3.12 TRANSPORTATION

3.12.1 Studies and Coordination

3.12.1.1 Studies

The transportation performance of the alternatives proposed for the corridor was evaluated to assess the degree to which each package of improvements optimized the performance of the I-405 corridor. Three primary criteria were used to evaluate transportation performance in the corridor:

- **Mobility:** How well does the alternative improve mobility for travelers along I-405?
- **Congestion:** How well does the alternative reduce congestion in the corridor?
- **Safety:** Does the alternative improve safety for all travelers in the corridor?

The performance of each action alternative was compared with the conditions that would exist under the No Action Alternative in 2020. These criteria and the performance measures used to determine the performance of each alternative are shown in Table 3.12-1.

Table 3.12-1: Evaluation Criteria and Transportation Performance Measures

Evaluation Criteria and Performance Measures	Definitions
A. IMPROVE MOBILITY	
Serve as much of the 2020 peak period travel demand within the corridor as possible.	
Person Volumes	P.M. peak period person volumes by mode across 3 screenlines[a]
	Daily person volumes by mode across 3 screenlines
Vehicle Volumes	P.M. peak period traffic volumes by types of vehicles (SOVs, HOVs, and trucks) at 3 screenlines
	Daily traffic volumes by types of vehicles (SOVs, HOVs, and trucks) at 3 screenlines
	Daily traffic volumes along segments of I-405
	Daily traffic volume shifts between facilities along selected screenlines, I-405, arterials
Improve predictability of travel times for all modes.	
Predictability of Travel Time	Effects on travel time reliability by mode (auto, HOV, transit, freight, nonmotorized)
Provide flexibility to accommodate post-2020 travel demands.	
Future Flexibility	Ability of alternatives to accommodate post-2020 demands
Reduce travel times for all modes door-to-door compared with current conditions.	
Travel time	General traffic travel times (door-to-door) between selected origins and destinations during the P.M. peak period
	HOV travel times (door-to-door) between selected origins and destinations during the P.M. peak period
	Transit travel times (door-to-door) between selected origins and destinations during the P.M. peak period
Reduce the share of peak-period and daily trips by single-occupant vehicles.	
Modal Shares	Percentage of peak-period persons choosing modes of travel at 3 screenlines
	Shares of study area work trips
Transit riders	P.M. peak-period transit riders along key segments
Transportation Demand Management	Effects on non-HOV trip reduction
Provide effective connections to regional and local transportation systems.	
Compatibility with Regional Systems	Degree of compatibility with regional transportation systems

Evaluation Criteria and Performance Measures	Definitions
Compatibility with local systems	Degree of compatibility with local transportation systems
B. REDUCE CONGESTION	
Reduce congestion on study area freeways and arterials below current levels (examine peak-period and daily conditions).	
Hours of Traffic Congestion	Hours of congestion aggregated within the study area by freeway and arterial functional classification
	Hours of congestion in each segment of I-405 and arterial segments in a typical day
Vehicles Miles of Travel	Study area and region-wide daily total
Vehicle Hours of Travel	Study area and region-wide daily total
Speed	Study area
C. IMPROVE SAFETY	
Improve the safety for all modes above current levels.	
Safety	Potential for traffic accident reduction along high accident locations
	System-level effects
	Potential for improving safety for transit vehicles
	Potential for reducing conflicts between vehicles, pedestrians, and bicycles

[a] A screenline is an imaginary line that crosses a number of roadway facilities. Three screenlines were used in the study: the Bothell (north) screenline at the King County / Snohomish County line; the Bellevue (central) screenline through downtown Bellevue along NE 8th Street; and the Renton (south) screenline between SR 167 and SR 181 in Renton.

Note: HOV is defined as three or more persons in a vehicle.

These criteria were carefully selected to identify and measure changes in mobility, congestion, and safety in the corridor. The I-405 Corridor Program Study committees did not assign weights to any of the criteria. Mobility was assessed using measures that compared travel demand by mode, travel time, future flexibility, and connectivity to other regional systems. The congestion criterion measured the hours of congestion and speed on I-405 and other facilities, together with travel demand. Safety was looked at from the perspective of reducing accidents at both the high accident locations and system-wide. The key findings from the technical studies are described in this section and documented in greater detail in the *I-405 Corridor Program Draft Transportation Expertise Report* (Mirai and DEA, 2001).

3.12.1.2 Coordination

From the beginning of the I-405 Corridor Program, the Washington State Department of Transportation has worked in partnership with communities along the I-405 corridor. As a result, throughout the project decision-making process, local city staff have provided input to the study.

In addition, a number of ongoing studies, plans, and projects within the I-405 study area have varying degrees of influence on the I-405 corridor alternatives evaluated here (WSDOT and Mirai Associates, August 1999). Roadways within the project study area are included in regional plans such as King County's Regional Arterial Network (RAN), the WSDOT State Highway System Plan (SHSP), PSRC's Metropolitan Transportation Plan (MTP), Sound Transit's Regional Transit System Plan, and the Eastside Transportation Partnership. All of these plans have strong policy sections intended to shape transportation in the region. Most of the plans also include specific project implementation lists, usually segregated into funded and not funded categories. In addition, each of the fifteen incorporated cities in the primary study area has a transportation plan and policies designated for urban development and concurrency requirements. Additional discussion on plans and policies can be found in section 3.13.2.

Other sub-area and corridor studies affecting the I-405 Corridor Program area include East King County Corridor Study (CONEKC), the Trans-Lake Washington Project, the Fast Phase II Study of Truck Mobility (FASTrucks), Bellevue-Redmond-Overlake Transportation Study (BROTS), and the Eastside Transportation Partnership's Mobility Action Program (ETP). All of these projects are focused on a specific corridor or sub-area location.

The Washington State Growth Management Act (GMA) requires local jurisdictions to adopt and enforce ordinances linking approval of new development to maintenance of transportation level-of-service standards. The ordinances must prohibit development approval if the development would cause the level-of-service on a transportation facility to decline below the jurisdiction's adopted standards unless transportation improvements or strategies to accommodate the impacts of development are made concurrent with (within six years of) the development. This provision is commonly referred to as transportation "concurrency." Each of the jurisdictions within the I-405 corridor has adopted a comprehensive plan and a concurrency ordinance as required by the 1990 GMA.

The projects included in the I-405 No Action Alternative are included as committed projects in the regional and local plans.

At the beginning of the I-405 Corridor Program, one-on-one interviews were conducted with agency and jurisdictional staff. Throughout the project, the project team has collaborated with affected jurisdictions in the study area to identify reasonable and feasible solutions that support (or at least do not conflict) with their jurisdictional planning. Two workshops was held during Summer 2000 to work with jurisdictions on selecting projects for the alternatives, one covering the central corridor segment and one covering the south and north corridor segments.

During the evaluation of the EIS alternatives, the project team met on several occasions with each jurisdiction to further refine the definition of the project elements being studied. This process provided a focused list of design assumptions that were appropriate for each jurisdiction.

The final package of transportation improvements developed through the I-405 Corridor Program will be proposed for adoption into existing local, regional, state, and federal transportation plans and programs.

3.12.2 Methodologies

The future expected transportation performance of each alternative was evaluated by using established travel demand forecasting models and analysis methods as well as experience from across the United States.

The Puget Sound Regional Council (PSRC) four-county travel demand forecasting model was applied to forecast general traffic, carpool, and transit demand for transportation alternatives in the I-405 corridor. The PSRC model is multimodal and captures both regional and corridor-level trip-making. The I-405 Corridor Program used the current version of the PSRC model as updated/refined for use on the Trans-Lake Washington Study. Additional model validation was conducted prior to use at the corridor level. The model was used to develop a number of different performance measures, (such as model demand travel times between activity centers, vehicle miles of travel (VMTs), and vehicle hours of travel (VHTs).

The main differences among the alternatives were captured by changes in the highway and transit model networks. The future highway and transit networks, representing each of the alternatives, were consistent with other ongoing regional studies.

The population and employment forecasts used to produce the 2020 forecasts were the "Working Forecasts" released by the PSRC in 2000 (and consistent with those used for the Trans-Lake Washington Study). These have undergone extensive review by local jurisdictions and have been used for other transportation studies in the region at this time. Year 2030 forecasts were prepared using forecasted population and employment, parking costs, and other data from the PSRC, consistent with the update of the Metropolitan Transportation Plan (PSRC, 2000).

The transportation analyses for the DEIS alternatives and the Preferred Alternative used the most current regionally adopted travel model and forecasts available from the PSRC at the time the alternatives were identified. The DEIS modeling results and forecasts underwent extensive review by local jurisdictions and were the same forecasts used for the Trans-Lake Washington Study and other major transportation studies in the region. Following analysis of the DEIS alternatives and issuance of the I-405 Corridor Program Draft EIS, the PSRC continued its program of ongoing model refinements. These refinements related primarily to updates of base year assumptions and revisions of some land use and network data. The underlying modeling procedures remained unchanged by these routine refinements.

Model refinements that were accomplished by PSRC during the interim period between modeling of the DEIS alternatives and identification of the Preferred Alternative included the following:

- The regional travel forecasting model was updated to 1998 (compared to 1995 which had been used previously). This included bringing the transit network up to 1998 service levels.
- A new regional 2020 No Action Alternative was developed consistent with the updated 1998 base year conditions and assumptions.
- Selected land use and highway network conditions and assumptions were updated to reflect changes in local jurisdictions' plans.

These changes related primarily to the assumptions used as inputs to the travel model; there were minimal changes made to the model itself. For example, there were no changes made to the key trip generation, distribution, and mode split functions within the model.

When the Preferred Alternative was identified after receipt of comments on the DEIS, the travel assumptions and forecasts used originally for the DEIS were no longer current or available due to the model refinements completed by the PSRC discussed above. Thus, it was not reasonably possible to evaluate the Preferred Alternative's transportation performance using the same assumptions and forecasts that had been used for the DEIS. After discussions with PSRC, the decision was made to take advantage of the latest information available using the PSRC's model refinements and current forecasts to evaluate the Preferred Alternative in the Final EIS.

While the forecasts using the updated PSRC travel model are similar to those conducted during the DEIS, the model refinements made direct comparisons between the Preferred Alternative and DEIS alternatives difficult. To enable a more effective comparison between the Preferred Alternative and the DEIS alternatives, new forecasts also were prepared using the refined PSRC model for two DEIS alternatives: the No Action Alternative and Alternative 3. This set of DEIS alternatives is believed to provide the most meaningful direct comparisons to the Preferred Alternative while also approximating the range in transportation performance of the DEIS alternatives under the updated PSRC model and forecasts.

The modeling results produced two primary findings:

1. As expected, the updated model and forecasts produced system-level results that were somewhat different than the previous DEIS results due especially to the change in the base year conditions (1998 compared to 1995). Measures such as vehicle miles of travel, vehicle hours of travel, average speeds, and travel times were affected by this change. Other measures such as average trip length, mode shares, and study area person/vehicle volumes were similar between the two forecasts.
2. However, the overall relative differences between the No Action Alternative and Alternative 3 were very similar to those reported in the DEIS. A comparison of the No Action Alternative and Alternative 3 using the two modeling methods showed almost identical differences and percent changes. This suggests that the performance of all alternatives was affected similarly by the model updates. This is a logical finding given that the forecasting procedures within the updated PSRC travel model were not changed.

For example, the changes in transit and carpool mode shares for Alternative 3 compared with No Action were virtually identical. The relative differences between the Preferred Alternative and Alternative 3 results using the updated model were also very small, as would be expected given the similarities between these two alternatives.

Given that the relative differences among the DEIS alternatives and Preferred Alternative were very similar using the previous and updated models, it was unnecessary to repeat this process for each of the other DEIS action alternatives. The updated model results confirm the anticipated performance of the Preferred Alternative, and the results can be used to effectively compare the Preferred Alternative against the No Action Alternative in a manner directly comparable to the analyses documented in the DEIS.

In summary, this analytical approach using the PSRC's updated model and forecasts for the Preferred Alternative analysis took advantage of the most current ongoing regional model refinements, while also allowing meaningful comparisons to be made to the DEIS alternatives.

The travel forecasting model was also used during the DEIS process for a sensitivity test of "unconstrained demand" in the corridor. This hypothetical analysis helps to answer the question: *By what route would people travel by car within the I-405 corridor if there were no limits on available capacity or any constraints due to traffic congestion?* For this analysis, it was assumed that land use, population, and employment do not change in response to the unlimited transportation capacity. Similarly, it was assumed that the distribution of travel, the number of trips estimated to travel between point A and point B, would not change; only the travel routes would be different.

The PSRC travel forecasting model accounts for the major sources of region-wide induced travel. Induced travel can be defined as an increase in daily travel resulting from an increase in transportation capacity. Such effects are most commonly associated with the expansion of highway facilities.

The I-405 Corridor Program acknowledges that induced travel occurs in response to improvements in transportation accessibility. In fact, the forecasting conducted for the EIS analysis explicitly includes the major induced demand factors cited in published literature. Of the remaining factors, there is no clear research that documents the magnitude of those effects. Many of the research studies try to draw simple correlations between growth in travel and growth in highway capacity. This correlation does not necessarily mean that highway capacity changes cause growth in travel.

The overall effects of induced demand are expected to be limited within the I-405 study area for the following reasons:

- Growth in population and employment is expected to increase daily travel demands by over 50 percent. This growth will leave minimal available capacity to generate additional induced demand. The effects of substantial travel growth also complicate any conclusions regarding the effects of induced demand.
- Peak-period congestion levels with the Preferred Alternative are expected to improve slightly with respect to current levels. However, congestion will still persist during the prime peak hours, providing limited incentives for persons to generate additional trips or to shift travel hours.
- Growth management policies in place within the I-405 corridor will result in limited shifting of land use patterns and resulting trip-making in response to the I-405 improvements.

Given the long-term horizon for the study (i.e., 20 to 30 years), any effects of induced demand (that are not already captured) are expected to be very small in the context of overall corridor growth. In fact, such effects could be eliminated by the implementation of the corridor-level aggressive TDM program, the effects of which were not able to be explicitly modeled in the travel forecasts. The I-405 model produced substantial shifting in travel patterns and trip lengths for the action alternatives, resulting in changes to study area and regional vehicle miles of travel and vehicle hours of travel. This factor is a major component of the induced travel behavior. The modeling also captured diversion of travel between regional corridors and shifts in modes arising from changing transportation accessibility. It is important to note that the reported model results were for the entire transportation system, comprising all freeway and arterial segments within the region.

