments are generally those that provide direct access to existing park-and-ride lots in the South King County Corridor. Provision of direct access to I-5 median HOV lanes in these areas is consistent with existing transit operations and therefore provides travel time savings to transit patrons. The direct access designs (rather than in-line transit access) would also allow carpool access and travel time savings to carpool occupants. An additional shortcoming of alternatives based upon in-line access within the I-5 median was the longer pedestrian walking distances that are inherently required. Another general finding was that locational alternatives located where I-5 interchanges do not currently exist (e.g., at S. 288th Street), often were not compatible with adjacent land uses and the street system, and had smaller HOV/transit markets in the vicinity of the potential access treatment. Some alternatives rated lower because of insufficient width of the existing I-5 median in the vicinity of the potential access treatment. Lack of median width has a dramatic affect on the construction costs because of the requirement to widen/realign I-5 mainline lanes to accommodate HOV access ramps into the median. Regarding transit access between I-5 and the E-3 Busway, the final analysis indicated that the length of access connection, compatibility with adjacent land uses and potential to share/use existing roadways were important factors in identifying the best access solution. A summary of alternatives recommended for further consideration and alternatives considered and rejected is provided below.

PHASE I ALTERNATIVES CONSIDERED AND REJECTED

Alternatives evaluated for south King County but not carried forward for consideration in Phase II are described below:

Access at I-5 / S. 348th Street (Alternatives 2 and 3)

This alternative did not serve a substantial HOV market. The direct access connection (Alternative 2) was significantly more expensive than other alternatives and did not provide a significant benefit.

Access at I-5 / S. 312th Street (Alternative 20)

This alternative would require indirect and circuitous transit routing through Federal Way to and from the Federal Way park-and-ride lot. Recent input from the City of Federal Way staff indicated that the city no longer favored this solution.

Access at I-5 / S. 304th Street (Alternative 22)

This alternative only works with median access and was not favored by the City of Federal Way. The location of the alternative, within a high density residential area may not have significant public support and would be expensive in comparison to the modest market served.

Access at I-5 / S. 288th Street (Alternatives 24 and 25)

This alternative is also located within a high density residential area but may have some public opposition. The alternatives, particularly for median access are expensive and not cost effective.

In-Line and Park-and-Ride Access at I-5 / SR 516 (Alternative 47)

This alternative was rejected because it required longer pedestrian access distances to transit, it did not accommodate carpool access and would have potential impacts on general purpose traffic operations on SR 516 due to close intersection spacing.

Access at I-5 / S. 178th Street (Alternatives 69 and 71)

This alternative was designed with in-line transit only. This location would require re-routing of transit service to be effective. This location may also have some public opposition.

Interurban Avenue Queue Jump (Alternative 78)

This alternative did not serve a significant adjacent market, however it serves as a significant transit connection between the Kent Valley and I-5.

Lander Street (Alternative 90) and the Transitway Alignment (Alternative 81)

These alternatives were more expensive and would have greater impacts on adjacent properties.

ALTERNATIVES CARRIED FORWARD FOR PHASE II EVALUATION

The following locational alternatives were recommended for further evaluation in Phase II due to their ability to enhance HOV access in the south King County Corridor:

S 320TH STREET

This alternative provides an elevated "Texas-T" interchange with I-5 providing connections to the Federal Way Park-and-Ride, possibly extended to S 324th Street to connect SR 99 with I-5.

Features

- Requires realignment of southbound lanes.
- Transit can avoid the congested 320th Street corridor.
- Cost: $23.7 million.

Trade-Offs and Considerations

- Serves a heavily used park-and-ride which is proposed for expansion.
- Serves a strong employment and population market; Federal Way has been designated as an urban center.
- Alternative is not affected by the proposed SR 509 extension.
- Extension of rail may result in relocation of this park-and-ride lot.

Phase II Refinements and Final Recommendations

- Recommended.

S 272ND STREET

This alternative provides an elevated "Texas-T" interchange with I-5 providing connections to the Star Lake Park-and-Ride.

Features

- Requires realignment of southbound lanes.
- Cost: $27.0 million.

Trade-Offs and Considerations

- Park-and-Ride lot heavily utilized by commuters to Seattle CBD.
- Catchment includes north Federal Way and unincorporated areas of south King County.
- Park-and-Ride is proposed for expansion.
- This access is needed if direct carpool access is not provided within the City of Federal Way.
- SR 509 extension may eliminate the need for this alternative.

Phase II Refinements and Final Recommendations

- Since this ramp is not needed to operate the currently proposed regional transit service, it does not rate as high as the S 320th Street ramp and is not recommended for early implementation. If the Star Lake Park-and-Ride lot is expanded, then the priority for this ramp would increase. Access ramps are recommended to and from both the north and south. However, if service to this lot is not paired with service to the Federal Way lot and regional bus routes do not utilize it, then access would be recommended to and from the north only.

SR 516 AT I-5

This alternative consists of drop ramps from the I-5 overpass to a new at-grade signalized intersection with SR 516 / Kent-Des Moines Road S.

Features

- Requires realignment of northbound lanes.
- Realignment of northbound off- and on-ramps from new signalized intersection on Military Road S.
- Link from new northbound ramps to the Kent-Des Moines Park-and-Ride lot.
- Cost: $24.4 million.

Trade-Offs and Considerations

- Medium priority rating.
- Serves travel markets in the immediate Des Moines area and cross-valley commuters.
- General traffic flow along Ken-Des Moines Road S will be disrupted by new intersection.

Phase II Refinements and Final Recommendations

- Recommended.

E-3 BUSWAY

This alternative provides for transit-only fly-over ramps to / from the south to S Industrial Way, providing direct access to / from the E-3 Busway. The E-3 facility currently extends from the downtown bus tunnel south to Spokane Street along 5th Avenue.

Features

- Requires realignment of southbound lanes.
- Extension of the E-3 Busway along 5th Avenue from Spokane Street to S Industrial Way.
- Reconstruction of S Industrial Way to provide two GP lanes and two transit lanes.
- Fly-over ramps extended to pass over Airport Way S.. Requires realignment of northbound lanes.
- Cost: $46.1 million.

Trade-Offs and Considerations

- This alternative ranked the highest of all alternatives connecting to the E-3 Busway.
- Reconstruction of Industrial Way will require coordination with regard to the high-voltage transmission towers along this street, as well as with the railroad along 5th Avenue.
- This alternative has a relatively high construction cost but would provide significant benefits in the form of travel time savings for CBD access to and from the south.

Phase II Refinements and Final Recommendations

- Recommended.

4.2.3. East King County

This section includes a summary of the HOV direct access evaluations for the I-405 corridor and the I-90 corridors.

As outlined in the *Methodology Report*, April, 1994, the first step in the I-405 corridor study was to identify a "universe of options." These options were derived largely from an interagency workshop and resulted in 25 alternatives, as documented in *Working Paper #1.* Two levels of fatal flaw screening were applied to the 25 alternatives, the results of which were documented in *Working Paper #2.* Two levels of MOE screening were then applied, the first level of which was a qualitative screening, documented in *Working Paper #3.* The next step consisted of a quantitative MOE screening of the remaining 18 alternatives, documented in *Working Paper #4,* the result of which was six areas recommended for further study with several areas having more than one alternative. These areas were reduced further to reach the five finalized locations recommended in *I-405 Corridor HOV Access Study, Final Task Report,* David Evans and Associates, May 1995. Stakeholder involvement was present throughout the study through a series of meetings and working paper reviews.

The five general areas in the I-405 corridor considered for direct access improvements were the following:

- Southcenter / Tukwila
- Renton
- Newcastle
- Bellevue
- Kirkland

A description of alternatives considered by area follows.

SOUTHCENTER / TUKWILA AREA: I-405

There is no existing transit service at this location; providing such would be in line with Metro's proposed emphasis on service to activity centers. Selection of one of these two Southcenter alternatives would increase the market served for this location. The following two alternatives were selected for this area.

1. **Southcenter:** This alternative includes elevated in-line flyer stops for both directions between I-5 and SR 181, plus supporting improvements.

   #### *Features*

   - Cost: $18.2 million.

   #### *Trade-Offs and Considerations*

   - Ranked high for social measures due to location in a commercial area.
   - Ranked low for transportation impacts or environmental issues due to smaller work-trip market.

   #### *Phase II Refinements and Final Recommendations*

   - Only one of the two locations in this area is likely to be implemented. This location is recommended contingent upon establishment of transit service that would utilize it, such as a regional transit route from Bellevue or Renton to Sea-Tac. If an RTA commuter rail station is located at SR 181, then that location would be preferred over the Southcenter location.

2. **SR 181 / Interurban:** This alternative includes elevated in-line flyer stops for both directions at SR 181, plus supporting improvements.