Table 3.12-2 identifies six sources of induced travel, along with an order-of-magnitude estimate of the degree of their effect on regional travel. The table also indicates how the I-405 Corridor Program has addressed each of these components. As indicated, when one takes a region-wide perspective, the major source of induced travel is the lengthening of trips. Analysts have found that the impact of highway accessibility on the number of motorized person-trips (source 3) is insignificant. The sixth source (shifts in travel route) comes into play if rerouting by travelers due to the highway improvement involves a detour that lengthens the trip distance. Table 3.12-2 shows that the I-405 forecasts have accounted for most of the important sources of potential induced travel.

A review of the planning literature shows that one source that planners usually find difficult to estimate is the effect that transportation investment may have on aggregate regional economic growth and development (sources 1 and 2 in Table 3.12-2). The I-405 Corridor Program forecasts were developed in response to adopted regional land use projections that had been approved by all of the local jurisdictions in the I-405 Corridor Program study area. Each alternative's potential effects on growth and development were evaluated by examining projected future land use based on year 2020 PSRC forecasts and comprehensive plans for jurisdictions in the study area. Land use in the corridor in the study area is guided by local comprehensive plans. The currently adopted comprehensive plans and land use were assumed for all alternatives. The State of Washington has strong growth management policies calling for concurrency of adequate transportation facilities for new development that increases trips on the transportation system. The other induced travel component often cited is new, or additional, trips that might be generated by households or other uses in response to improved transportation accessibility. The I-405 corridor program did not directly model this effect (often termed trip frequency), although the forecasts used the results of regularly-conducted household surveys that are used to update regional trip generation rates. Limited research

on this topic (DeCorla-Souza, 2000; Dowling Associates, 1994) indicates that these effects are likely to be small. The issues surrounding these components along with an extensive discussion of induced travel are included in the *I-405 Corridor Program Draft Transportation Expertise Report* (Mirai and DEA, 2001) herein incorporated by reference.

Table 3.12-2: Sources of Induced Travel

Source of Induced Travel	Published Literature	I-405 Forecasts	Magnitude of Expected Effect[c]
1. Increase in residential development, i.e., person-trip production (P) related to new development	YES	NO[a]	Low to none
2. Increase in non-residential development, i.e., person-trip attraction (A) related to new development	YES	NO[a]	Low to none
3. Increase in number of daily motorized person-trip Ps and A's per development unit	YES	NO[b]	Very low
4. Increase in average motorized person-trip distance due to origin/destination changes	YES	YES	High
5. Increase in share of person travel by private motorized vehicles	YES	YES	Low to moderate
6. Shift in vehicle travel to improved facilities from unimproved facilities within a corridor, or through an improved corridor due to diversion of traffic from other corridors	YES	YES	Low to moderate

[a] Secondary and cumulative effects of the alternatives on land use patterns were analyzed using the PSRC land use allocation model, as documented in Section 3.23. These effects were not substantial enough to justify rerunning the regional travel forecasting model.

[b] Specific data to support these changes were not available. The PSRC regularly conducts household surveys to update trip generation rates that account for changing accessibility within the region.

[c] DeCorla-Souza. "Induced Highway Travel: Transportation Policy Implications for Congested Metropolitan Areas." p.18.

3.12.3 Affected Environment

This section summarizes transportation facilities in the I-405 corridor. A discussion of various travel modes in the study area and recent data profiles of traffic conditions along the corridor were summarized in Chapter 1, Purpose and Need for Action. More detail is provided in the *I-405 Corridor Program Draft Transportation Expertise Report* (Mirai and DEA, 2001).

3.12.3.1 Roadway Network

I-405 Facility

I-405 is the region's dominant travel corridor east of Lake Washington. Originally built as a bypass around Seattle, I-405 is now the roadway of choice for most north-south trips for the Eastside. More than two-thirds of the total trips on I-405 begin and end in the corridor itself. The remaining third have strong ties with the communities along SR 167 to the south of the study area, and with developing areas to the east within the urban growth area of King County.

The roadway network within the I-405 study area reflects local geography and the development patterns that have occurred over the years. The relatively sparse roadway network in the I-405 study area creates the demand for the higher capacity state highways (e.g., I-405, I-90, SR 520, SR 522) to frequently serve as the principal means of transportation, even for non-regional trips. Other major arterials have also become heavily congested as the area's population and employment has grown.

Interstate 405 is the transportation backbone of the primary study area, beginning at I-5 in Tukwila and ending in the north at I-5 outside Lynnwood. It is the designated military route through Seattle, since Interstate 5 was deemed too constricted. I-405 varies from six to ten lanes along the 30-mile corridor. The section of I-405 from I-5 in Tukwila to I-90 includes two general purpose lanes and an HOV lane in each direction with 4- to 10-foot shoulders. The next section from I-90 to SR 522 in Bothell has three general purpose lanes and an HOV lane in each direction except for the northbound direction between SR 520 and NE 70th, where it has an additional climbing lane. On the section north of SR 522, I-405 has two general purpose lanes in each direction and an HOV lane in each direction.

There are 25 interchanges on I-405, including the connections with I-5. Under Sound Move, Sound Transit has plans and funding to provide three direct-access connections from the center roadway HOV lanes at Bellevue (1), Kirkland (1), and Renton (1).

Supporting Roadway Network Characteristics

The I-405 corridor includes a considerable number of arterial streets maintained by local jurisdictions including Bellevue, Kirkland, Redmond, Renton, Newcastle, Tukwila, Woodinville, and Bothell. The overall Eastside arterial street network is not very dense. This provides fewer lanes to carry general purpose traffic and transit. In addition, much of the adjacent arterial system is discontinuous because of topography and development patterns. I-405 currently carries a large number of non-regional trips, while traffic congestion on arterial streets remains severe.

The roadway network supporting I-405 consists of freeways and surface streets intersecting with or paralleling I-405. Nine state highways connect with I-405 along its length: SR 167, SR 169, SR 181, SR 900 (Sunset and Park interchanges), I-90, SR 520, SR 908, SR 522, and SR 527. At the north end of the study area, I-405 becomes SR 525 in Lynnwood, while at the south end SR 518 is the extension heading west towards SeaTac and Burien. Two other state highways (SR 515 and SR 524) cross but do not connect with I-405. Another highway in the primary study area, SR 202, parallels I-405 between SR 520 and SR 522. Major local arterials include: Woodinville-Duvall Road, Bellevue-Redmond Road, Petrovitsky Road, Richards Road, 148th Ave. NE, and Coal Creek Parkway.

3.12.3.2 Transit Providers

Transit service in the study area is currently provided by King County, Sound Transit, and Community Transit. King County currently provides local service between and within Eastside communities and provides express service between major urban centers. Community Transit provides express service between urban centers in Snohomish County and the Eastside. Sound Transit began express service between selected urban centers in Fall 1999; as of September 2001, 17 of 19 route commitments from Sound Move are operational. Sound Transit's Regional Express is currently in the planning and early design stages of new park-and-ride lots, transit centers, and direct access ramps, including large-scale improvements to several I-405 interchanges. Historically, King County services primarily served downtown Seattle, the University of Washington, and downtown Bellevue. This is a hub and spoke system based primarily on these three activity centers, with downtown Seattle being predominant. Bus service for the I-405 study area is now beginning to serve multiple activity centers. This type of service concept will greatly increase the convenience of making trips between Eastside activity centers as opposed to focusing on select hubs. King County's and Sound Transit's current planning efforts are being developed around this regional transit service concept.

Park-and-Ride Lots

King County, Sound Transit, and Community Transit serve park-and-ride lots located in the study area. There are 26 permanent park-and-ride lots and 32 leased park-and-ride lots in the primary study area, most of which are located in King County. The total number of available park-and-ride spaces is 10,200, 84 percent of which are in the permanent lots. Although the average utilization among the permanent lots is 84 percent, the parking demand for many of the permanent lots exceeds 100 percent. The lots currently experiencing more than 100 percent utilization are Bothell, Brick Yard, Eastgate, Evergreen Point, Mercer Island, South Bellevue, Wilburton, Kent/Des Moines, South Renton, Tukwila, and Renton Boeing Lot 6. The average utilization of the leased lots is 55 percent. Many of those leased lots are relatively small, with fewer than 50 available parking spaces.

Non-Motorized Facilities

The bicycle and pedestrian facilities in the study area include dedicated trails, sidewalks, and bike lanes. Long commute trips by nonmotorized modes can be problematic due to the lack of north-south arterials, topography, and transportation infrastructure like highways and cul-de-sacs. However, walking and bicycling accounts for up to 5 percent of total daily trips in the study area. To accommodate the bicycling demand, King County's entire bus fleet is equipped with bicycle racks that can carry two bicycles. King County estimates that their buses transport 465,000 bikes a year. Another program King County and Community Transit offer combines biking with transit by providing bike racks and lockers at park-and-ride lots and transit centers.

There is no existing document or data on pedestrian and bicycle deficiencies area-wide. However, discussions with King County bicycle and pedestrian planners have identified that I-405 itself is often a major impediment to nonmotorized connectivity.

3.12.4 Impacts

3.12.4.1 No Action Alternative

The No Action Alternative includes the funded highway and transit capital improvement projects of cities, counties, Sound Transit, and WSDOT. These projects are already in the pipeline for implementation within the next six years, and are assumed to occur regardless of the outcome of the I-405 Corridor Program.

Construction Impacts

The No Action Alternative involves no additional construction beyond what is planned and committed within the corridor. Beside the usual and customary detours and other construction mitigation set for these projects, no additional traffic impacts are expected.

Operational Impacts

Transportation Operational Impacts are defined with respect to three categories of criteria:

1. Mobility Impacts: Travel demand by mode, travel times, compatibility
2. Congestion Impacts: Hours of congestion, system performance
3. Safety Impacts: High Accident Locations; Accident Rates

The key findings from the technical studies are summarized in Table 3.12-3. Extensive detail is provided in the *I-405 Corridor Program Draft Transportation Expertise Report* (Mirai and DEA, 2001.

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Table 3.12-3: Results of Transportation Performance Analyses

Evaluation Criteria Performance Measures	Alternatives						
	1995 (Reference)	2020 No Action	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Preferred Alternative[e]
A. IMPROVE MOBILITY							
Serve as much of the 2020 peak period travel demand within the corridor as possible							
Person Volumes by Mode across 3 Screenlines							
P.M. Peak Period	See Figures 3.12-1A, 3.12-1B, and 3.12-1C; Appendix I, Table 1						Figures 3.12-4A, 3.12-4B, 3.12-4C
Daily	Appendix I, Table 2; Patterns similar to Peak Period volumes						Appendix I, Table 6
Vehicle Volumes by Types of Vehicles							
P.M. Peak (Avg)	Appendix I, Table 3; Patterns similar to Person Volumes						I-405 Corridor Program Draft Transportation Expertise Report Appendix H
Daily (Avg)	Appendix I, Table 4; Patterns similar to Person Volumes						Appendix I, Table 7
Daily Traffic along Segments of I-405, by Segment	See Fig 3.12-2; Appendix I, Table 5	See Fig 3.12-2; Appendix I, Table 5	Appendix I, Table 5				Figure 3.12-5, Appendix I, Table 8
Daily Volume Shifts between Facilities	Refer to text for discussion; Alternatives 3, 4, and the Preferred Alternative shift traffic from other corridors (e.g., I-5) as freeway capacity is added.						
Improve predictability of travel times for all modes							
Effects on Travel Time Reliability by Mode	Not Applicable	Qualitative Assessment- Refer to text					
Provide flexibility to accommodate past 2020 travel demands							
Future Flexibility- Ability of Alternatives to Accommodate Post-2020 Demands	Not Applicable	Qualitative Assessment- Refer to text					
Reduce travel times for all modes door-to-door compared with current conditions							
Travel Time - Avg of Sample Trips, in Minutes P.M. Peak Hour							
General Traffic	49	64	64	60	57	55	Table 3.12-13

Evaluation Criteria Performance Measures	Alternatives						
	1995 (Reference)	**2020 No Action**	**Alt. 1**	**Alt. 2**	**Alt. 3**	**Alt. 4**	**Preferred Alternative[e]**
HOV	40	48	43	43	43	43	Table 3.12-14
Transit (Walk & Ride/ Park-and-Ride Access)	102/91	102/93	85/79	85/80	89/81	98/89	Table 3.12-15 Table 3.12-16
Reduce the share of peak period and daily trips by single-occupant vehicles							
Modal Shares							
Peak Period (SOV + HOV 2/HOV 3+/Transit %) [a]	Refer to Figures 4-12 through 4-14 in I-405 Corridor Program Draft Transportation Expertise Report (Mirai and DEA, 2001); Appendix I, Table 1						Updated March 2002
Bothell [a] (%)	85/14/1	76/23/1	75/23/2	76/22/2	78/20/2	78/20/2	79/20/1
Bellevue [a] (%)	84/15/1	72/25/3	69/24/7	71/22/7	72/23/5	75/23/2	73/23/14
Renton [a] (%)	81/17/2	67/31/2	66/31/3	69/28/3	72/25/3	72/27/1	73/24/2
Shares of Study Area Work Trips (SOV + HOV 2/HOV 3+/Transit %)	Not Estimated	74/19/7	73/19/8	73/19/8	73/19/8	74/19/7	Similar to Alt. 3
Transit Riders Along Key Segments	Not estimated	Not estimated	Figure 3-12.3	Same as Alt 1	Appendix I, Fig 2	Not estimated	Appendix I Figure 3
TDM Effects: Non-HOV trip Reduction in % VMT (A.M./P.M.)	10-15/7-10	10-15/7-10	18-21 [b] Both peaks	10-15/7-10	10-15/7-10	10-15/7-10	10-15/7-10
Provide Effective Connections to Regional and Local Transportation Systems							
Compatibility with Regional Systems	Not applicable		Qualitative Assessment- Refer to text				
Compatibility with Local Systems	Not applicable		Qualitative Assessment- Refer to text				
B. REDUCE CONGESTION							
Reduce Congestion On Study Area Freeways And Arterials Below Current Levels							
Hours of Traffic Congestion (1999)							
I-405 Average	7	7	7	6	5	4	4
Other Freeways	3	5	5	4	4	3	4
Arterials	3	5	5	4	4	4	4
All Facilities Average	4	5	5	5	4	4	4
Vehicle Miles of Travel -- Daily, in Millions of Miles							
Region	69	101	101	102	102	103	104

Evaluation Criteria Performance Measures	Alternatives						
	1995 (Reference)	**2020 No Action**	**Alt. 1**	**Alt. 2**	**Alt. 3**	**Alt. 4**	**Preferred Alternative[e]**
Study Area (for trips taken wholly within study area only)	16	23	23	24	25	26	27
Vehicle Hours of Travel -- Daily, in Millions of Hours							
Region	2.3	4.0	3.9	3.9	3.9	3.9	3.4
Study Area (for trips taken wholly within study area only)	0.6	1.2	1.2	1.2	1.2	1.2	0.9
Average Speed in Study Area, (A.M./P.M./Daily) mph	30/24/28	26/13/19	26/13/19	27/13/21	28/14/22	29/14/22	34/26/31
C. IMPROVE SAFETY							
Safety[c]							
Fatalities (total annual)	40[d]	56	55	55	54	53	51
High Accident Location Accident Reduction % (State Routes/Local Streets)	NA	15%/6%	32%/9%	60%/19%	60%/19%	62%/19%	62%/19%
System Level Effects (total accident rate/injury rate – per million VMT)	1.9/1.1	2.1/1.3	2.1/1.3	1.9/1.1	1.8/1.0	1.8/1.0	1.7/1.0
System Level Effects (total annual accidents – per million VMT)	10,060	13,900	13,840	13,840	13,640	13,310	13,860
Nonmotorized Safety Hazard Reductions	Not applicable	0%	53%	53%	53%	47%	53%

[a] Does not include TDM Effects

[b] Alt 1 includes Congestion Pricing

[c] Reduction in Mode Conflicts – This measure was originally part of the safety evaluation criteria. Sufficient data were not available on transit technologies and other project details to evaluate this criterion as part of the programmatic EIS.