   #### *Features*

   - This location would serve the Boeing Longacres facility along with Southcenter, as well as the proposed intermodal facility or commuter rail.
   - Cost: $ 17.9 million.

   #### *Trade-Offs and Considerations*

   - King County has identified SR 181 as an HOV corridor, and HOV priority ramps are already proposed as part of the current I-405 / SR 181 interchange reconstruction.
   - Some environmental and transportation impacts were not positive, again due to the low market served.

   #### *Phase II Refinements and Final Recommendations*

   - Only one of the two locations in this area is likely to be implemented. This location is recommended contingent upon establishment of an RTA commuter rail station at SR 181 and the implementation of transit service that would utilize it as well, such as a regional transit route from Bellevue or Renton to Sea-Tac.

RENTON AREA: I-405

In Phase I of the study, the following three alternatives were selected for this area.

1. **Talbot Road or Benson Road / Grady Way:** This alternative includes drop ramps to the Talbot Road underpass to and from the south / west, or drop ramps for full access to a depressed single point intersection underneath the I-405 median, from there crossing under the southbound lanes to exit onto Benson Road near its intersection with Grady Way, plus supporting improvements.

   Features

   - Serves the Renton CBD and Soos Creek Plateau area.
   - Cost: $30.9 million.

   Trade-Offs and Considerations

   - King County and the City of Renton have identified SR 167, SR 515, and Benson Road as corridors for HOV improvements.
   - This alternative had positive transportation impacts primarily due to the low cost, and might face construction difficulties.
   - Transportation benefits, environmental issues, and social measures were not significantly positive.

   Phase II Refinements and Final Recommendations

   - Recommended.

2. **Park Avenue / SR 900:** This alternative includes drop ramps from I-405 to the SR 900 underpass for full access (with priority to / from the north), plus supporting improvements.

   Features

   - Serves the proposed Houser Way extension, the Renton CBD, and Maple Valley.
   - Cost: $32.4 million.

   Trade-Offs and Considerations

   - King County and the City of Renton have identified SR 900 as a corridor for HOV improvements; however, the City of Renton considers access to the Boeing Longacres facility as higher priority than access to SR 900.
   - This alternative scored well under transportation measures due to the market served and significant travel time savings.
   - Transportation impacts were slightly negative due to high cost and constructibility.
   - Social measures and transportation benefits were only slightly positive.

   Phase II Refinements and Final Recommendations

   - Recommended.

3. **Lind Avenue:** This alternative provides direct access to and from the south on I-405.

Features

- Could potentially serve carpools and vanpools destined for the Boeing Longacres facility.
- Cost: $20.3 million.

Trade-Offs and Considerations

- Would conflict with freeway-to-freeway connections at SR 167/I-405.
- Limited transit market and potentially limited carpool market results in a low ranking in transit and HOV travel time savings and cost-effectiveness.

Phase II Refinements and Final Recommendations

- Not recommended due to low anticipated travel time savings benefits as compared to other Renton alternatives.

RENTON AREA: SR-167

An additional location, SR 167 at SW 27th, was investigated with three potential direct access options as part of the Phase II study.

In particular, the Phase II effort investigated the background conditions and developed alternatives to provide direct HOV access between SR 167 and the Renton Valley area. It also reviewed the right-of-way needs, constructability, and cost estimates for each alternative. The focus of the study was on connections between SR 167 and SW 27th Street. This minor arterial is currently proposed by the City of Renton Transit Plan as the main transit distribution corridor, and will connect to the city's commercial and neighborhood centers. A summary of the final report is provided below; the reader is referred to the finalized document, *Direct Access Analysis: SR 167 at SW 27th Street, Technical Memorandum,* CH2M Hill, Bellevue, WA, November 1995 for further detail.

Several locational alternatives were developed to examine HOV direct access treatments between SR 167 and SW 27th Street. These alternatives were developed in consideration of the findings and recommendations presented in *Freeway-to-Freeway HOV Connections Study, Task Report* by ICF Kaiser (formerly Tudor Engineering Company). Also taken into consideration were traffic operational factors, physical constraints, current and future land uses, current and future HOV and transit facilities, improvements outlined in the City of Renton Comprehensive Plan, and adjacent jurisdiction Plans.

The intent of the locational alternatives was to eliminate or minimize delays experienced by HOV travelers. Three feasible locational alternatives were developed, as follows. All three alternatives are dependent upon direct access between SR 167 and I-405.

1. **SR 167 at SW 27th with Full Access:** This option provides direct access ramps from SW 27th Street up to an elevated Texas T interchange on SR-167, with full access to / from both directions.

Features

- Ramps touch down at the existing intersection of SW 27th Street and E Valley Road, which would be newly signalized.
- Cost: $26.1 million.

Trade-Offs and Considerations

- Realignment of northbound mainline lanes, potentially impacting the wetland and creek along the east side of the freeway. Further environmental assessment needed.
- Constraints exist with the distance between the SW 27th Street and I-405 interchanges along SR 167 if a freeway-to-freeway connection between SR 167 and I-405 is built. Barrier or buffer separation of HOV lanes would then be necessary to prevent weaving; these barriers would add another $3 million to the cost of this alternative.

Phase II Refinements and Final Recommendations

- Recommended, however if SR 167/I-405 freeway-to-freeway connections are built, then only I-405 traffic could enter and exit to and from the north.

2. **SR 167 at SW 27th with Access To/From the South Only:** This option provides fly-over ramps for access to / from the south only.

Features

- Ramps touch down at the existing intersection of SW 27th Street and E Valley Road, which would be newly signalized.
- Cost: $18.2 million.

Trade-Offs and Considerations

- HOV traffic to / from the north would have to use alternative routes.
- Realignment of northbound mainline lanes, potentially impacting the wetland and creek along the east side of the freeway. Further environmental assessment needed.

Phase II Refinements and Final Recommendations

- Not recommended.

3. **SR 167 at SW 27th with Access To/From the South with Ramp Extension:** This option provides fly-over ramps for access to / from the south, with ramps continuing over the East Valley Road / SW 27th Street intersection.

Features

- Ramps touch down to the west of the existing intersection of SW 27th Street and E Valley Road.
- SW 27th Street would be widened to five lanes for HOV lanes between E Valley Road and Lind Avenue SW.
- Cost: $23.1 million.

Trade-Offs and Considerations

- This alternative provides additional ramp storage capacities, improves grades, and reduces intersection delays.

- HOV traffic to / from the north would have to use alternative routes.
- Realignment of northbound mainline lanes, potentially impacting the wetland and creek along the east side of the freeway. Further environmental assessment needed.

Phase II Refinements and Final Recommendations

- Not recommended.

NEWCASTLE AREA: I-405

The following location within the Newcastle area was identified for direct access consideration.

112th Avenue: Elevated ramps for full access to the 112th Avenue overpass to a single point signalized intersection over the I-405 median, or elevated in-line flyer stops for both directions, plus supporting improvements, to primarily serve the Newport Park-and-Ride.

Features

- Freeway access is the only feasible way to offer transit service to this park-and-ride lot due to the inability of surrounding local streets to accommodate transit.
- Direct access or an in-line transit stop here is considered important for moving the HOV lane to the center on I-405 in this area.
- HOV queue by-pass at the Coal Creek interchange for the northbound ramps is also to be provided if no freeway-to-freeway HOV connections are built between I-405 and I-90.
- Cost: $25.4 million.

Trade-Offs and Considerations

- This alternative scored relatively low compared to other corridor alternatives, but was selected due to its adjacent location to the park-and-ride and consideration for moving the right side HOV lane to the left side.

Phase II Refinements and Final Recommendations

- An in-line transit station is recommended for this location.

BELLEVUE AREA: I-405

The following integrated alternative was identified for providing direct access to and from the Bellevue central business district (CBD) area:

Bellevue CBD (Option #2): This integrated alternative includes fly-over ramps to provide access to a continuous I-405 future inside HOV lane through Bellevue and a direct inside transit connection to a newly dedicated transit corridor along 114th Avenue NE to and from the south, plus supporting improvements. For north access, drop ramps would tunnel beneath the I-405 southbound lanes and tie directly into the 114th corridor. For south access, a ramp would connect the south end of downtown Bellevue to future I-405 inside HOV lanes to and from the south. It would leave the HOV lanes south of SE 8th Street and fly over the interchange, landing on 114th Street, which is an uncongested frontage road allowing a fast trip to NE 6th Street and the Bellevue Transit Center. If the Wilburton Park-and-Ride lot at SE 8th Street is ever expanded, a transit stop could be provided there as well.