[d] Year of reference is 1999.

[e] Forecasts for Preferred Alternative used an updated modeling base. Refer to text for modifications. Results may not be directly comparable with other action alternatives.

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Mobility Impacts

To measure how much mobility would be improved in the corridor by the No Action Alternative, answers were sought for the following questions:

1. How well does the alternative meet the 2020 peak-period travel demand in the corridor?
    - What happens to the daily person volumes and P.M. peak-period volumes by mode?
    - What is the effect on vehicle volumes (daily traffic volume shifts between freeways and arterials, changes in traffic volume for daily and P.M. peak periods)?
2. Does this alternative improve the predictability of travel time for the modes of travel?
3. Can this alternative accommodate increases in volume (in all modes) beyond 2020 (the study planning horizon)?
4. Do the travel times improve for the modes in this alternative compared to current conditions (1995)?
5. Does the alternative reduce the number of single-occupant vehicles (SOVs) on I-405 and, as a result, do the improvements and strategies reduce the SOV share of the daily and peak-period trips?
6. How compatible is the alternative with the regional and local transportation systems? Do local and regional plans and policies support the alternative?

Freight impacts were measured for improving mobility (serving future volumes, improving travel time, providing system connections), reducing congestion, and improving safety.

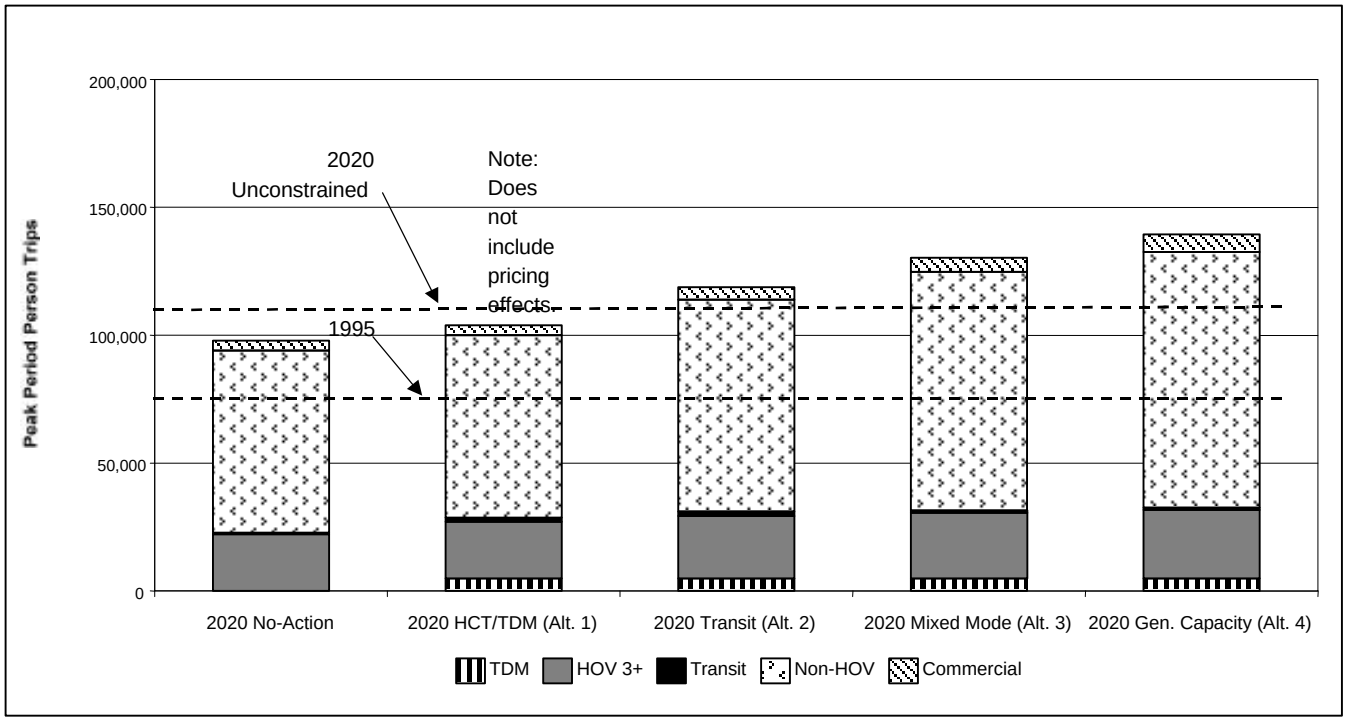
Criterion: Serve as Much of the 2020 Peak Period Travel Demand within the Corridor as Possible

P.M. Peak and Daily Period Person Volumes by Mode Across 3 Screenlines

Person volumes were summarized at three screenline locations: Bothell (north) at the King County/Snohomish County line; Bellevue (central) through downtown Bellevue along NE 8th Street; and Renton (south) between SR 167 and SR 181. On average, the No Action peak person demand at the screenlines is 34 percent higher than the 1995 base conditions as shown in Figures 3.12-1A, 3.12-1B, and 3.12-1C. This demand is consistent with growth expectations within the study area. The trend in daily person-trips is similar to the peak period.

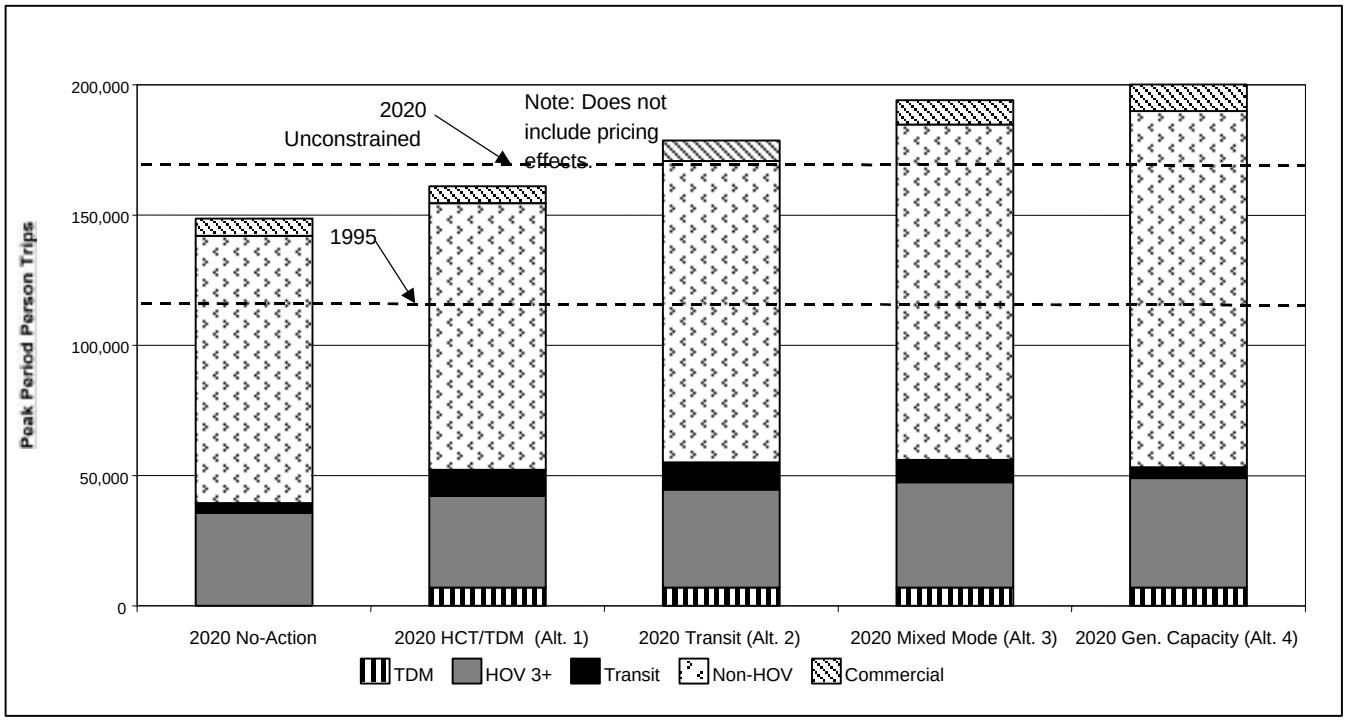
Appendix I contains additional daily vehicle volumes for 30 screenlines throughout the study area. Relative trends in peak-period and person trips can be inferred from these data.

Figure 3.12-1A: Peak Period Person Demand by Mode: Bothell Screenline



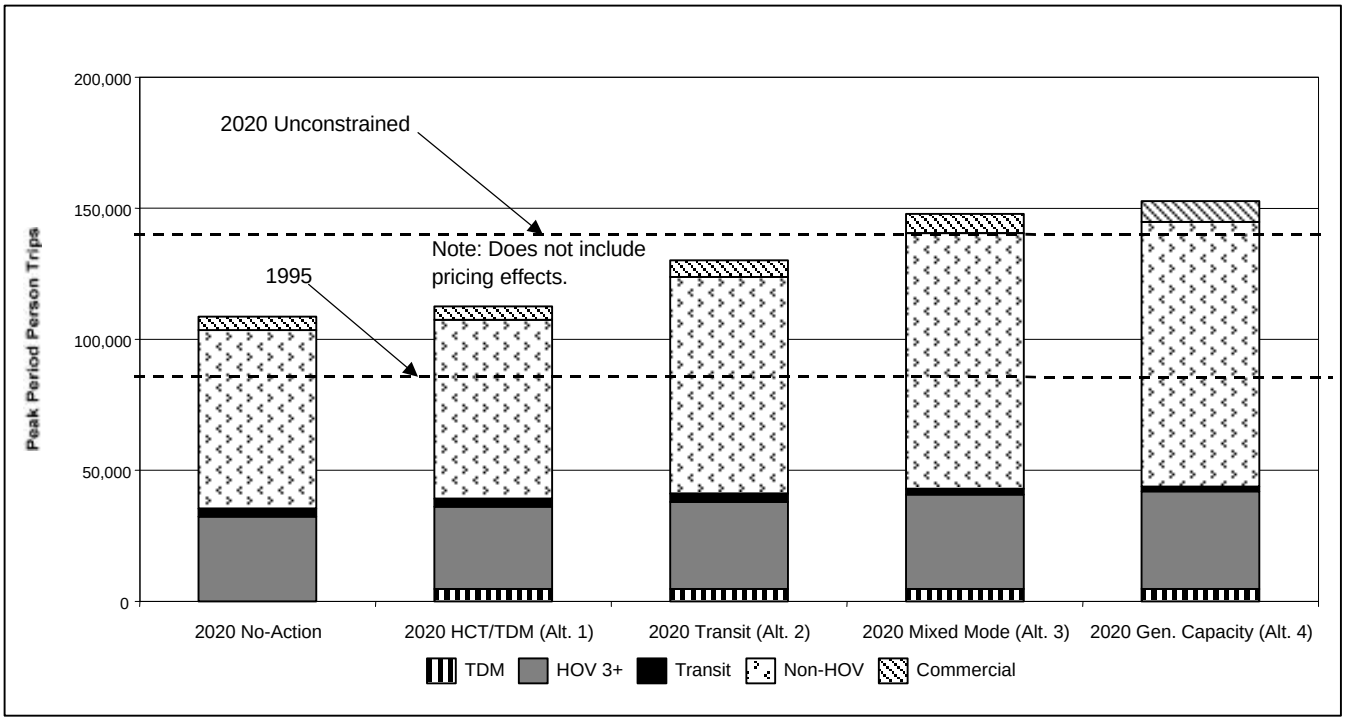
Source: PSRC Model, Parsons Brinckerhoff

Figure 3.12-1B: Peak Period Person Demand by Mode: Bellevue Screenline



Source: PSRC Model, Parsons Brinckerhoff

Figure 3.12-1C: Peak Period Person Demand by Mode: Renton Screenline



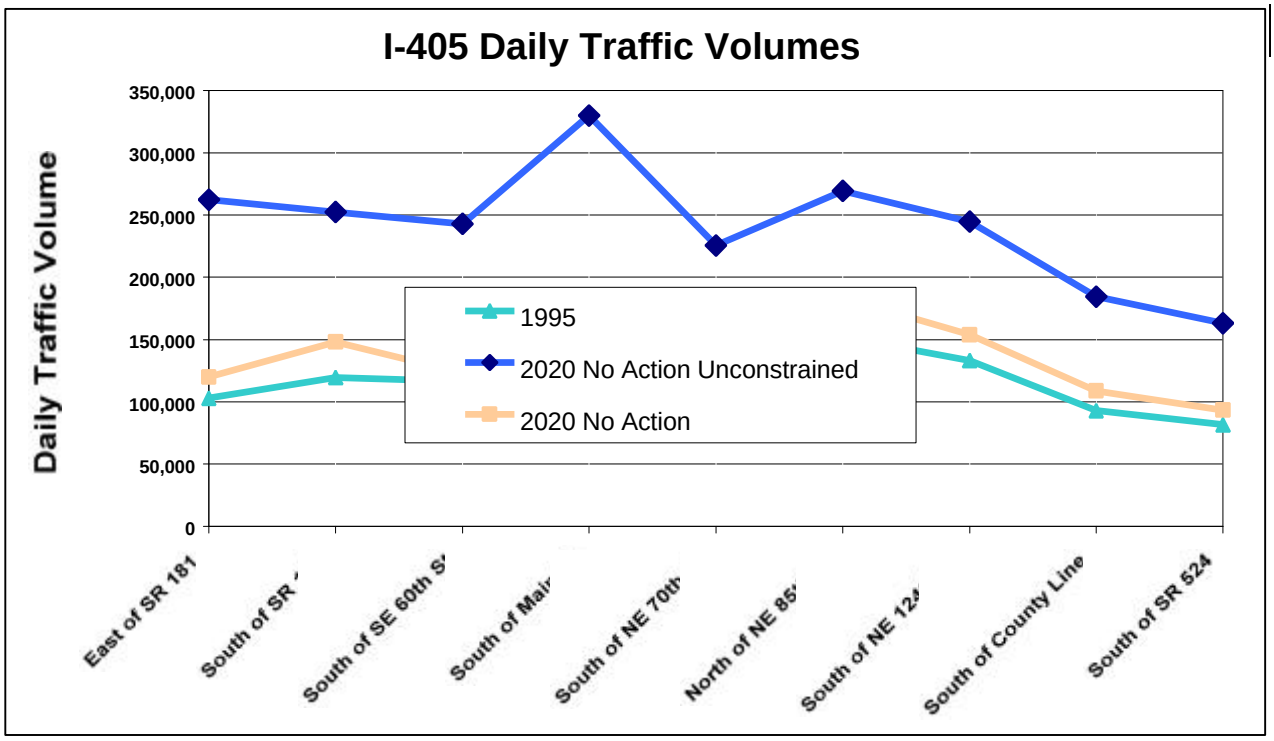
Source: PSRC Model, Parsons Brinckerhoff

Daily and P.M. Peak Period Traffic Volumes by Types of Vehicles (SOVs, HOVs, and Trucks)

On average across these screenlines, peak vehicle demand is 21 percent higher than the 1995 base conditions. This demand is lower than the person demand, reflecting increases in carpooling and transit usage by 2020 due to the general worsening of congestion and the relative travel time advantages of the HOV lanes on major freeways.