Features

- Both directions significantly contribute to the effectiveness of the regional transit system by providing access to the Bellevue transit center.
- Both directions are rated high in terms of carpool travel time savings as well
- Cost: north access: $66.0 million.
  south access: $41.9 million

Trade-Offs and Considerations

- The north half of the alternative is contingent upon removal of the NE 8th Street ramps on the west side of the freeway.
- CBD access issues must be coordinated with the freeway-to-freeway HOV connections between I-405 and I-90, as well as between the Bellevue CBD and SR 520.
- This alternative lends itself to north / south construction phasing.
- This alternative was the highest cost for this area, but was selected due to a strong market and positive environmental and social measures.

Phase II Refinements and Final Recommendations

- This alternative is recommended. It is noted, however, that the City of Bellevue is working on an alternative concept to provide HOV access at NE 6th Street. If shown to be feasible, that alternative would be preferred due to lower costs.

KIRKLAND AREA: I-405

The access improvement selected for this area must address transfer needs between local and freeway services. Three alternatives that serve dense markets were selected for this area. A fourth alternative, which was re-evaluated as part of the study's Phase II effort, is also presented; however, it is not recommended.

1. **NE 70th Street:** This alternative provides direct access with a transit passenger station to and from both the north and south.

Features

- Elevated ramps for full access to the NE 70th Street overpass as well as elevated in-line flyer stops for both directions, plus supporting improvements, to serve the Houston Park-and-Ride and downtown Kirkland.
- Cost: $ 33.9 million.

Trade-Offs and Considerations

- Interchange vicinity residents are very sensitive to this alternative, and will need to be addressed should this alternative go forward.

Phase II Refinements and Final Recommendations

- This alternative is recommended.

2. **NE 132nd Street:** This alternative includes direct access with a transit passenger station to and from both the north and south.

Features

- Drop ramps to the NE 132nd Street underpass for full access to a depressed single point signalized intersection underneath the I-405 median and / or in-line flyer stops for both directions to serve the Kingsgate Park-and-Ride, plus supporting improvements.
- Cost: $ 24.0 million.

Trade-Offs and Considerations

- The Kingsgate Park-and-Ride is heavily used and forecasted for continued high demand due to transfer activity. Pedestrian access would have to be addressed for the flyer stop option.
- This alternative has no known significant negative environmental or social impacts, and significant transportation benefits.

Phase II Refinements and Final Recommendations

- This alternative is recommended.

3. **NE 160th Street:** This alternative provides direct access to and from the south.

Features

- An elevated Texas-T interchange which touches down on NE 160th Street just south of the Brickyard Park-and-Ride, plus supporting improvements.
- Cost: $26.7 million.

Trade-Offs and Considerations

- There are no known negative environmental or social impacts.
- Due to the elevations involved, a tunnel "T-ramp" connection option should be considered in the design phase at this location.
- While this ramp received a high evaluation, it is not recommended for early implementation — Metro's 6-year plan routes these buses to use NE 132nd, serving both park-and-ride lots, and that approach may prove adequate in the short run.

Phase II Refinements and Final Recommendations

- Although this alternative is recommended, it is not recommended for early implementation.

4. **SR 527/SE 228th Street:** This alternative would provide direct access connections between I-405 and SE 228th to and from both the north and south.

Features

- Depressed inside ramps creating an HOV only interchange at SE 228th Street with provision of a direct link to the existing Bothell Park-and-Ride II via a new frontage road.
- Cost: $35.9 million

Trade-Offs and Considerations

- This alternative has a relatively high cost and low accessibility ratings for both carpools and transit (i.e., it serves a fairly light market for HOVs).

- The preliminary priority ranking for this alternative in the initial Phase I evaluation was low.
- This alternative was dropped following the final Phase I evaluation.

Phase II Refinements and Final Recommendations

- This alternative was reconsidered in Phase II after being dropped in Phase I in order to consider options which were well spaced throughout the corridor. However, following the Phase II evaluation this alternative is still not recommended due to its high cost and relatively low benefits.

RELEVANT ISSUES

The following issues may still have a bearing on HOV direct access implementation in the I-405 corridor.

- A decision to build one or more freeway-to-freeway HOV connections will affect recommendations for HOV direct access locations along the I-405 corridor, particularly for the Renton, Bellevue, and Newcastle areas.
- A recommendation for an HOV direct access location in Bothell is contingent upon the outcome of campus planning at the University of Washington / Bothell and Cascadia Community College.
- The Bellevue recommendation is contingent upon completion of the NE 8th / 10th Street couplet and related interchange improvements, which is currently unfunded.
- The ongoing I-405 Multimodal Corridor Study will examine different long-term options for this corridor.

EASTGATE AREA: I-90

The purpose of this study was to determine how to provide direct access between the I-90 HOV lanes and the Eastgate Park-and-Ride lot. The study process involved an examination of existing transportation conditions, development of possible alternative direct access configurations, preliminary and then detailed screening of the alternatives, evaluation of the remaining alternatives, and then selection of a preferred alternative. A summary is provided below; the reader is referred to the finalized document, *I-90 Corridor: Eastgate Park-and-Ride Direct Access, Draft Final Task Report,* Parsons Brinckerhoff, May 1995, for further detail.

Nine original alternatives at eight separate locations were identified between the 128th Avenue SE / Richards Road and the 148th / 150th Avenue SE interchanges for the preliminary fatal flaw screening. Preliminary screening was based on financial viability, geometric feasibility, functional adequacy, safety, and public acceptability. Seventeen MOEs were then applied to the remaining six alternatives, with transit travel time savings receiving the highest consideration, and cost and cost-effectiveness receiving the next highest considerations.

Following the Phase II evaluation, it was determined that one of two design options are possible: either a T-ramp can be constructed to meet 141st Street at the west end of the park-and-ride lot, or drop ramps can be constructed from the existing 142nd Street overpass, which is high above the east end of the park-and-ride lot. In addition, two in-line flyer stops are also recommended on the west side of the interchange. This alternative is expected to provide substantial benefits regardless of the service concept provided by Metro.

Features

- High travel time savings.
- Above-average cost effectiveness.
- Provides service for both transit and carpools.
- Improves access to both the Eastgate Park-and-Ride and Bellevue Community College.
- Cost: $28.9 million.

Trade-Offs and Considerations

- Alternatives can be staged with pedestrian access to the flyer stops as a first step.
- Providing transit signal priority along the current arterial transit routing (Eastgate Way and SE 36th Street) would also provide travel time savings for the first stage.
- King County / Metro is considering expansion of the Eastgate Park-and-Ride, possibly by constructing a second level structure over the existing lot. This would result in a reduced distance for the ramp to touch down in the park-and-ride.

Phase II Refinements and Final Recommendations

- Carry the two design options forward and determine final selection at the *Design Report* stage.

4.2.4. North King County

Two separate studies produced results for this corridor—the "I-5/NE 145th Street Study" conducted as part of Phase II, and the "Central Seattle HOV Corridor Study" conducted in Phase I with follow-up work in Phase II.

I-5 AT NE 145TH STREET

This study investigated the preliminary design options and analysis for direct access alternatives to and from the south at NE 145th Street on I-5. A workshop was held with agency participation to examine a first generation of alternatives, resulting in two viable alternatives developed for this location. Metro's future transit network based on the Six-Year Transit Development Plan was considered in the process. MOEs emphasizing travel time savings and costs were applied; the remaining MOEs were qualitatively evaluated through an in-house workshop with the design team.

A comparison of MOE ratings for the two alternatives did not disclose a significant difference in the areas of transportation benefits or environmental and social measures. The preferred alternative was chosen due to significantly lower cost, and providing greater travel time savings. A summary of this alternative is provided here; the reader is referred to *I-5 at NE 145th Street, Final Technical Memorandum,* David Evans and Associates, Bellevue, WA, January 15, 1996 for further detail.

The recommended alternative consists of elevated ramps to and from the south intersecting at a new signalized intersection on the NE 145th Street overpass.

Features

- New bridge structure with transit stops.

- Relocation of the northbound off-ramp to 5th Avenue NE to just north of the NE 130th Street overcrossing to allow for mainline widening.
- Removal of existing Jackson Park Park-and-Ride lot; new park-and-ride to be constructed just to the east, shortening the existing pedestrian access distance.
- Removal of transit-only ramps to and from the south.
- Transit vehicles to and from the north will use GP ramps.
- Cost: $8.8 million.

Trade-Offs and Considerations

- Transit routes on NE 145th will provide local and commuter service to and from communities along SR 522 north of NE 145th Street.
- Access to and from the north should be developed as the region's employment centers develop, along with a Lynnwood to Seattle trunk route.

CENTRAL SEATTLE HOV CORRIDOR ACCESS CONCEPTS

The central Seattle corridor is defined as the area between Northgate and the downtown CBD, including the University District.

Four working papers were prepared during the course of this study, describing existing conditions, the alternatives development process, the feasibility screening process, and the alternative evaluation process. Corridor stakeholders assisted in all these activities, participating in a series of workshops and providing comments and input into the alternatives development, screening, and evaluation processes.