The No Action Alternative accommodates lower levels of person demand than any of the action alternatives. Daily traffic volumes along I-405 are shown in Figure 3.12-2. The No Action Alternative volumes are only about 10 percent higher than the 1995 volumes due to the limited spare capacity available on the existing freeway; much of the demand occurs on parallel arterials instead of on I-405. During peak periods, I-405 cannot absorb much more demand; as a result, there is a growing spillover of demand to the parallel arterials.

Figure 3.12-2: I-405 Daily Traffic Volumes at Selected Locations



Note: Data are derived from the PSRC Travel Model and are intended for comparative use only. These freeway data have not been adjusted to match current I-405 volumes, but show similar volume trends throughout the corridor.

Source: PSRC Model

Daily Traffic Volume Shifts Between Facilities

Each alternative was examined with respect to potential shifts in travel patterns between facilities. Vehicular and person volume increases are due to two primary factors: (1) travel demand shifts from heavily congested roadways inside and outside the study area, and (2) changes in travel mobility within the study area that result in different trip patterns and longer trips being made. Traffic shifts onto I-405 were found to come from the I-5 and SR 99 corridor, from East King County, and shifts of trip patterns within the study area. The No Action Alternative provides the baseline for comparison of travel demands among the action alternatives.

The effects of other induced demand are expected to be minimal for the No Action Alternative. However, a test was made to determine whether the land use patterns assumed in the PSRC model would be affected if no additional transportation infrastructure were provided. Section 3.13 (Land Use) documents the results of this analysis, which showed that the overall effects on expected development patterns under the No Action Alternative were small at the regional level.

Criterion: Improve Reliability of Travel Times for All Modes

The reliability of travel time is influenced by the system's ability to move vehicles under various conditions. When more vehicles enter into a transportation network than the capacity provides, the system becomes unstable and slowdowns occur. Fluctuating volumes are most often caused by increased commuter travel demand, weekday volume fluctuations, seasonal volume variations, and special events.

When a system is operating in unstable conditions, heavy rain, accidents, vehicle breakdowns, and other incidents easily disrupt the flow of traffic and cause major delays. Additionally, if the system is not designed to manage such incidents with adequate shoulder widths, sight distances, and other such design features, delays can become more severe and travel times become highly unpredictable. Reliability can also be affected by the presence of redundant facilities in the transportation system. A network of interconnected roadway or transit facilities provides better reliability than a system that emphasizes the use of a limited number of facilities.

Travel time reliability for non-SOV modes such as carpools and transit is the same as the general purpose as long as those vehicles travel with SOVs in mixed conditions. However, when HOV modes are provided with exclusive right-of-way, they can travel in a highly predicable manner.

Overall, under the No Action Alternative, the reliability of travel times would degrade and become much worse than the existing conditions in 1995. The duration of traffic congestion would increase from 4.5 to 5.8 hours a day, spreading beyond the traditional peak periods, and worsening the reliability of travel times. Sections of the existing facilities that do not meet current design standards would not be improved. Similarly, 2-person carpools and transit vehicles would be caught in the growing congestion outside of the 2020 HOV (3+) system.

Criterion: Provide Flexibility to Accommodate Post-2020 Travel Demands

This criterion was measured by looking at the future flexibility of each alternative to accommodate travel demands beyond the year 2020. The issue was addressed from two perspectives: How much system capacity is remaining beyond 2020? Is there potential for the system to adapt to changing needs and conditions?

Comparing the 2020 travel demands, by mode, to the capacity provided by an alternative allowed a qualitative assessment of the remaining capacity available for future growth beyond 2020. In addition, the design and operation of each alternative was examined to provide a qualitative assessment of its ability to be expanded and to adapt to technologies that could be implemented during the next 20 years or beyond.

Additional travel forecasts to the year 2030 were conducted to assist in this analysis. The 2030 forecasts follow a consistent growth trend that was projected from 1995 to 2020, resulting in around a 10 percent increase in regional trips from 2020 to 2030. Within the study area, daily travel on the street system would increase from 5 to 15 percent depending upon the specific location.

The No Action Alternative would have minimal available capacity for travel growth remaining after 2020. By 2030, daily traffic volumes on I-405 are forecasted to increase by only 5 percent over 2020. However, the volumes on the already congested arterials would continue to increase at a faster rate than I-405, as they carry the growing spillover traffic from I-405.

The No Action Alternative contains facilities and programs that are extensions of existing conditions. There are few unique features that would provide potential for adapting to new technologies or designs. The No Action Alternative does include several applications of intelligent transportation systems (ITS) that would continue to maximize the efficiency of the current system.

Criterion: Reduce Travel Times for All Modes Door-to-Door Compared with Current Conditions

This criterion is applied to measure the door-to-door travel time for selected origins and destination trips during the P.M. peak period for three types of trips: general traffic (including 2-person carpools), HOVs (carpool 3+ and vanpool), and transit. The study selected six trips that

represent a wide range of typical travels mostly using the facilities in the study area. The 2020 travel times of these six trips for the P.M. peak hour under the No Action Alternative are compared with the 1995 conditions. Table 3.12-4 shows the travel times for general traffic in 1995, No Action, and four action alternatives. Table 3.12-5 shows HOV travel times. In Tables 3.12-6 and 3.12-7, the transit travel times are analyzed by the two types of access to transit service — walk-and-ride and park-and-ride.

Table 3.12-4: General Traffic P.M. Peak Travel Time Comparisons Between Existing (1995), No Action Alternative, and Action Alternatives

	General Traffic[a] Travel Time (Minutes)										
Trips	1995	2020 No Action	Change from 1995	Alt 1	Change from NA[b]	Alt 2	Change from NA[b]	Alt 3	Change from NA[b]	Alt 4	Change from NA[b]
Bellevue CBD to Federal Way/Kent	56	79	+23	79	0	72	-7	67	-12	65	-14
Renton to Mill Creek	65	84	+19	84	0	78	-6	73	-12	71	-14
Bellevue CBD to Edmonds/Lynnwood	42	55	+13	55	0	50	-5	46	-9	45	-11
Tukwila/Sea-Tac to Redmond/Overlake	49	61	+13	61	0	57	-4	53	-8	52	-10
Issaquah/Cougar Mtn. To Bothell/Kenmore	46	62	+15	62	0	58	-4	55	-7	54	-8
Issaquah/Cougar Mtn. to Federal Way/Kent	56	74	+19	74	0	70	-5	68	-7	67	-8

[a] Single occupant vehicles, 2-person carpools, trucks
[b] Change compared to No Action Alternative
Source: Puget Sound Regional Council (PSRC) Model

Table 3.12-5: HOV Traffic P.M. Peak Travel Time Comparisons

	HOV 3+ Travel Time (Minutes)										
Trips	1995	2020 No Action	Change from 1995	Alt 1	Change from NA[a]	Alt 2	Change from NA[a]	Alt 3	Change from NA[a]	Alt 4	Change from NA[a]
Bellevue CBD to Federal Way/Kent	40	42	+3	41	0	41	-2	41	-2	41	-1
Renton to Mill Creek	49	51	+2	50	0	50	-1	50	-1	50	0
Bellevue CBD to Edmonds/Lynnwood	38	36	+1	36	0	36	0	36	-4	37	0
Tukwila/Sea-Tac to Redmond/Overlake	39	42	+3	42	0	42	-1	42	-1	42	0
Issaquah/Cougar Mtn. To Bothell/Kenmore	39	45	+6	45	0	45	0	45	-1	45	-1
Issaquah/Cougar Mtn. To Federal Way/Kent	47	51	+5	50	-1	50	0	50	-1	51	-1

[a] Change compared to No Action Alternative
Source: Puget Sound Regional Council (PSRC) Model

Table 3.12-6: Transit P.M. Peak Period Travel Time Comparisons for Walk-and-Ride

Trips	Transit Travel Time with Walk-and-Ride Access (Minutes)										
	1995	2020 No Action	Diff from 1995	Alt 1	Diff from NA[a]	Alt 2	Diff from NA[a]	Alt 3	Diff from NA[a]	Alt 4	Diff from NA[a]
Bellevue CBD to Federal Way/Kent	95	95	0	77	-17	77	-18	82	-12	92	-2
Renton to Mill Creek	125	126	+1	99	-27	99	-27	109	-17	117	-9
Bellevue CBD to Edmonds/Lynnwood	85	84	-1	77	-7	77	-7	80	-4	79	-4
Tukwila/Sea-Tac to Redmond/Overlake	116	116	0	86	-30	85	-31	88	-27	112	-3
Issaquah/Cougar Mtn. To Bothell/Kenmore	108	114	+6	100	-14	100	-14	99	-15	107	-7
Issaquah/Cougar Mtn. To Federal Way/Kent	132	130	-2	108	-22	108	-22	116	-14	125	-5

[a] Change compared to No Action Alternative
Source: PSRC Model

Table 3.12-7: Transit P.M. Peak Period Travel Time Comparisons for Park-and-Ride

Trips	Transit Travel Time with Park-and-Ride Access (Minutes)										
	1995	2020 No Action	Diff from 1995	Alt 1	Diff from NA[a]	Alt 2	Diff from NA[a]	Alt 3	Diff from NA[a]	Alt 4	Diff from NA[a]
Bellevue CBD to Federal Way/Kent	83	85	+2	69	-16	68	-17	73	-12	83	-2
Renton to Mill Creek	105	112	+7	90	-22	89	-23	95	-17	104	-8
Bellevue CBD to Edmonds/Lynnwood	76	73	-3	67	-6	67	-6	67	-6	68	-5
Tukwila/Sea-Tac to Redmond/Overlake	103	102	-1	78	-24	78	-24	83	-19	101	-1
Issaquah/Cougar Mtn. To Bothell/Kenmore	98	104	+6	93	-11	92	-12	91	-13	98	-6
Issaquah/Cougar Mtn. To Federal Way/Kent	118	119	+1	101	-18	101	-18	107	-12	114	-5

[a] Change compared to No Action Alternative
Source: PSRC Model

The resulting analyses for the No Action Alternative showed the following results:

General Traffic.

Minimal new general traffic capacity is added to the transportation system. As a result, the travelers of all of the six trips would take much longer in 2020 than current conditions. The additional delays would be substantial, in the range of 13 to 19 minutes more than the current conditions. Overall, the 2020 travel times would be 25 to 40 percent slower than current trip times.

HOVs.

The 2020 travel times for HOVs for those six trips would be similar to the 1995 travel times.

Transit.

As is the case for the HOV trips, the 2020 No Action Alternative transit travel times would change little compared with the existing travel times. Transit travel times remain considerably higher than general traffic times for comparable trips.

Freight.

From a freight mobility perspective, the No Action alternative addresses few of the criteria. Committed improvements include the SB to SB ramp at I-405/SR 167, the Coal Creek interchange, and a few arterial improvements. It provides little relief for the problems affecting freight movement in the corridor.

Criterion: Reduce the Share of Peak Period and Daily Trips by Single-Occupant Vehicles

This criterion looked at the percentage of P.M. peak period trips by mode (HOV 3+ and transit) at three screenlines located in Bothell, Bellevue, and Renton (Figures 3.12-1A, 3.12-1B, and 3.12-1C). The pedestrian and bicycle mode was not estimated. In 2020, the regional HOV occupancy policy is assumed be HOV 3+ and is built into the PSRC travel forecasts used in these analyses for all HOV facilities.

Using the HOV 3+ definition, there would be a considerable increase in HOVs by 2020. HOV 3+ usage in the HOV lanes would range from 24 percent in Bothell, to 25 percent in Bellevue, to 32 percent in Renton. In addition, 2-person carpools (HOV 2+) would continue to comprise 10 to 20 percent of the total screenline person demand even though these vehicles would no longer be able to use the HOV lanes. Many of these carpools are expected to be for non-work purposes (e.g., shopping, recreation).

Transit usage increases are small for all three screenlines. The largest increase is at the Bellevue screenline, where peak-period usage increases from 1 percent to 3 percent in 2020; Renton stays in the 2 percent range, while Bothell remains less than 1 percent of the P.M. peak-period person-trips.

High-capacity transit (HCT) is not included in the No Action Alternative.

Criterion: Provide Effective Connections to Regional and Local Transportation Systems

There are two measures under this criterion: 1) the compatibility of the improvement package with the regional transportation systems, and 2) compatibility with local transportation systems. The regional transportation system refers to connections to the regional freeway network. I-405 is connected at the following interchanges to other regional facilities: I-5 (Sea-Tac); SR 167 (Renton); I-90 (Bellevue); SR 520 (Bellevue); and I-5 in the vicinity of Lynnwood.

The No Action Alternative assumes that the existing conditions of the HOV lane system would continue into the future. The existing I-405 facilities are not effectively connected with the regional transportation systems for both general_purpose and HOV traffic. Given that travel demands within the I-405 corridor system in 2020 would increase substantially, the compatibility problem for general_purpose (GP) traffic would degrade and the conditions would become worse.

Problems related to the compatibility with local transportation systems exist in the I-405 corridor today. The compatibility problem between I-405 and local transportation systems would worsen if no action is taken within the I-405 corridor beyond the No Action Alternative improvements.

Congestion Impacts

Traffic congestion along I-405 is widespread during the morning and afternoon peak periods and has spread to surrounding time periods. The use of the measure "hours of congestion" examines the number of vehicles on a road compared to the available capacity, hour-by-hour. For purposes of this analysis, "congestion" is defined as travel speeds below 45 mph on the freeway and 25 mph on arterials. The hours of congestion were estimated separately for I-405, other freeways, and arterials within the study area.

Criterion: Reduce Congestion on Study Area Freeways and Arterials Below Current Levels

Table 3.12-8 shows the estimated hours of congestion for the existing and No Action conditions for each alternative on I-405 and other freeways and arterials in the study area. The last row in the table shows average hours of congestion for all facilities combined.

The hours of congestion on 5 out of 8 segments of I-405 would worsen under the No Action Alternative, compared with the existing conditions. The extended hours of traffic congestion are in a range of 1-4 hours per direction. Of the remaining 3 segments, two would remain the same and one segment from I-90 to SR 520 would improve slightly. Three out of eight sections would operate with more than 10 hours of congestion in 2020 (I-5 to SR 167, SR 167 to NE Park Drive, and NE Park Drive to I-90). The average hours of congestion on other freeways in the study area would extend to five hours from the current three hours; on the arterials, hours would extend to five from the current four hours today.

Table 3.12-8: Hours of Traffic Congestion by I-405 Segment for Existing, No Action, and Action Alternatives

	Hours of Congestion and the Change from No Action Alternative										
I-405 Segment and Arterials	1999	No Action (NA)	Change from 1999	Alt 1	Change from NA[a]	Alt 2	Change from NA[a]	Alt 3	Change from NA[a]	Alt 4	Change from NA[a]
I-5 to SR 167	12	13	+1	13	0	12	-1	6	-7	10	-3
SR 167 to NE Park Dr.	10	14	+4	14	0	13	-1	10	-4	9	-5
NE Park Dr. to I-90	10	11	+1	11	0	12	+1	13	+2	13	+2
I-90 to SR 520	9	8	-1	8	0	5	-3	5	-3	4	-4
SR 520 to NE 85th St.	5	5	0	5	0	5	0	4	-1	5	0
NE 85th Street to NE 124th St.	5	9	+4	9	0	8	-1	5	-4	5	-4
NE 124th St. to SR 522	4	8	+4	8	0	6	-2	5	-3	5	-3
SR 522 to I-5	5	6	+1	6	0	3	-3	1	-5	2	-4
Average of I-405	7	7	0	7	0	6	-1	5	-2	4	-3
Average of Other Freeways	3	5	+2	5	0	4	-1	4	-1	3	-2
Average of Arterials	3	5	+2	5	0	4	-1	4	-1	4	-1
Average of All Facilities	4	5	+1	5	0	5	-1	4	-1	4	-1

[a] Change compared to No Action Alternative (NA)
Source: PSRC Model, Mirai Associates

Vehicle miles of travel (VMT) is a measure of total vehicle trips per day multiplied by the length of the trip (in miles). VMT is summarized at the study area level and regional level and portrays overall changes in travel activity that may occur in response to an alternative. Vehicle hours of travel (VHT) is a similar measure, but captures the quality of travel in terms of travel time.

Table 3.12-9 summarizes the changes in study area and regional daily VMT and VHT for the No Action Alternative compared to 1995 base conditions. Within the I-405 study area and regionally, the growth in VHT would increase at a much higher rate than growth in VMT. This result correlates with the increased congestion levels that are expected to occur in the 2020 No Action Alternative. The VMT changes were relatively consistent during the peak and off-peak periods. However, the increase in VHT was found to be much higher (+160 percent in the study area; +97 percent region-wide) during the P.M. peak period in comparison to other times during the day.

Table 3.12-9: VMT and VHT for Study Area and Region-wide – Existing, No Action Alternative 2020, and Action Alternatives

Alternative	VMT (Daily)		VHT (Daily)	
	Study Area (trips within)	Region-wide	Study Area (trips within)	Region-wide
1995	16,346,000	69,412,000	586,000	2,295,000
2020 No Action Alternative	22,510,000	100,571,000	1,156,000	3,948,000
Change vs. 1995 (%)	37.7%	44.9%	97.3%	72.0%
Alternative 1	22,563,000	100,497,000	1,155,000	3,941,000
Change vs. No Action Alternative(%) Change vs. 1995	0.2% 38.0%	-0.1% 44.7%	-0.1% 97.2%	-0.2% 71.7%
Alternative 2	24,215,000	101,560,000	1,164,000	3,922,000
Change vs. No Action Alternative(%) Change vs. 1995	7.6% 48.1%	1.0% 46.3%	0.7% 98.6%	–0.7% 70.9%
Alternative 3	25,346,000	102,263,000	1,170,000	3,907,000
Change vs. No Action Alternative (%) Change vs. 1995	12.6% 55.0%	1.7% 47.3%	1.2% 99.7%	-1.0% 70.2%
Alternative 4	26,208,000	102,730,000	1,184,000	3,903,000
Change vs. No Action Alternative (%) Change vs. 1995	16.4% 60.3%	2.1% 48.9%	2.4% 102.0%	-1.14% 70.1%

Source: PSRC Model

Average speeds portray the deterioration of travel conditions between the current conditions in 1995 and 2020 and the speed forecasted under each alternative. Table 3.12-10 shows the average speeds for the study area freeways and state routes.

Table 3.12-10: Average Travel Speeds on Study Area Freeways and State Routes

Alternative	Average Speeds in mph (A.M. Peak Period/P.M. Peak Period/Daily)		
	I-405	Study Area (Trips Within)	Region-Wide
Existing 1995	39/33/37	30/24/28	31/28/30
2020 No Action Alternative	34/25/31	26/13/19	29/20/25
Alternative 1	34/25/31	26/13/19	29/20/25
Alternative 2	38/28/35	27/13/21	29/20/26
Alternative 3	42/32/39	28/14/22	29/21/26
Alternative 4	44/34/41	29/14/22	30/21/26

Source: PSRC Model

The local jurisdictions in the I-405 study area are facing serious traffic concurrency problems. If those issues are not managed effectively and addressed adequately by 2020, it is possible that the projected growth might not be realized. The existing concurrency problems in most of the local jurisdictions would be exacerbated in the future with the No Action Alternative. Traffic congestion on I-405 and arterials is expected to increase. The analysis results show virtually every jurisdiction within the study area would reach or exceed concurrency levels by 2020. The land use analysis (Section 3.13) shows that the No Action Alternative may force some land use growth to occur outside of the I-405 study area, partially due to restricted transportation accessibility. The effects of the alternatives on future land use are discussed in the Cumulative and Indirect Effects section (3.23).

Safety Impacts

Criterion: Improve the Safety for All Modes Above Current Levels

The safety analysis examined the effects of alternatives on reducing the number of accidents in high accident locations and decreasing the potential for traffic accidents throughout the I-405 corridor.

Committed projects in the No Action Alternative improve 15 percent of the high accident locations (HALs) within the study area on I-405, I-90, I-5, and the state routes, and 6 percent of the HALs on local streets.

The system-level safety analysis considered the following factors: type of facilities (freeway, arterial; facility design characteristics); the proportion of facilities designed to standards; amount of travel (measured by VMT); the amount of congestion; and traffic patterns in the area. Using WSDOT data assembled for Puget Sound area facilities, the total, injury, and fatal accident rates were developed. The analysis, Table 3.12-11, shows that injury and fatal accidents in the study area are expected to increase by 40 percent between 1999 and 2020.

Table 3.12-11: Study Area Accidents in 1999, No Action Alternative, Action Alternatives

Alternative	Total Accidents (per million VMT)	Injury Accidents (per million VMT)	Fatal Accidents (per 100 million VMT)
1999	10,060 (1.92)	5,910 (1.12)	40 (0.76)
No Action Alternative (2020)	13,900 (2.10)	8,340 (1.26)	56 (0.84)
Alternative 1	13,840 (2.10)	7,480 (1.26)	55 (0.84)
Alternative 2	13,840 (1.93)	8,120 (1.13)	55 (0.77)
Alternative 3	13,640 (1.79)	7,920 (1.04)	54 (0.71)
Alternative 4	13,310 (1.79)	7,680 (1.04)	53 (0.71)

Source: PSRC Model, Mirai Associates

3.12.4.2 Alternative 1: HCT/TDM Emphasis

This alternative emphasizes reliance on a physically separated, fixed-guideway HCT system within the study area and substantial expansion of bus transit service. It also minimizes addition of new impervious surface from general_purpose transportation improvements by placing emphasis on non-construction mobility solutions and transportation demand management (TDM) strategies.

Transportation demand strategies are emphasized in this alternative, along with consideration of regional pricing strategies in the I-405 corridor. Alternative 1 includes a physically separated, fixed-guideway HCT system, probably using some form of rail technology. Transit service would be increased up to 100 percent. I-405 improvements would be limited to minor actions aimed at improving safety and key congestion "hot spots." Minimal improvements would be made to arterials.

Construction Impacts

This alternative would have minimal road construction resulting in the least impact to existing traffic during construction compared to other action alternatives. Much of the HCT alignment would be separated from existing roadways, while HCT alignments that follow existing roadways would be located above, beside, or below existing lanes. Construction of the fixed-guideway HCT within the existing BNSF right-of-way would likely impact the operation of the existing freight and dinner trains along that corridor. In Alternative 1, the basic freeway improvements could be completed by 2010, while the extensive high-capacity transit system construction could extend until 2018. Minimal impacts to arterial or neighborhood traffic patterns would be expected during construction of Alternative 1.

Operational Impacts

Transportation operational impacts are defined with respect to three categories of criteria:

1. Mobility impacts: Travel demand by mode, travel times, compatibility
2. Congestion impacts: Hours of congestion, system performance
3. Safety impacts: High accident locations; accident rates

The key findings from the technical studies are identified in the following sections.

Mobility Impacts

Mobility was evaluated with six performance measures.

Criterion: Serve as Much of the 2020 Peak-Period Travel Demand Within the Corridor as Possible

P.M. Peak-Period Person Volumes by Mode Across 3 Screenlines

The peak person demand in Alternative 1 is virtually unchanged from No Action Alternative conditions. There was a minimal change in demand on parallel arterials.

Daily and P.M. Peak Period Traffic Volumes by Types of Vehicles (SOVs, HOVs, and Trucks)

The peak vehicle demand is virtually unchanged from the No Action Alternative. Daily traffic volumes along I-405 are shown along with other action alternatives in Figure 3.12-2.

Daily Traffic Volume Shifts between Facilities

Travel patterns are very similar to the No Action Alternative with no meaningful shifts between facilities or other induced travel effects.

Criterion: Improve Reliability of Travel Times for All Modes

Transit trip reliability would be greatly improved in Alternative 1. A high-capacity transit (HCT) system would operate on an exclusive right-of-way. This situation would provide high levels of travel time predictability for users of the HCT system. The travel time reliability for general traffic would be slightly better than under the No Action Alternative. The improvements

to accident and congestion "hot spots" along I-405 would help reduce delays due to incidents. The reliability would remain worse than existing conditions due to higher levels and duration of congestion. HOV conditions would be similar to the No Action Alternative.

Criterion: Provide Flexibility to Accommodate Post-2020 Travel Demands

Available Capacity in 2020

The transit element of Alternative 1 would have substantial capacity to serve additional persons after 2020. Once built and operational, the fixed-guideway would operate at about 25 percent of the new capacity. The fixed-guideway system can easily respond to increased demand by adding more cars. Such capacity would need to be matched with future transit demand in the corridor.

In contrast, I-405 and the arterial system would remain highly congested as in the No Action Alternative. By 2030, daily traffic volumes in the study area would be very similar to the No Action Alternative condition. This alternative accommodates the second lowest number of persons of the action alternatives.

Potential for Adaptability

Alternative 1 contains a fixed-guideway transit system that offers several opportunities for expansion and modification as demand and technology change. The I-405 and arterial elements would provide limited opportunities for further expansion unless additional capacity was incorporated into the facility design. The alternative includes several applications of intelligent transportation systems (ITS) that would continue to maximize the efficiency of the current system.

Criterion: Reduce Travel Times for All Modes Door-to-Door Compared with Current Conditions

General Purpose Traffic.

The travel times for general purpose travel under Alternative 1 would the same as the No Action Alternative, as shown in Table 3.12-4.

HOVs.

The travel times for HOVs (3+) under Alternative 1 conditions would not change substantially from No Action Alternative. There may be one or two minutes of travel time reduction for certain trips as shown in Table 3.12-5.

Transit.

Alternative 1 would improve transit travel times considerably compared to the No Action Alternative. As shown in Tables 3.12-6 and 3.12-7, the transit travel time reductions for the seven trips are in the range of 7 to 30 minutes for walk-and-ride access, and from 6 to 24 minutes for park-and-ride access. The largest travel time change from the No Action Alternative condition would be for the trip from Tukwila/SeaTac to Redmond/Overlake with a 30-minute travel time reduction for walk-and-ride access. From Renton to Mill Creek, the transit travel times would be shortened by 27 minutes and 22 minutes with walk-and-ride and park-and-ride access, respectively. Two transit trips would have a relatively small improvement in travel time: three to five minutes from the Bellevue CBD to the Seattle CBD, and six to seven minutes from the Bellevue CBD to Edmonds/Lynnwood.

Most of the travel time improvements are due to reductions in in-vehicle transit times. Walk access times also decrease due to more transit routes and more frequent service.

Freight

In terms of the corridor criteria, Alternative 1 provides minimal relief to congestion and does not serve future truck volumes and provide good connections as well as some of the other alternatives. Alternative 1 does not include any additional improvements at the SR 167/I-405 interchange, which is the single most critical bottleneck according to recent surveys of trucking interests done for the FASTrucks effort. There are no connecting arterial improvements or other arterial capacity improvements in this alternative. These arterials are important connectors trucks use to access industrial and warehouse locations.