A "universe" of alternatives were screened for fatal flaws. A second level of screening was then applied, focusing on geometric feasibility. Alternatives were divided into corridor concepts and access alternatives; four corridor concepts and four direct access alternatives were then evaluated against MOEs. A summary of these alternatives is provided here; the reader is referred to *Central Seattle HOV Corridor, Task Report,* HNTB, Bellevue WA, May 1995, for further detail.

The following three alternatives were assessed in detail during the Phase I evaluation.

1. **NE 40th / 42nd Street Transit Ramp:** This alternative provides a reversible, off-peak direction transit ramp between NE 40th Street and the express lanes at NE 42nd Street, with a reversible barrier-separated, transit-only contraflow lane on the express lanes to Stewart Street.

Features

- Bridge widening and replacement of shoulder paving.
- Extensive modifications to structures and ramps at the Mercer Street interchange.
- Cost: $22.2 million.

Trade-Offs and Considerations

- Existing transit service between the University district and the CBD is some of the region's highest patronage.

- Primary benefits are for travel time savings to transit patrons. Would not be necessary if the rail between downtown Seattle and the University District is implemented; however, the ramp might be useful as an interim measure.
- Most significant impact is reduction in number of peak-direction reversible express lanes.
- This alternative requires a tight, low-speed, 180° turn on the ramp to thread through existing bridge piers. Possible mitigation includes relocation of piers in conjunction with a seismic retrofit project, or use of 5th Avenue NE as an alternative to the transit-only ramp.
- This alternative would preclude implementation of the #3 corridor alternative above—barrier-separated southbound HOV lane—due to the resulting lack of acceleration and merging distances.

Phase II Refinements and Final Recommendations

- Maintain as a potential recommendation in conjunction with the SB PM peak contraflow lane concept, from the University District to the Seattle CBD.

2. **NE 47th Street Texas-T Interchange:** This alternative includes an elevated Texas-T interchange above the median at NE 47th Street, providing access to / from the north, south, and east. A reversible, off-peak direction transit ramp to / from the south, and a reversible, peak-direction transit ramp to / from the north via the express lanes are also provided, along with a barrier-separated transit-only lane between Stewart and NE 47th Streets.

Features

- Reconstruction of northbound I-5 mainline on-ramp at NE 45th Street and the off-ramp at NE 50th Street.
- Modifications to 7th Avenue NE between NE 45th and NE 50th Streets.
- Bridge widening and replacement of shoulder paving.
- Extensive modifications to structures and ramps at the Mercer Street interchange.
- Cost: $33.0 million.

Trade-Offs and Considerations

- This alternative is only recommended in the event that neither the 40th / 42nd Street Transit Ramp alternative or rail between the University District and the Seattle CBD are implemented.
- Significant works remains with regard to impacts on adjacent neighborhoods and public acceptance.

Phase II Refinements and Final Recommendations

- Not recommended. To be considered only if neither the 40th / 42nd Street Transit Ramp alternative nor rail between the University District and the Seattle CBD are implemented.

3. **NE 50th Street HOV Ramp:** A northbound direct access on-ramp to the express lanes from the NE 50th Street overpass, reversible to southbound off-ramp usage concurrent with peak direction flow.

Features

- Widening of the NE 50th Street overpass.
- Cost: $6.0 million.

Trade-Offs and Considerations

- Provides access to the express lanes for traffic between the University District and Northgate.
- Travel time savings up to six minutes.
- Increase in person-throughput on the express lanes during northbound operations.
- Primary beneficiaries will be Community Transit express routes which serve the University district.
- Requires more analysis of negative impacts to traffic operations on NE 50th Street, and possibility of signalization of the new intersection.
- Would also require re-evaluation of University District transit routes.
- Alternative would not be necessary if rail service is extended to Northgate.

Phase II Refinements and Final Recommendations

- Recommended.

4.2.5. Snohomish County

The area for this study included 16 miles of I-5 from the King / Snohomish County Line to SR 2 in Everett, as well as three miles of SR 525 between I-5 and SR 99. Three working papers were prepared and distributed for review by the Stakeholder Committee. Comments on the papers were incorporated into the process and are reflected in the recommendations.

The existing conditions were presented in *Working Paper #1.* Candidate locations for direct access were initially provided by the study performed for the Community Transit Arterial System HOV Study. New HOV-only access points were developed and coordinated with proposed arterial HOV improvements. Other locations were added based on the existing and future conditions assessment, for a total of 16 possible locations along I-5 and one location on SR 525. An initial fatal flaw screening was performed in a workshop format, resulting in the following six sub-area locations, and presented in *Working Paper #2*:

1. Mountlake Terrace
2. Lynnwood
3. Alderwood Mall
4. 164th Street SW on I-5
5. 164th Street SW on SR 525
6. 112th Street SW and 128th Street SE

Conceptual design layouts were then developed for each of the alternatives within the six sub-areas, and reviewed by the Stakeholders Committee, further eliminating several alternatives. The remaining six alternatives were given a detailed evaluation and screened against Measures

of Effectiveness (MOEs), as presented in *Working Paper #3,* and then finally ranked as a high, medium, or low priority options for direct access. These options were further reviewed in Phase II, resulting in further refined alternatives. A summary of the final refined recommendations is provided here; the reader is referred to *Snohomish County HOV Access Study, Final Draft Task Report,* Parsons Brinckerhoff, Seattle WA, April 1995, for further detail on Phase I results.

Due to high population and employment forecasts for this area, the travel time savings resulting from these recommendations are expected to be substantial. Continued jurisdictional involvement and supportive policy changes are recommended for successful implementation of any of these alternatives. The alternatives in this study were developed with the assumption that transit operations in the study area would be bus-oriented rather than rail-oriented; should light rail be extended to Snohomish County, reassessment of the recommendations would become necessary.

SE 112TH STREET AT I-5

This alternative includes elevated ramps to and from the south to the SE 112th Street overpass.

Features

- New signalized intersection on bridge.
- Bridge widening.
- Cost: $2.9M * (without detention pond)[3]
  $5.7M * (with detention pond)

Trade-Offs and Considerations

- High travel time savings and cost-effectiveness (lower estimate).
- Would attract HOVs away from the Airport Road / 128th Street SE corridor, which already has a significant investment in terms of HOV priority treatments.
- Possible neighborhood opposition.
- Would work well with a new park-and-ride facility in the I-5 median just north of this location. New park-and-ride not included in estimate.
- Construction will need to avoid the Silver Lake Stream, as well as a detention pond proposed by WSDOT in this location.

Phase II Refinements and Final Recommendations

Further meetings were held with Snohomish County stakeholders during Phase II, resulting in a consensus that direct HOV access at 128th Street SE should be a priority over direct access at 112th Street SE for the following reasons:

- Access at 128th is consistent with the Snohomish County Comprehensive Plan.
- With arterial HOV lanes on 128th / Airport Road, this is already an HOV emphasis corridor.
- Two major park-and-ride lots exist adjacent to the 128th I-5 interchange.
- The 128th interchange vicinity is designated as an urban center, which is consistent with providing enhanced transit facilities.

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[3] Costs marked with an asterisk are Phase I costs before Phase II refinement; costs without an asterisk are Phase II refinements.

- Concern exists over the additional levels of traffic which would be attracted to 112th Street SE with provision of HOV direct access.
- Direct access facilities at 112th would not directly serve any park-and-ride facility.
- An initial benefit of the 112th Street SE option was its low cost; however, with the addition of having to provide a structure over a proposed detention pond and additional widening on the overpass for turning channelization and radii, refined cost estimates at this location become comparable to those at 128th Street SE.

As a result of the Phase II evaluation, direct access at 112th Street SE was no longer recommended; however, subsequent to Phase II, a Regional Transit Authority (RTA) plan was developed which includes direct HOV access and a park-and-ride lot at 112th Street SE at the request of the City of Everett. Under this plan, no direct HOV access would be provided at 128th Street SE.

128TH STREET SE

This alternative connects the 128th Street SE overpass to I-5 with ramps to and from the south.

Features

- New signalized intersection on bridge.
- Would connect to the existing HOV lanes on 128th Street / Airport Road as well as to two adjacent park-and-ride lots.
- Cost: $6.9 million.

Trade-Offs and Considerations

- Would need to be concurrent with interchange improvements, adding a westbound to southbound loop to remove the need for a left-turn from 128th Street to the I-5 on-ramp.

Phase II Refinements and Final Recommendations

- Recommended (Note that current RTA plans, developed subsequent to the Phase II evaluation, call for direct HOV access at 112th Street SE instead of at 128th Street SE).

52ND AVENUE W AT I-5, SINGLE RAMP

This alternative consists of a northbound off-ramp from I-5 down to the 52nd Avenue W underpass.