Alternative 1 could have a negative impact on rail freight movement in the corridor if portions of the rail line are used for high-capacity transit.

Criterion: Reduce the Share of Peak Period and Daily Trips Made by Single-Occupant Vehicles

Modal Shares

HOV usage in Alternative 1 is very similar to the No Action Alternative conditions before considering the effects of TDM (discussed below). Transit usage at all three screenlines would increase. Bothell transit usage increases to 2 percent of the total P.M. peak period trips with a 100 percent increase in total transit trips. Bellevue peak period transit usage would increase by 250 percent; as a result transit mode increases to 7 percent of P.M. peak period trips due to the concentration of transit services and physically separated, fixed-guideway HCT facilities in that area. Renton peak period transit usage would increase by 80 percent compared to the No Action Alternative, although the transit share would only increase from 2 to 3 percent.

Transportation Demand Management Program Effects

Alternative 1 includes a TDM program that is common to each action alternative. This program would provide important financial and service incentives to encourage trip reduction. In addition, Alternative 1 includes a regional 'congestion pricing' strategy. All of these TDM effects were estimated separately from the other travel forecasting processes. As shown in Table 3.12-12, the corridor TDM program was estimated to affect about 5 percent of the daily demand within the study area, and up to 10 to 15 percent of the peak-period demand. These results are based upon a review of comparable TDM programs around the nation applied to characteristics found within the I-405 corridor.

Table 3.12-12: I-405 TDM Program Effectiveness

TDM Element	Estimated Reduction in Daily Travel Demand[a]	Estimated Reduction in A.M. Peak Period Travel Demand[a]	Estimated Reduction in P.M. Peak Period Travel Demand[a]
Vanpooling	0.9%	2.7%	1.6%
Public Information	0.25 - 0.75%	1.0 – 2.0%	0.7 – 1.5%
Employer-Based	0.5 – 1.0%	2.0 – 3.5%	1.5 – 2.5%
Land Use as TDM	1.0 – 2.5%	3.5 – 5.0%	2.0 – 3.5%
Misc. Programs	0.5 – 1.0%	1.25 – 2.5%	0.75 – 1.25%
Total Estimated Travel Demand (VMT) Reduction	**3 – 6%**	**10 - 15%**	**7 – 10%**
Pricing[b]	15%	Not Estimated	Not Estimated
Total Estimated Travel Demand Reduction, Alt. 1 only	**18-21% (Note: may include some double-counting of benefits)**	**Not Estimated**	**Not Estimated**

[a] Results measured in terms of percent reduction in vehicle miles of travel (VMT).

[b] Pricing is included in Alternative 1 only. Regional congestion pricing effects have been studied as part of the Puget Sound Regional Council's *2001 Update Metropolitan Transportation Plan* (PSRC, 2000)

Source: WSDOT

Taken as a whole, the transit and TDM strategies contained in Alternative 1 could result in a reduction of peak-period single-occupant trips (i.e., SOV = one person per vehicle) in the 10 percent range. The transit forecasts indicated that the improved transit mobility would result in higher numbers of transit trips being made without affecting the total amount of vehicle trips (i.e., slightly more overall trips are occurring within the corridor to offset the shift to transit). Therefore, most of the potential SOV trip reduction comes from the supportive effects of the TDM strategies.

The primary effects of the TDM program would be to shift single-occupant vehicle users into carpools, vanpools, and transit. Some peak-period and daily trips may also be eliminated. A planning level analysis was conducted to estimate these relative effects on the different modes during the P.M. peak period. The preliminary findings show that possible effects of the TDM program on the P.M. peak period person-trips for each mode are as follows (without pricing effects):

- Single-occupant vehicles (SOV): reduced 5 to 10 percent
- HOV (carpools, vanpools): increased up to 10 percent
- Transit: increased 20 to 30 percent depending on incentives
- Total person-trips: reduced less than 2 percent

Pricing Effects

Research to-date indicates that congestion pricing can have a major effect on overall regional travel. For example, a scenario was tested that in essence doubled the variable cost of driving a vehicle (approximately $0.20 to $0.25 per mile), which would vary by time of day and congestion levels. Under this scenario, short-range vehicle miles of travel were estimated to be reduced by up to 15 percent on a daily basis. This scenario's effectiveness is shown in Table 3.12-12. Additional regional research will be required to refine these estimates and to characterize the effects of pricing within the I-405 in a regional context and to examine the effects of pricing with the variety of other TDM strategies that are included in the I-405 alternatives.

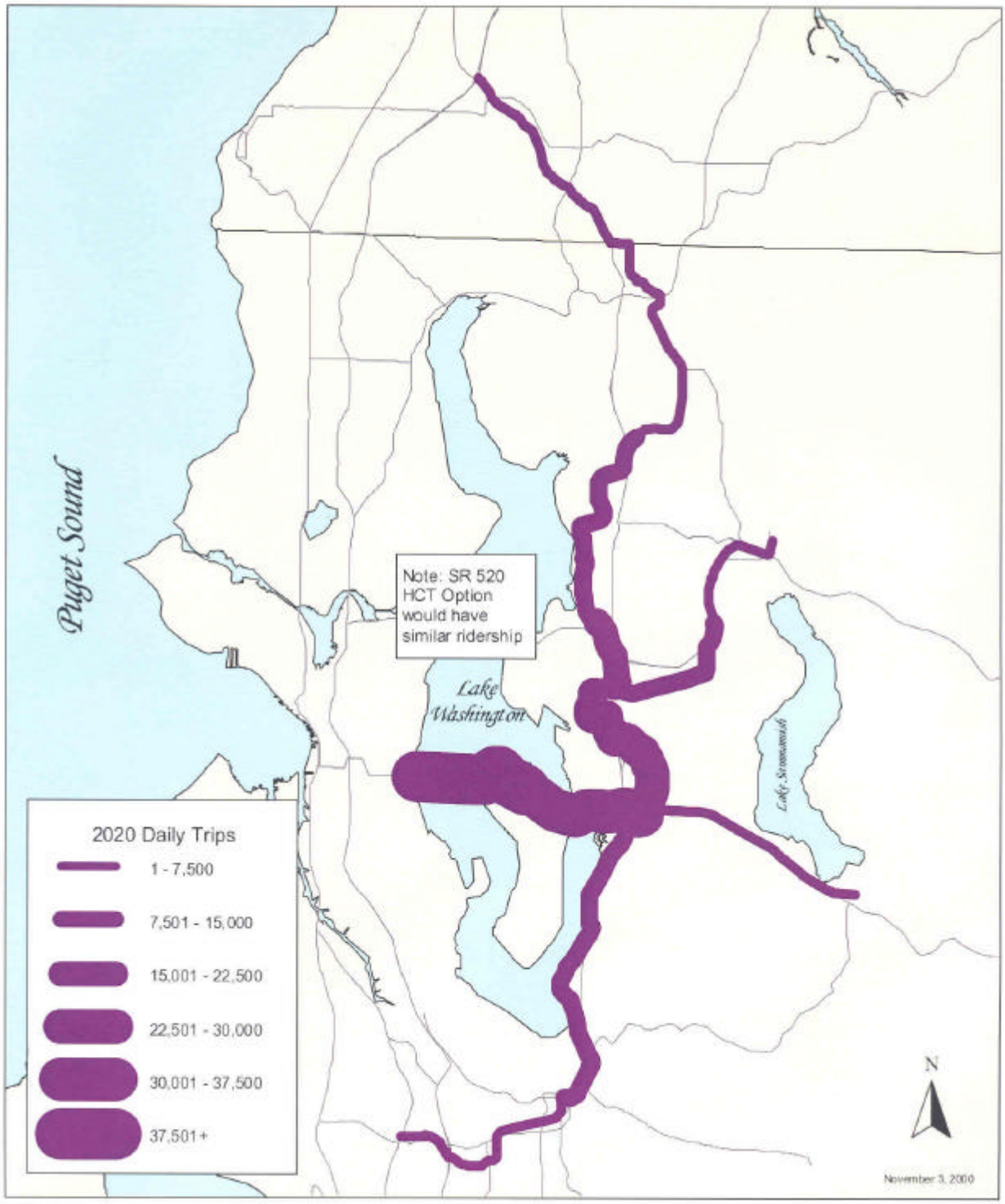
Transit Riders

The segments of highest fixed-guideway HCT ridership (e.g., at least 15,000 riders per day) fall within the central portion of the study area from south Kirkland to Factoria as shown in Figure 3.12-3. Ridership to the north and south along I-405 beyond these points is in the 7,500 to 15,000 range from Factoria to Renton and Kirkland to Totem Lake. The Bellevue to Overlake segment also attracts ridership in that range. Outside of these segments, daily transit ridership is estimated to fall below 7,500 persons.

HCT Service Plan Sensitivity Test

As a sensitivity test, the transit forecast for Alternative 1 was re-run assuming a different HCT service plan. The overall HCT operating parameters (e.g., vehicle speed, number of stations, alignment) were kept the same as Alternative 1. However, the sensitivity test service plan assumed that HCT vehicles would run directly from an origin station to the destination station for the passengers on that vehicle, bypassing intermediate station stops. This would result in faster transit trips along the HCT guideway. The service plan also assumed that this direct station-to-station service could occur between any stations on the Eastside HCT network, including the I-405, SR 520, and I-90 lines, allowing, for example, a direct no-transfer trip between Kirkland and Issaquah. This service plan would result in increased transit usage throughout the study area ranging from a 6 percent increase in Renton to a 25 percent increase at the Bothell screenline.

Figure 3.12-3: High Capacity Transit Daily Ridership - Alternative 1



A second sensitivity test assuming a commuter rail line estimated the 2020 daily ridership that could be expected on a line from Tukwila to Kirkland. This analysis provided updated information contained in previous studies of commuter rail in the corridor. The analysis indicated that an Eastside commuter rail line from Tukwila to Kirkland would carry about 1,800 to 1,900 daily passengers in 2020. If the trains were directly routed from the I-405 corridor to Sound Transit's south commuter rail line to Tacoma, the ridership could grow to about 2,800 passengers a day.

Criterion: Provide Effective Connections to Regional and Local Transportation Systems

The urban centers of the Eastside and Seattle would be connected with a high-capacity transit system under this alternative. The compatibility with the regional HCT system would be excellent. However, the I-405 HOV lanes would not be connected with direct freeway-to-freeway HOV ramps to the other freeway HOV lanes. The compatibility with the regional HOV system would be the same as the No Action Alternative.

This alternative assumes that there would be no major freeway improvements to enhance the general purpose traffic connectivity. The compatibility with the regional freeway network is the same as the No Action Alternative. Overall, this alternative would make the compatibility problem slightly better than under the No Action Alternative. Alternative 1 does not improve mobility on the local system.

This alternative supports improvements in pedestrian and bicycle circulation. Those improvements would enhance the compatibility with local transportation systems.

Congestion Impacts

Criterion: Reduce Congestion on Study Area Freeways and Arterials Below Current Levels

Table 3.12-8 shows the projected hours of congestion for Alternative 1, compared with the No Action Alternative and action alternatives. Although the high capacity transit system assumed to be in place by 2020 for this alternative would reduce traffic congestion slightly, it would not be enough to change hours of congestion. For practical purposes, the hours of congestion under the Alternative 1 conditions are the same as under the No Action Alternative.

Table 3.12-9 summarizes the changes in the study area and region for daily VMT and VHT. Before the effects of TDM strategies are considered, the change in VMT and VHT is very small.

Average travel speeds remain the same as the No Action as seen in Table 3.12-10.

Since Alternative 1 would not act to reduce the levels of traffic congestion on I-405, compared with the No Action Alternative, it would not be effective in addressing the concurrency problems at the local level. Unless local jurisdictions lower their acceptable levels of service standards, concurrency problems would continue to threaten growth in each local jurisdiction under this alternative.

Safety Impacts

Criterion: Improve the Safety for All Modes Above Current Levels

Alternative 1 would improve 32 percent of the high accident locations (HALs) on I-5, I-90, I-405, and state routes, with 40 percent of the HALs on I-405 improved and 9 percent of the HALs on local streets improved.

The system-wide effect of improvements under Alternative 1 would result in a slight reduction in the number of accidents (Refer to Table 3.12-11). This can be attributed to the basic improvements package of actions along I-405 in Alternative 1. The overall accident rates were actually unchanged from No Action Alternative conditions.

Several non-motorized hazard locations would be improved with Alternative 1.

Conclusion

After careful study and consideration of public and agency comments received on the Draft EIS (contained in Volume 2 of the FEIS), the co-lead agencies concluded that Alternative 1 would not meet the adopted purpose and need for the I-405 Corridor Program. In the best professional judgment of agency staff, this alternative is not a reasonable alternative to achieve the purpose and need because of its inability to provide meaningful long-term improvement in general purpose mobility, freight mobility, or reduction in foreseeable traffic congestion. Although it is likely that an aggressive pricing strategy could reduce VMT by about 15 percent based on national experiences, as discussed under operational impacts in Section 3.12.4.2 above, without roadway expansion, Alternative 1 would:

- accommodate a minimal amount of the increased peak-period person travel demand in 2020;
- have minimal effect on reliability of travel time for general traffic;
- not be expected to reduce travel times for either general purpose or 3+ HOVs;
- not provide truck freight mobility improvements in the corridor;
- not reduce congestion; and
- provide no meaningful improvement in overall safety on I-405 or other study area facilities.

Because it provides little benefit beyond that resulting from the No Action Alternative, Alternative 1 is not considered a cost-effective solution for potential implementation.

3.12.4.3 Alternative 2: Mixed Mode with HCT/Transit Emphasis

Alternative 2 emphasizes transit through implementation of a physically separated, fixed-guideway HCT system and major expansion of bus transit service, similar to Alternative 1. It also emphasizes improved mobility for other travel modes by providing HOV and general purpose roadway improvements on I-405 and connecting arterials. One general purpose lane each direction is added to I-405. Alternative 2 also includes a TDM package of strategies.

Construction Impacts

The fixed-guideway HCT and bus transit construction impacts for Alternative 2 are similar to Alternative 1. Alternative 2 also includes adding one lane in each direction on I-405 and would require modifications to some bridges and interchanges, although most of the construction activity could be focused within the I-405 right-of-way. Construction would require some temporary narrowing of lanes and shoulders. Temporary detours and lane closures would be allowed during non-peak hours. Although efforts would be made to maintain the existing number of lanes during construction, most traffic control measures would result in some decrease in capacity and increases in roadway congestion during the construction periods. In Alternative 2, the freeway widening construction could extend over a 6- to 8-year period ending after 2010. Construction within any given 5-mile segment of freeway would likely be limited to a 3- to 4-year period, during which localized impacts to connecting arterials and interchanges would be

sequenced. The HCT system construction period could extend until 2018. Arterial improvements would occur throughout the 2005 to 2015 period.

There would be anticipated construction impacts on traffic resulting from the reduction of lane capacity along I-405. The analyses suggest that spillover traffic to parallel arterial routes would occur during the construction period, primarily during evenings, nights, and weekends. Parallel arterials, such as Coal Creek Parkway, Bellevue Way, 148th Ave, SR 202, and Lake Washington Boulevard, would likely experience some traffic increases. There would also be the potential for short-term increases in local street cut-through traffic to avoid construction-related traffic impacts such as interchange or arterial connection closures. Implementation of an expanded TDM program and transit service would be essential to provide mobility choices to travelers during construction.

Operational Impacts

Transportation operational impacts are defined with respect to three categories of criteria:

1. Mobility impacts: Travel demand by mode, travel times, compatibility
2. Congestion impacts: Hours of congestion, system performance
3. Safety impacts: High accident locations; accident rates

The key findings from the technical studies are identified in the following sections.

Mobility Impacts

Mobility was evaluated using six performance measures.

Criterion: Serve as Much of the 2020 Peak Period Travel Demand Within the Corridor as Possible

In Alternative 2, the corridor handles 15 to 20 percent more demand than the No Action Alternative. As a result, some traffic would shift from other corridors to I-405.

P.M. Peak-Period Person Volumes by Mode Across 3 Screenlines

The peak person demand in Alternative 2 increases by 15 to 20 percent compared with No Action Alternative conditions. Most of the increase in demand occurs in response to the added lanes on I-405 and the increase in travelers using transit and the fixed-guideway HCT system. There is a 7 to 10 percent reduction in demand on north-south parallel arterials in Bellevue and Renton.

Daily and P.M. Peak Period Traffic Volumes by Types of Vehicles (SOVs, HOVs, and Trucks)

The peak vehicle demand is virtually unchanged from No Action conditions. Daily traffic volumes along I-405 are shown along with other action alternatives in Figure 3.12-2. Daily traffic volumes along I-405 increase by 25 to 60 percent, compared to the No Action Alternative volumes. The greatest traffic increases are south of I-90, with increases of 40 to 60 percent.

Daily Traffic Volume Shifts between Facilities

Alternative 2 produces small shifts in travel patterns within the I-405 corridor. About one-third of the I-405 growth can be attributed to a demand shift from the I-5/SR99 corridor. Over half of the growth is attributable to changing travel patterns and generally longer trips in the study area.

Other effects of induced travel associated with Alternative 2 are expected to be minimal.

Criterion: Improve Reliability of Travel Times for all Modes

The general traffic travel time reliability in Alternative 2 would be better than the No Action Alternative. When the general purpose lanes (one in each direction) are added, those sections of I-405 would be constructed to current design standards, enhancing safety and reducing incidents that slow down traffic. Improvements to accident and congestion "hot spots" along I-405 would also help reduce delays due to incidents. The hours of congestion would be shorter than under the No Action Alternative conditions, improving the traveler's ability to predict travel times. These effects would also improve freight reliability. Transit reliability would be enhanced by fixed-guideway HCT system that would operate on an exclusive right-of-way similar to Alternative 1. HOV (3+) travel time predictability would improve due to additional HOV direct access ramps.

Criterion: Provide Flexibility to Accommodate Post-2020 Travel Demands

Available Capacity in 2020

As described in Alternative 1, the transit system would have substantial capacity to serve additional persons after 2020 by adding more vehicles to meet future demand.

Conversely, Alternative 2 would have minimal available roadway capacity remaining after 2020. Although the alternative could accommodate 2020 person demands that are up to 15 percent higher than the No Action Alternative, this alternative would not accommodate the total demand within the corridor. By 2030, daily traffic volumes within the study area would use up this limited available capacity.

Potential for Adaptability

Alternative 2 is similar to Alternative 1.

Criterion: Reduce Travel Times for all Modes Door-to-Door Compared with Current Conditions

General Purpose Traffic

The travel times for general purpose travel under Alternative 2 would be reduced. As shown in Table 3.12-4 travel time for the seven trips decreases on average from one to seven minutes, resulting in a 6 to 9 percent improvement over the No Action Alternative travel times.

HOVs

The travel times for HOVs (3+) under Alternative 2 conditions would not change substantially from the No Action Alternative. There may be one or two minutes of travel time reduction for certain trips as shown in Table 3.12-5.

Transit

Alternative 2 would improve transit travel times considerably compared to the No Action Alternative. As shown in Tables 3.12-6 and 3.12-7, the transit travel time reductions for the seven trips are almost the same as Alternative 1. Similarly, most of the travel time improvements are due to reductions in in-vehicle transit times. Walk access times also decrease due to more transit routes and more frequent service.

Freight

Alternative 2 would improve truck freight travel times and mobility. The alternative contains a directional SR 167/I-405 interchange, connecting freeway improvements, some arterial capacity

improvements, and one additional GP or auxiliary lane in each direction on I-405 – all positive for freight movement. Like Alternative 1, this alternative could have negative impacts on the rail freight movements along the BNSF.

Criterion: Reduce the Share of Peak-Period and Daily Trips Made by Single-Occupant Vehicles

Taken as a whole, the transit and TDM strategies contained in Alternative 2 could reduce peak-period SOV trips by 10 percent. The TDM program would also provide major financial and service incentives to encourage ridesharing. It is estimated that these incentives could result in a 20 to 30 percent additional increase in transit use, and 10 percent increase in HOV 3+. Transit ridership is similar to Alternative 1 (if pricing is not included).

Criterion: Provide Effective Connections to Regional and Local Transportation Systems

As with Alternative 1, this alternative would provide excellent connections among the urban centers with the fixed-guideway HCT system. The compatibility with the regional HOV system would be much improved under this alternative. Freeway-to-freeway HOV direct access connections would be added at I-5 in Tukwila, SR 167 in Renton, I-90, SR 520, SR 522, and I-5 in Lynnwood. HOVs would then have exclusive lanes to travel between the I-405 HOV system and other HOV systems.

In addition to adding one general_purpose lane on I-405 in each direction, this alternative assumes that segments of the freeways connecting with I-405, such as I-90, SR 520, SR 522, and I-5, would be improved to ensure adequate interchange ramp capacity. Therefore, the compatibility with the regional general_purpose transportation network, including truck freight movements, would be much better than the No Action Alternative.

Overall, this alternative would have higher levels of compatibility with local transportation plans. Actions would be taken to improve arterials in the vicinity of the I-405 interchanges, and the configuration and capacity of I-405 interchanges would be improved. Those improvements are designed to match the added general_purpose capacity on I-405 with arterial capacity. Together, these improvements would enhance general_purpose traffic, including truck movement. Many of the existing and anticipated incompatibility problems identified in the No Action Alternative would be addressed in the proposed improvements in this alternative.

Since most of the arterial improvements in this alternative have been previously adopted in the local transportation plans, actions to implement those improvements would make this alternative more compatible with local transportation plans.

Congestion Impacts

Criterion: Reduce Congestion on Study Area Freeways and Arterials Below Current Levels

The capacity improvements proposed in Alternative 2 would reduce the hours of traffic congestion on most segments of I-405, compared with the No Action Alternative.

Average I-405 congestion levels would be around six hours per day, which is similar to current levels. The average congestion total for all roads would be slightly better than the No Action Alternative. Table 3.12-8 shows the projected hours of congestion for Alternative 2, compared with the No Action Alternative and action alternatives.

As shown in Table 3.12-9, before the effects of TDM strategies are considered, the study area VMT would increase by up to 8 percent (+1 percent regionally), while changes in VHT are very small. The TDM program included in Alternative 2 was estimated to result in a 3 to 6 percent

daily VMT reduction, which would offset the VMT increase created by the added capacity on I-405. Changes in VHT due to the TDM program, although not estimated, could be expected to show a similar reduction.

Average speeds in the study area are shown in Table 3.12-10. Alternative 2 results in an increase in average speed on I-405 during all time periods, while overall study area speeds improve slightly and regional average speeds are virtually unchanged.

Alternative 2 adds capacity to I-405 and provides some reduction in study area traffic congestion, compared with the No Action Alternative. In addition, this alternative assumes that capacity of some arterials in the study area would be expanded. Therefore, this alternative would slightly reduce the magnitude of the concurrency problems that the local jurisdictions would face in the future. However, the concurrency improvement would be fairly limited since considerable unmet travel demand remains and few arterial improvements are included with this alternative.

Safety Impacts

Criterion: Improve the Safety for All Modes Above Current Levels

Alternative 2 would improve 60 percent of the high accident locations (HALs) on I-5, I-90, I-405, including 80 percent of the HALs on I-405 and 19 percent of the HALs on local streets. See Table 3.12-11.

The system-wide effect of improvements under Alternative 2 is a slight decrease in the number of accidents, despite a greater amount of travel in the corridor. The decrease can be attributed to geometric improvements on I-405 provided by the addition of the general purpose lanes, the basic improvements package, and the shift of traffic from arterial routes to I-405.

Several potentially hazardous locations for pedestrians and bicycles would be improved with Alternative 2.

3.12.4.4 Alternative 3: Mixed Mode Emphasis

This alternative emphasizes mobility improvements through implementation of a bus rapid transit (BRT) system, substantial expansion of bus transit service, and substantial HOV and general purpose roadway improvements on I-405 and connecting arterials. Two additional lanes in each direction replace the auxiliary and climbing lanes contained in the No Action Alternative. Alternative 3 includes a bus rapid transit system using the existing HOV lanes on I-405, I-90, and SR 520. Selected arterial missing links would be completed together with planned arterial capacity improvements of local jurisdictions.

Construction Impacts

The process of adding two lanes in each direction on I-405 would increase the duration and extent of impacts to traffic throughout the study area. Construction would require rebuilding or modifying most bridges and interchanges. Construction would require some temporary narrowing of lanes and shoulders. Temporary detours and lane closures would be allowed during non-peak hours. Although efforts would be made to maintain the existing number of lanes during construction, most traffic control measures would result in some decrease in capacity and increases in roadway congestion during the construction periods.

During the construction period, travel time reliability for general traffic would be difficult to manage. However, extensive use of evening, night, and weekend construction times and innovative construction techniques would help maintain reliability during these periods.

Parallel arterial facilities such as Coal Creek Parkway, Bellevue Way, 148th Ave, SR 202, and Lake Washington Boulevard would likely experience some traffic increases. There would also be the potential for short-term increases in local street cut-through traffic to avoid construction-related traffic impacts such as interchange or arterial connection closures.

Depending on funding, the freeway widening construction in Alternative 3 could extend over a 10- to 12-year period. Construction within any given 5-mile segment of freeway would likely be limited to a 3- to 4- year period, during which localized impacts to connecting arterials and interchanges would be sequenced. Impacts to travelers would vary according to the specific location, time, and length of their trip.

The bus rapid transit system portion of Alternative 3 can begin service in the short term on the existing HOV lanes and can provide opportunities to accommodate the corridor person demand that is affected during freeway construction. Implementation of an expanded TDM program and local transit service would also be essential to provide mobility choices to travelers during major construction along I-405. The north-south arterial improvements included in Alternative 3 could also occur earlier in the construction period to provide some traffic relief to persons affected by the freeway construction.

Operational Impacts

Transportation operational impacts are defined with respect to three categories of criteria:

1. Mobility impacts: Travel demand by mode, travel times, compatibility
2. Congestion impacts: Hours of congestion, system performance
3. Safety impacts: High accident locations; accident rates

The key findings from the technical studies are identified in the following sections.

Mobility Impacts

Mobility was evaluated by using six criteria.

Criterion: Serve as Much of the 2020 Peak-Period Travel Demand Within the Corridor as Possible

P.M. Peak-Period Person Volumes by Mode Across 3 Screenlines

On average, the peak person demand in Alternative 3 increases by 25 to 30 percent compared with No Action Alternative conditions. Demand on I-405 would increase by up to 75 percent on some segments. Most of the increase in demand occurs due to the added freeway capacity and expanded transit service.

Daily and P.M. Peak Period Traffic Volumes by Types of Vehicles (SOVs, HOVs, and Trucks)

The peak vehicle demand in Alternative 3 increases by 30 percent compared with No Action Alternative conditions. Daily traffic volumes along I-405 are shown along with other action alternatives in Figure 3.12-2. Demand increases 66 percent at Bothell and Bellevue screenlines and doubles in Renton.

Daily Traffic Volume Shifts between Facilities

The major widening of I-405 in Alternative 3 results in substantial increases in peak-period travel demand across the three screenlines within the study area. Most of this growth shows up on I-405 itself. Of the total increase in I-405 daily traffic (compared to the No Action Alternative), up to 45 percent can be attributed to changing travel patterns and somewhat longer trips being made. Another major source for trip growth on I-405 is a shift in travel from the general I-5/SR 99 corridor through Seattle. This shift represents 30 to 35 percent of the I-405 demand increase and results in about a 3 percent reduction in north/south travel within Seattle. Lesser traffic shifts occur from the parallel north/south arterials in the I-405 corridor (10 to 15 percent of daily I-405 volume increase) and from east King County facilities (5 to 10 percent). A related effect of the widening of I-405 is the increase in travel demand on roadways connecting to I-405. Increases of around 10 percent were estimated on the east/west arterials and freeways (e.g., SR 520, I-90) that provide primary access to I-405.

Over 90 percent of the added trips on I-405 would have trip lengths in excess of 10 miles, with almost 60 percent being over 30 miles in length.

The substantial increase in roadway capacity provided in Alternative 3 could result in shifts in land use patterns and study area trip making. A test was made to determine the land use effects of the improved accessibility provided by Alternative 3. Section 3.13 (Land Use) documents the results of this analysis, which showed that Alternative 3 causes some clustering of development patterns within the study area but does not affect the overall growth assumed by local and regional plans. In the short run after implementation (prior to 2020), the substantial improvement in mobility provided by Alternative 3 could result in an increase in the number of discretionary trips made within the corridor. By 2020 and beyond, these effects are expected to be minimal in comparison with the high growth in overall study area and regional trips produced.