Features

- New signalized intersection on 52nd Avenue W.
- Addresses weaving problems for northbound transit headed toward the park-and-ride.
- Southbound transit continues to use ramp from the Lynnwood Park-and-Ride to the southbound on-ramp.
- Cost: $6.2 * million.

Trade-Offs and Considerations

- High cost.
- No bridge widening required.
- Would increase the amount of bus traffic on local streets as the buses travel along 52nd Avenue W to the park-and-ride lot.

Phase II Refinements and Final Recommendations

This option was dropped from further consideration as a result of further meetings held with Snohomish County stakeholders during Phase II. Strong community opposition to increased traffic on 52nd Avenue W is expected and was deemed a fatal flaw for this option.

52ND AVENUE W AT I-5, DOUBLE RAMPS

This alternative provides ramps down to the 52nd Avenue W underpass, to and from the south.

Features

- Bridge widening.
- New signalized intersection on 52nd Avenue W.
- Addresses weaving problems for northbound transit headed toward the park-and-ride.
- Cost: $8.2 * million.

Trade-Offs and Considerations

- Serves more HOV trips than previous option.
- High cost.

Phase II Refinements and Final Recommendations

This option was dropped from further consideration as a result of further meetings held with Snohomish County stakeholders during Phase II. Strong community opposition to increased traffic along 52nd Avenue W is expected and was deemed a fatal flaw for this option.

LYNNWOOD PARK-AND-RIDE LOT AT I-5

This alternative originally provided direct access ramps from Lynnwood Park-and-Ride lot, underneath the southbound I-5 mainline, to the inside HOV lanes, to and from the south only, or to and from both the north and south. Based on Phase II analyses, as noted below, it was determined that this connection should be made via flyover ramps rather than a tunnel.

Features

- Ramps could be restricted to transit-only, transit and vanpools only, or all HOVs.
- Ramps could be constructed to connect to and from the south only, or to and from both the north and south.
- Cost: $18.4 million (to and from south only).
  $29.4 million (to and from the north and south).

Trade-Offs and Considerations

- Large benefit to transit vehicles and travel time reliability.
- A configuration which accommodates non-transit HOVs as well is preferable for this location.
- Most expensive sub-area alternative.
- The option connecting to I-5 north and south would be preferred if a regional transit trunk service were to operate through the corridor. If transit service remains as is, then a connection to / from the south only would be preferred.
- Impacts on water quality from additional surface areas.

Phase II Refinements and Final Recommendations

Upon further review during Phase II, it was determined that the tunnel connection to I-5 had several disadvantages, including disruption of I-5 and southbound on-ramp traffic during construction, impacts to the existing wetland and stream, and the required relocation of an existing pump station. A flyover ramp option was developed which would avert and / or minimize these impacts. This flyover configuration is now the preferred option for this location. Cost estimates have been prepared for a configuration including ramp connections to and from both the north and south, as well as an option to and from the south only. The former option is desirable should a regional trunk route on I-5 be implemented with a primary transfer stop at the Lynnwood Park-and-Ride lot. The later option, to and from the south only, is recommended if transit service is to remain similar to current service. This option is recommended only if it can accommodate non-transit as well as transit HOVs.

44TH AVENUE W

This option was added during Phase II discussions with stakeholders. It would be coupled with direct access for transit into the Lynnwood Park-and-Ride lot from 44th Avenue just north of the southbound on-ramp, and would involve a new signalized intersection, with signal activation by transit only, at that location.

Phase II Refinements and Final Recommendations

- This option was not recommended due to the Lynnwood flyover ramp option having priority for this area.

ASH WAY PARK-AND-RIDE LOT AT I-5

This alternative provides fly-over ramps, connecting the inside HOV lanes to the proposed Ash Way park-and-ride lot.

Features

- The ramps could be either to and from the south only, or to and from both the north and south.
- Facility should be able to accommodate non-transit HOVs without significant impact to transit operations.
- Cost: $10.9 million (to / from the south only.
  $14.0 million (to / from the north and south).

Trade-Offs and Considerations

- Scored high in transit connectivity, impact to general purpose traffic, safety, agency support, and public acceptance.
- Lower scores in travel time savings, HOV accessibly, and cost effectiveness.
- The option connecting to I-5 north and south would be preferred if a regional transit trunk service were to operate through the corridor. If transit service remains as is, then a connection to / from the south only would be preferred.
- Direct access alternative at 164th Street SW would be expected to capture some of this market. Priority rating would increase if 164th Street SW facility not built and new park-and-ride well supported by transit service.

Phase II Refinements and Final Recommendations

- Recommended

164TH STREET SW / SWAMP CREEK PARK-AND-RIDE LOT AT SR 525

This alternative consists of a half-diamond HOV-only interchange with ramps to and from the south connecting the outside HOV lanes to 164th Street SW and the Swamp Creek Park-and-Ride lot. There is currently no interchange at this overpass.

Features

- New signalized intersection at northbound off-ramp. Possible signalization at southbound on-ramp / entrance to park-and-ride.
- Cost: $2.0 million.

Trade-Offs and Considerations

- This alternative is preferable whether SR 525 HOV lanes are on the outside or inside. Ramps would still be located on the outside even if HOV lanes were moved to the inside of SR 525, due to cost prohibitions.
- Low construction impacts.
- Low cost.
- Rated low on travel time savings and HOV accessibility due to small catchment area and the unlikelihood of direct freeway-to-freeway HOV connections between SR-525 and I-5.
- Benefits to HOVs dependent on enforcement of ramp restrictions.

Phase II Refinements and Final Recommendations

- Recommended

MOUNTLAKE TERRACE PARK-AND-RIDE LOT

For this alternative, an in-line transit stop would be provided on I-5 adjacent to the Mountlake Terrace Park-and-Ride lot, with a pedestrian bridge linkign it with the park-and-ride lot.

Features

- At-grade transit flyer stop in the I-5 median.
- Pedestrian overpass to park-and-ride with vertical transportation.
- Cost: $2.8 million.

Trade-Offs and Considerations

- Recommendation contingent upon concurrent recommendation of a regional I-5 bus route.

Phase II Refinements and Final Recommendations

- This option was developed and evaluated as part of Phase II.

4.3. HOV DIRECT ACCESS RECOMMENDATIONS

Direct access ramps and stations in the Puget Sound region were estimated to cost about $20 million on average to design and build. In most cases there is no more room for construction in the freeway median, and in many cases the freeway will need to be realigned, overpasses reconstructed, and existing ramps moved to provide room in the middle of an interchange to fit the new ramps. Phase II system evaluation summary results of the direct access alternatives are shown in Table 4-2. During Phase I of the project, all of the projects shown in the matrix survived a screening process and were recommended as a result of the initial evaluation. The majority of these were still recommended following the more refined Phase II evaluation.

The analysis presented some interesting challenges. For example, consider this *Catch-22*: the only technical basis to evaluate how well these projects will benefit transit service is to measure how they would affect existing or planned transit routes. However, current transit routes do not take advantage of direct access improvements, and transit agencies do not have firm plans beyond a six-year horizon. As a result, in many cases technical ratings alone do not reflect the potential benefits of direct access ramps to transit, and the collective judgment of the project team therefore became a critical factor in the recommendations.

The Central Puget Sound Regional Transit Authority (RTA) is proposing a set of regional express bus routes that would primarily use the HOV system. At the time of this study, it was premature to guess the specifics of these routes. Working with the RTA and transit agencies, the Pre-Design project has anticipated, as best as possible, which direct access proposals would have the greatest impact on the proposed RTA "HOV expressway" routes. As the RTA system proposal becomes more clearly defined, these proposals may require fine tuning.

Following Table 4-2 are brief descriptions, with both text and graphics, of the Phase II recommended HOV direct access systems. A map depicting the locations of these recommendations can be found on page 3 of the Summary Project Digest (see Chapter 2).

Table 4-2
Direct Access Evaluation Matrix

MOE RANKING

1 ○ Least Effective — 2 ◔ — 3 ◑ — 4 ◕ — 5 ● Most Effective

Location	Improvement Type	Travel Time Savings: Transit	Travel Time Savings: HOV	Cost: Cost ($ Mil)	Cost: Cost Effectiveness ($/Per-min Saved)	Facilitates Regional Transit Service	Safety	Land Use	Environmental	General System Enhancement	Recommended with Regional Bus	Recommended without Regional Bus	Cost ($ Millions)
Mountlake Terrace P&R	In Line Transit Stop NB & SB	○	○	●	○	◑	◔	◕	◑	◔	✓		$ 2.82
Lynnwood P&R access	Direct Access to/from South	●	●	◑	●	●	◕	●	◑	◑		✓	$ 18.36
Lynnwood P&R access	Direct Access, NB & SB										✓		$ 29.38
164th Street SW / SR 525	Interchange to/from South	◑	●	●	●	◑	◔	◕	◑	◑	✓	✓	$ 1.98
164th/ Ash Way P&R / I-5	Direct Access to/from South	◔	◑	◕	◑	◔	◕	◑	◑	◔		✓	$ 10.85
164th/ Ash Way P&R / I-5	Direct Access, NB & SB										✓		$ 14.02
I-5/SW 128th Street	Direct Access to/from South*	◔	●	●	●	◔	◔	●	◑	◑	✓	✓	$ 6.86
Between I-5 & SR 181(Southcenter)	in Line Transit Stop	◔	○	◕	○	◑	◔	●	○	◔	✓		$ 18.17
Lind Avenue	Direct Access to/from South	○	○	◕	○	○	◔	●	◑	◔			$ 20.29
Talbot Road S/SW Grady Way	Direct Access to/from South	○	◑	◔	○	●	◑	◕	◑	◑	✓		$ 30.89
SR 900 (Park Avenue)	Direct Access, NB & SB	○	◔	◔	○	●	◑	◕	◑	●	✓	✓	$ 32.42
112th SE	In Line Transit	◔	○	◑	○	◔	◑	◑	○	●	✓	✓	$ 25.38
SE 8th	Direct Access, NB & SB	○	●	○	◔	●	◑	◕	◑	◕	✓	✓	$ 41.86
Bellevue CBD	Direct Access, NB & SB	●	●	○	◕	●	◑	◕	●	●	✓	✓	$ 65.95
NE 70th	Direct Access, NB & SB	◕	◑	◔	◔	◕	◕	◕	◑	◕	✓	✓	$ 33.91
NE 132nd	Direct Access, NB & SB	●	●	◑	●	◑	◑	◕	●	◕	✓	✓	$ 24.01
NE 160th	Direct Access to/from South	●	◕	◑	◑	◔	◑	◕	●	◑	✓	✓	$ 26.72
Canyon Park P&R / 228th	Direct Access NB & SB	○	◔	◔	○	◑	◑	◑	◑	◑			$ 35.95
I-5 / SR 516	Direct Access NB & SB	●	●	◑	●	◕	◑	◕	◕	◑	✓	✓	$ 24.39
I-5 / S 272nd St.	Direct Access NB & SB	●	◑	◑	◕	◑	◑	●	◕	◔	✓	✓	$ 26.98
I-5 / S 320th St.	Direct Access NB & SB	●	●	◑	●	●	◑	●	◑	◑	✓	✓	$ 23.71
I-5 / E-3 Busway	Transit Ramp to/from South	●	○	○	◕	●	◕	◕	◕	●	✓	✓	$ 46.09
SR 167 at SW27th St.	Direct Access NB & SB	○	◕	◑	◕	○	◑	◑	○	◔	✓	✓	$ 26.11
I-90 / Eastgate P&R	EB & WB Transit & HOV	◑	◕	◑	◑	◕	◑	◕	◑	◔	✓	✓	$ 28.90
I-5 / NE 145th St.	Direct Access to/from South	◑	◕	●	●	◑	◑	◑	◔	◕	✓	✓	$ 8.83
I-5 / Ft. Lewis	Direct Access NB & SB	○	○	●	○	○	◔	◑	◑	○			$ 7.35
I-5 / SR 512	Direct Access NB & SB	◑	◔	◑	○	●	◕	◕	◑	◕	✓	✓	$ 25.65
I-5 / S. 48th St.	Direct Access NB & SB	○	◔	◕	○	◑	◑	●	◑	◔	✓	✓	$ 13.33
I-5 / Tacoma Dome	Transit Tunnel Access, NB & SB	◕	○	◔	○	●	◕	◕	◑	●	✓	✓	$ 35.00
I-5 Ex / NE 42nd Street	Ramp to SB Contra flow lane**	●	○	◑	◑	●	◔	◕	◑	◑			$ 25.90
I-5 Ex / NE 50th Street HOV Ramp	Direct Access to/from North	●	◔	●	●	●	◕	◕	◑	◕	✓	✓	$ 6.04

TOTAL (Recommendations with Regional Bus System) $ 619.40

TOTAL (Recommendations without Regional Bus System) $ 553.33

Notes:

* This option assumes a general purpose interchange improvement to add a WB to SB loop ramp will be implemented. Costs for the general purpose improvement are not included in estimated costs for this alternative.

**Alternative only recommended in conjunction with SB transit only contraflow lane recommendation.

SR 512 (UNION AVENUE) DIRECT ACCESS

Just south of SR 512, Union Street crosses I-5. To provide direct access ramps connecting the Lakewood Park-and-Ride with HOV lanes to the north and south, ramps are proposed to drop from the Union Street overpass into the center HOV lanes on I-5 as shown in Figure 4-2. The Lakewood Park-and-Ride lot is a major transit transfer location, and access to the lot using the busy SR 512 interchange is difficult.

Cost Estimate Summary

- Total Estimated Cost: $25.65 M.

Significant Benefits

Direct access would provide an efficient transit connection to the Lakewood park-and-ride lot, which is the second most active transit facility in the Pierce Transit system.

Significant Impacts and Outstanding Issues

Ramp grades, profiles, and clearance under adjacent proposed structures need to be double-checked and confirmed with respect to engineering feasibility.

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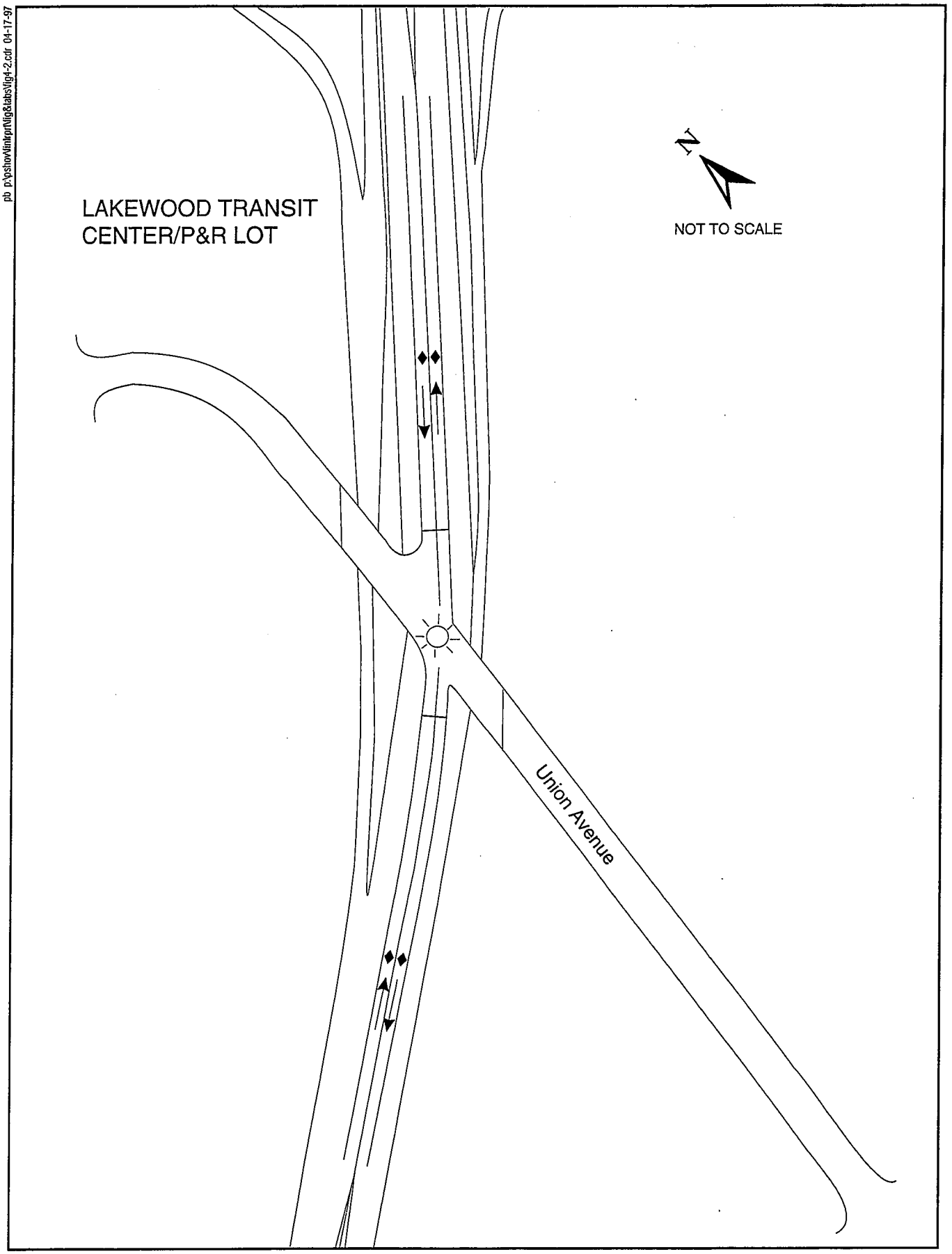

SR 512 (Union Avenue) HOV Direct Access

Puget Sound HOV Pre-Design Studies

Final Report

FIGURE 4-2

SOUTH 48TH STREET OVERPASS DIRECT ACCESS

South 48th Street crosses I-5, but there is no interchange there today. This alternative would provide drop-ramps from the 48th Street overpass into the northbound and southbound HOV lanes as shown in Figure 4-3.

Cost Estimate Summary

- Total Estimated Cost: $13.33 M.

Significant Benefits

With this option, carpools would gain better access to the Tacoma Mall, and buses would be able to more efficiently reach the Tacoma Mall transit center located nearby.

Significant Impacts and Outstanding Issues

Widening of I-5 to accommodate the direct access ramps could have right-of-way impacts on the Tacoma Mall frontage road and the Tacoma Mall parking lot.

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S. 48th Street Overpass HOV Direct Access

Puget Sound HOV Pre-Design Studies

Final Report

FIGURE 4-3

TACOMA DOME DIRECT ACCESS

The preferred alternative for this interchange would connect an inside HOV lane, both northbound and southbound directions, with the Tacoma Dome area and the Pierce Transit intermodal center via a tunnel from I-5 as depicted in Figure 4-4. Ramps from the median of I-5 would drop down to connect to a new 800 foot tunnel roadway which would connect to "G" Street under the Southbound lanes of I-5, Wiley Avenue and the North parking lot for the Tacoma Dome. A second, less expensive concept should remain under consideration in case funding can not be attained for the first option. This concept would provide direct access to the Tacoma Dome by using a restricted direct access ramps from the I-5 median to the "D" Street overpass. A pair of pedestrian bridges connecting the parking lots west of the Dome to the main entrance of the Tacoma Dome to mitigate concerns regarding pedestrian and vehicular traffic conflicts during Tacoma Dome events are required with this option, which may be feasible only if the Tacoma Dome South parking lots are expanded by building a parking garage. The cost of this would be comparable to the tunnel option but it would also result in additional parking.

Cost Estimate Summary

- Total Estimated Cost: $35.00 M.

Significant Benefits

Direct access would provide direct connection to the planned Pierce Transit intermodal center, which will be the most significant facility in the Pierce Transit system. This alternative rates high in transit time savings and facilitation of regional transit service. It is considered the most important direct access proposal in Pierce County.

Significant Impacts and Outstanding Issues

Widening of I-5 to accommodate direct access ramps could result in significant right-of-way impacts to Wiley Avenue and the Tacoma Dome north parking lot.

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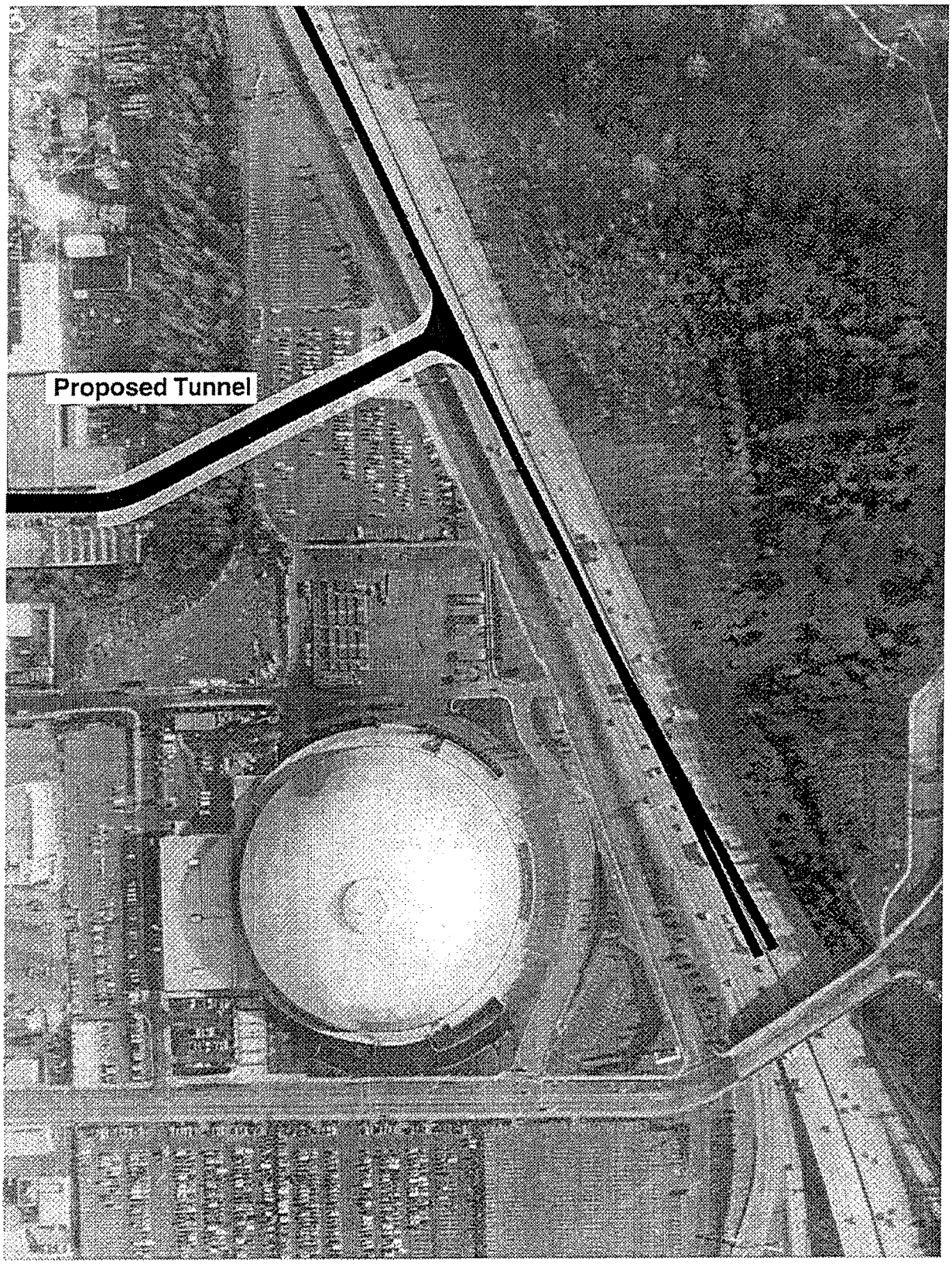


Tacoma Dome Direct Access

Puget Sound HOV Pre-Design Studies

Final Report

FIGURE 4-4

SOUTH 320TH STREET / FEDERAL WAY PARK-AND-RIDE DIRECT ACCESS

This project would provide direct inside access to and from I-5 at the Federal Way Park-and Ride Lot. The inside ramps would connect the median HOV lanes to a crossing of southbound I-5 that would tie directly to the park-and-ride lot as shown in Figure 4-5. With this treatment, buses could avoid traveling the congested 320th Street corridor, and could enter and exit the inside HOV lanes both northbound and southbound.

The direct connection would use a Texas-T type of design at the ramp junction with the crossing structure. Its location will be constrained on the north by the existing S. 320th Street overcrossing and the design standards applicable to the new ramps.

Pending more detailed demand analysis, this project could serve both transit and carpools. Another option would connect the new ramps to SR 99 via HOV lanes along S. 324th Street.

Earlier alternatives that would split access to the Federal Way CBD among S. 312th and S. 324th Streets were dropped from further consideration. These layouts would create circuitous bus routing and added travel time for transit patrons.

Cost Estimate Summary

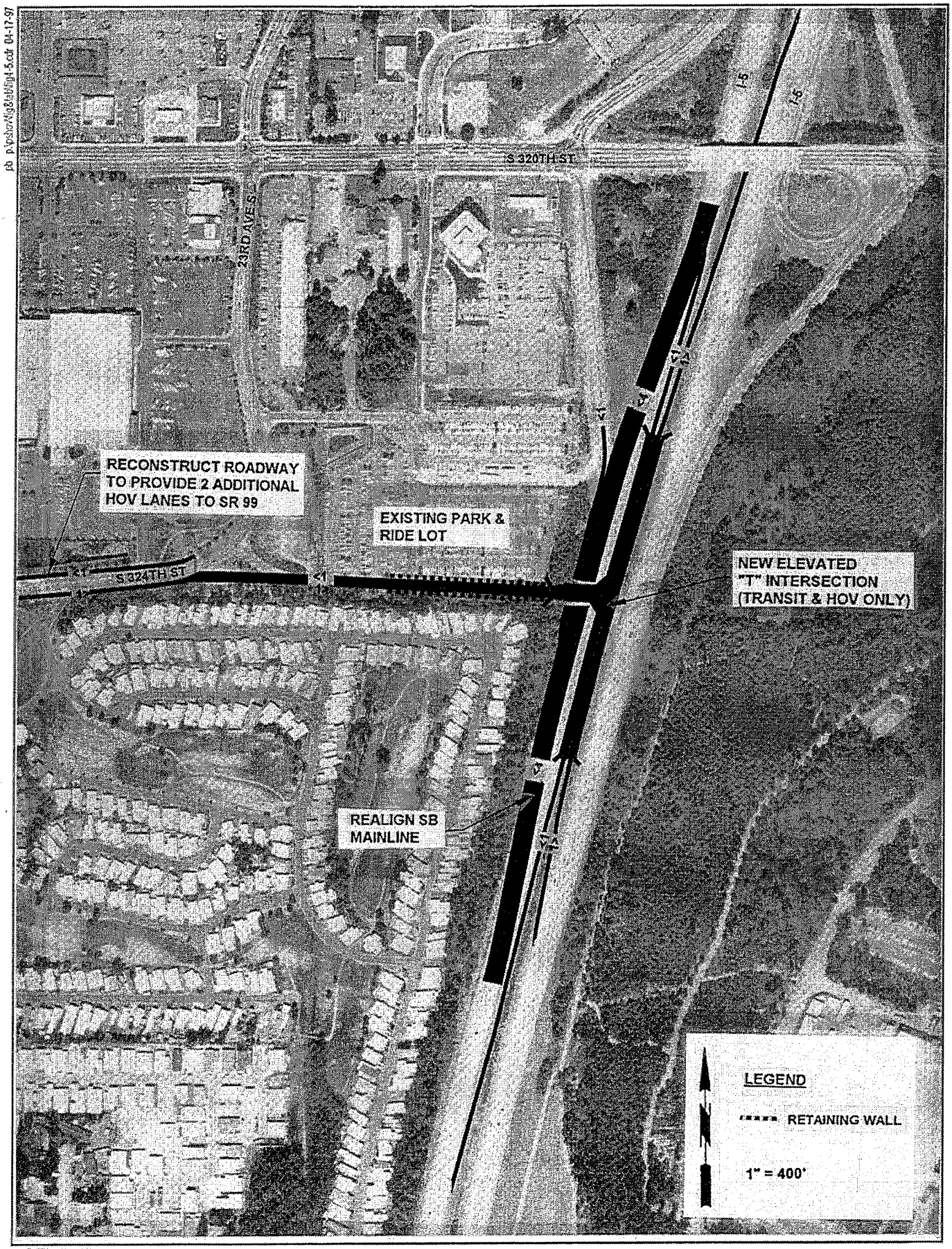
- Total Estimated Cost $19.10 M

Significant Benefits

This project would serve a heavily-used park-and-ride lot that has been proposed for expansion. It is served by express bus links to the Seattle CBD. Growth in population and employment in that market is strong, and designation of Federal Way as an urban center will focus growth in this area.

Significant Impacts and Outstanding Issues

The proposal is not influenced by the ultimate selection of an alignment for the SR 509 extension. Extension of rail transit to Federal Way may occur in the long-term and could result in relocation of this park-and-ride lot, but the near term benefits of this project suggest a high priority for implementation.



S. 320th Street

Puget Sound HOV Pre-Design Studies

Final Report

FIGURE 4-5

I-5 / SOUTH 272ND STREET DIRECT ACCESS

This "T-ramp" would connect with the I-5 inside HOV lanes, extend over the southbound lanes, and touch down adjacent to the Star Lake Park-and-Ride lot as shown in Figure 4-6. It would allow both buses and carpools to enter the HOV lanes, both northbound and southbound, from the Star Lake Park-and-Ride lot. Buses would also be able to make passenger stops.

Cost Estimate Summary

- Total Estimated Cost: $26.98 M.

Significant Benefits

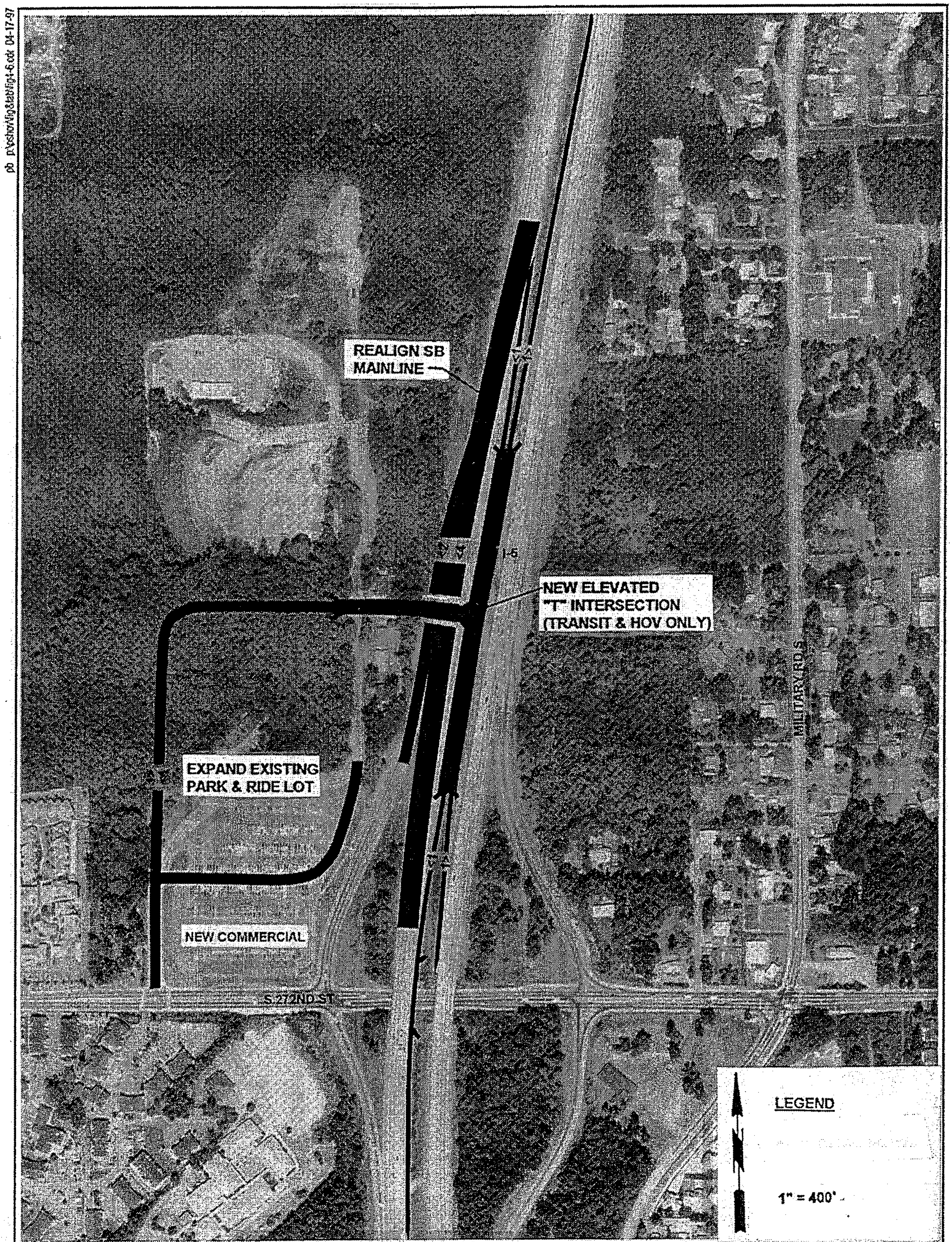
This alternative would provide direct access into the Star Lake Park-and-Ride lot. If bus service from the Federal Way Park-and-Ride lot were to serve this lot as well, then service would be more frequent to both lots. This option rates especially well with respect to transit travel time savings and compatibility with local land use activities.

Significant Impacts and Outstanding Issues

This ramp rates high, but is not needed to operate regional bus service, so it is not recommended for early implementation. If the Star Lake Park-and-Ride lot is expanded, then building this ramp should be considered. If service to this lot is not paired with service to the Federal Way Park-and-Ride lot, and if regional routes do not stop here, then access would only be needed to and from the north.

Further design analysis may be needed to allow a convenient pedestrian connection to an on-line transit station if regional service will make stops at this park-and-ride lot. This design assumed expansion of the park-and-ride lot to the north of the existing site, which may no longer be a valid assumption.

An extension of SR 509 with HOV facilities to I-5 south of Sea-Tac Airport could potentially eliminate the need for this facility.



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I-5 / S. 272nd Street

Puget Sound HOV Pre-Design Studies

Final Report

FIGURE 4-6