Criterion: Improve Reliability of Travel Times for all Modes

This alternative would provide higher levels of general traffic travel time reliability than the No Action Alternative. The expansion of I-405 mainline capacity under this alternative would improve general reliability. While I-405 would handle a higher proportion of the corridor travel demand, each mainline section would be reconstructed to current standards, and many interchanges along I-405 would be upgraded to meet standards. As a result, this alternative would greatly improve the ability to manage incidents and provide additional opportunities for vehicles on the freeway to bypass those incidents. Several north-south arterials would also be improved to provide motorists with better travel options should I-405 become blocked or slowed. The duration of traffic congestion would also be reduced, leading to better travel time reliability for both general traffic and freight.

HOV (3+) travel time predictability would improve due to additional HOV direct access ramps that allow HOVs to bypass congestion.

The bus rapid transit system in Alternative 3 would take advantage of the extensive HOV facilities to provide reliable bus travel times. This good reliability is dependent upon managing the demand in the HOV lanes by restricting their use to three-or-more-person carpools.

Criterion: Provide Flexibility to Accommodate Post-2020 Travel Demands

Available Capacity in 2020

Alternative 3 would have available corridor person capacity remaining after 2020. Alternative 3 would accommodate 2020 person demand that is up to 25 percent higher than No Action Alternative conditions.

The bus rapid transit element of Alternative 3 would have capacity to serve additional persons after 2020. Once built, the BRT would operate at up to 30 percent of the new capacity. The BRT system can easily respond to increased demand by adding more buses. A BRT system should be able to meet additional post-2020 ridership demand in the corridor provided that additional bus equipment and operating revenues are available; park-and-ride and transit center capacity are sufficient; and speed and reliability performance criteria are met running in a predominantly HOV lane ROW environment. Long-term demand may require transit center expansion and reserved bus lanes and curb space in urban centers.

I-405 congestion levels would improve to better than current conditions in 2020 with the added capacity provided in Alternative 3. By 2030, however, daily traffic volumes within the study area would use up most of this capacity.

Potential for Adaptability

Alternative 3 contains a BRT system that offers limited post-2020 opportunities for physical facility expansion within the I-405 ROW. However, lane designation and user group management modifications, including the introduction of a high-occupancy/toll (HOT) lane, offer long-range BRT system enhancement opportunities. In addition, ITS innovations would help to maximize the efficiency for present and future systems.

Criterion: Reduce Travel Times for all Modes Door-to-Door Compared with Current Conditions

General Purpose Traffic

Compared with the No Action Alternative travel times, Alternative 3 would substantially reduce travel times for the general purpose traffic, including freight. The travel time reduction would be from 11 to 16 percent (from 7 to 12 minutes). Most general traffic travel times would still remain longer than the 1995 trips times (Table 3.12-4).

HOVs

The travel times for HOVs (3+) under Alternative 3 conditions would not change considerably from No Action. There may be one or two minutes of travel time reduction for certain trips (Table 3.12-5).

Transit

Alternative 3 would improve transit travel times considerably compared to the No Action Alternative, as shown in Tables 3.12-6 and 3.12-7. Most of the travel time improvements are due to reductions in in-vehicle transit times. Walk access times also decrease due to more transit routes and more frequent service.

Freight

Alternative 3 would provide significant capacity increases in the highway system that would be beneficial to truck freight movement. This alternative is similar to Alternative 2 except that it

contains two additional GP lanes in each direction on I-405 and more arterial capacity improvements. Truck travel time reliability would improve and delay would be reduced. Along with Alternative 4, this alternative is the most positive for freight movement. Since HCT (bus rapid transit) would be confined to the freeway lanes in Alternative 3, rail freight movement would not be affected.

Criterion: Reduce the Share of Peak-Period and Daily Trips Made by Single-Occupant Vehicles

Taken as a whole, the transit and TDM strategies contained in Alternative 3 could result in a reduction of peak-period single-occupant trips in the 10 percent range (refer to Table 3.12-12: I-405 TDM Program Effectiveness). Daily transit ridership along the BRT segments in Alternative 3 is similar to that shown for the HCT segments of Alternative 2.

The TDM program effects in Alternative 3 would be similar to Alternative 2. It is estimated that the combination of additional vanpools and carpooling incentives could result in up to an additional 10 percent increase in HOV 3+ mode share and a 20 to 30 percent additional increase in peak-period transit use.

Criterion: Provide Effective Connections to Regional and Local Transportation Systems

Overall, the transit system compatibility with the regional system is much better in Alternative 3 than under the No Action Alternative.

This alternative assumes that the urban centers would be served by a bus rapid transit system using the HOV lanes and direct HOV access interchanges. These HOV interchanges would also allow interface with the regional passenger rail network. The freeway-to-freeway direct HOV ramp connections would also be provided. The general_purpose traffic capacity of I-405 would be expanded substantially under this alternative, as well as the connecting freeway capacity. As a result, the compatibility with the regional general_purpose transportation network would be better than under the No Action Alternative.

Overall, this alternative would have high levels of compatibility with local transportation plans. The compatibility problems existing under the No Action Alternative would be reduced or largely eliminated. General_purpose traffic, including truck freight movement, would be improved substantially. Since many of the arterial improvements in this alternative have been adopted in the local transportation plans, actions to implement those improvements would make this alternative more compatible with local transportation plans. Key arterial "missing links" would be added or improved to provide better roadway connectivity within the study area. Some additional arterial projects would need to be integrated into local plans.

Congestion Impacts

Criterion: Reduce Congestion on Study Area Freeways and Arterials Below Current Levels

Alternative 3 would reduce the hours of traffic congestion substantially as shown in Table 3.12-8. In the southern sections of I-405, the hours of congestion would be shortened by up to seven hours a day between SR 167 and I-5. Most of the segments in the north section would operate with less than five hours of congestion, which would be better than conditions today.

When hours of traffic congestion for all the I-405 segments are averaged, five hours of congestion are projected, two hours less than the No Action Alternative and better than current conditions. Average hours of congestion on arterials and other freeways also improve by one hour a day. The average congestion total for all roads would improve to levels similar to current conditions.

Table 3.12-9 shows that before the effects of TDM strategies are considered, the study area VMT would increase by up to 13 percent (+2 percent regionally). Regional VMT would increase about 1 percent, although regional VHT would decrease. The TDM program would result in reducing daily VMT by 3 to 6 percent. This reduction would offset part of the VMT increase created by the substantial added capacity provided on I-405 and connecting facilities. Although not estimated, VHT reductions could be expected to be similar to those shown for VMT.

As shown in Table 3.12-10, average speeds on I-405 and in the study area improve substantially in the corridor, but only slightly region-wide.

The capacity expansions on I-405 assumed in Alternative 3 would shift some traffic back to I-405 from the arterials. Additional arterial capacity would also be provided. As a result, the levels of service on the freeway and arterial system are expected to improve, compared with the No Action Alternative. These actions would assist local jurisdictions to better manage their concurrency problems. Since Alternative 3 would take several years to implement, short-term concurrency issues would remain.

Safety Impacts

Criterion: Improve the Safety for All Modes Above Current Levels

Alternative 3 would improve 60 percent or 36 of the high accident locations (HALs) on I-5, I-90, I-405, and state routes, including 80 percent of the HALs on I-405 and 19 percent of the HALs on local streets (Table 3.12-11). The addition of two general purpose (GP) lanes and other basic improvements would generally improve the geometrics of the freeway corridor.

Accidents and accident rates with Alternative 3 would decrease slightly, despite a 15 percent increase in vehicle miles traveled. System-wide, while accidents would increase on I-405 due to the greater volumes, there would be a net reduction in total accidents in the study area and accident rates. This results from a shift in traffic away from more hazardous arterial streets.

Several nonmotorized hazard locations would be improved with Alternative 3.

3.12.4.5 Alternative 4: General Capacity Emphasis

This alternative emphasizes general purpose capacity by providing one additional lane in each direction on I-405, improving major interchanges, and constructing a new four-lane I-405 express roadway consisting of two lanes in each direction with limited access points. In addition, there would be an expansion of major arterial routes and connections to I-405. Limited transit service expansion and the core TDM strategies would also be included.

Construction Impacts

The addition of six lanes of roadway capacity in the I-405 corridor in Alternative 4 would have substantial impacts on traffic compared to the other alternatives because of the extensive use of grade- and barrier-separated alignments, especially in the southern segment between Tukwila and I-90. Downtown Bellevue would be less of a problem because the express lanes could be on BNSF right-of-way. However, overall there would be more lane miles of existing roadways that would be exposed to construction, which could extend for up to 15 years with completion around 2020.

The higher costs and more extensive and complex designs would result in longer periods of traffic impacts during construction. Construction would require some temporary narrowing of

lanes and shoulders. Temporary detours and lane closures would be allowed during non-peak hours. Partial roadway closures would also be expected during certain times during reconstruction of interchanges and connections to the express roadway. However, extensive use of evening, night, and weekend construction times and innovative construction techniques would help maintain reliability during these periods.

Construction within any given 5-mile segment of freeway would likely be limited to a 4- to 5-year period, during which localized impacts to connecting arterials and interchanges would be sequenced. Impacts to travelers would vary according to the specific location, time, and length of their trip. It is possible that portions of the express roadway could be constructed first to serve as a bypass route during reconstruction of the I-405 mainline.

The magnitude and duration of the construction activities for Alternative 4 suggest that spillover traffic to parallel arterial routes would occur. Parallel arterials such as Coal Creek Parkway, Bellevue Way, 148th Ave, SR 202, and Lake Washington Boulevard would likely experience traffic increases. There would also be the potential for short-term increases in local street cut-through traffic to avoid construction-related traffic impacts. Implementation of an expanded TDM program and transit service would be essential to provide mobility choices to travelers during construction. The North-South arterial improvements included in Alternative 4 could also occur earlier (e.g., 2006-2012) in the construction period to provide some traffic relief to persons affected by the freeway construction.

Operational Impacts

Transportation operational impacts are defined with respect to three categories of criteria:

1. Mobility impacts: Travel demand by mode, travel times, compatibility
2. Congestion impacts: Hours of congestion, system performance
3. Safety impacts: High accident locations; accident rates

The key findings from the technical studies are identified in the following sections.

Mobility Impacts

Mobility was evaluated using six performance measures.

Criterion: Serve as Much of the 2020 Peak-Period Travel Demand Within the Corridor as Possible

P.M. Peak Period Person Volumes by Mode Across 3 Screenlines

The major widening of I-405 in Alternative 4, including the express roadway, would result in substantial increases in peak-period travel demand across the three screenlines. Most of this growth shows up on I-405 itself. On average, the peak person demand in Alternative 4 increases by 30 to 35 percent compared with No Action conditions. Person demand on I-405 (including the express roadway) increases about 70 percent in downtown Bellevue, and over 80 percent at the Renton and Bothell screenlines. Most of the increase comes from non-carpools (SOVs and 2-person carpools) using the additional lanes in this alternative.

Daily and P.M. Peak Period Traffic Volumes by Types of Vehicles (SOVs, HOVs, and Trucks)

On average, the peak-period vehicle demand increases by 38 percent, and daily traffic volumes by 60 to 130 percent compared to the No Action Alternative. Daily traffic volumes along I-405 are shown along with other action alternatives in Figure 3.12-2.

Daily Traffic Volume Shifts between Facilities

Travel shifts in Alternative 4 were found to be similar to Alternative 3. However, Alternative 4 has unique features due to the express roadway. This results in changing trip patterns and mobility within the study area that contribute to an increase in trip lengths along I-405. Over 90 percent of the added trips on I-405 (compared to the No Action condition) would have trip lengths in excess of 10 miles, with over 50 percent being more than 30 miles in length. From 20 to 30 percent of the express roadway demand are trips passing through the study area. This is a much higher proportion of through trips than the No Action Alternative condition.

The substantial increase in roadway capacity provided in Alternative 4 could influence shifts in study area trip-making. In the short run after implementation (prior to 2020), the substantial improvement in mobility provided by Alternative 4 could result in an increase in the number of discretionary trips (i.e., part of induced travel) made within the corridor. By 2020 and beyond, these effects are expected to be minimal in comparison with the high growth in overall study area and regional trips produced.

Criterion: Improve Reliability of Travel Times for all Modes

Alternative 4 improves general traffic travel time compared to the No Action Alternative. Most segments of I-405 would be reconstructed to add one additional travel lane plus a four-lane expressway. Current design standards would be used to design the roadway facilities. The express roadway could be designed and managed to operate with high levels of service to minimize travel time delays and increase reliability. General purpose traffic, including freight, would benefit from these improvements.

Transit would continue to operate in the HOV lanes. The transit travel time reliability could be maintained at existing levels, depending upon how the lanes are managed to avoid overcrowding. HOV (3+) reliability would benefit from the addition of HOV freeway-to-freeway ramps.

Criterion: Provide Flexibility to Accommodate Post-2020 Travel Demands

Available Capacity in 2020

Alternative 4 would have available capacity remaining after 2020. Alternative 4 would accommodate 2020 person demands that are up to 30 percent higher than No Action conditions, and equal to or greater than the 2020 theoretical unconstrained demand. This capacity is created by the equivalent of three general purpose lanes added in each direction along I-405. Transit capacity increases would keep pace with corridor growth, but would provide minimal excess capacity after 2020. However, additional transit capacity could be provided beyond 2020 given the same provisos as stated for Alternative 3.

The expansion of I-405 with Alternative 4 could greatly reduce traffic congestion on I-405 in 2020. However, overall study area congestion levels would still be similar to current traffic conditions. By 2030, daily traffic volumes within the study area would use up most of this available capacity for further person volume growth within the corridor.

Potential for Adaptability

The I-405 capacity expansion would provide the opportunity to manage the express roadway for different user groups, such as for a high-occupancy/toll (HOT) facility. Additional expansion of I-405 could not be readily accommodated without major redesign or property acquisition. The alternative includes several applications of intelligent transportation systems (ITS) that would continue to maximize the efficiency of the current system.

Criterion: Reduce Travel Times for all Modes Door-to-Door Compared with Current Conditions

General Purpose Traffic

Alternative 4 shows the greatest improvement in general purpose traffic travel time among the action alternatives. The general traffic travel times would improve by 11 to 20 percent compared to No Action conditions throughout the study area. The general traffic travel times under Alternative 4 would remain 3 to 11 minutes longer than 1995 travel times. However, for trips focused directly along I-405 such as Bellevue CBD to Federal Way/Kent, Renton to Mill Creek, and Bellevue CBD to Edmonds/Lynnwood, travel times could be expected to improve similar to or better than current travel times (Table 3.12-4).

HOVs

The travel times for HOVs (3+) under Alternative 4 conditions would not change substantially from No Action. There may be one or two minutes of travel time reduction for certain trips (Table 3.12-5).

Transit

The transit travel time improvements in Alternative 4 are relatively modest. For both walk-and-ride access and park-and-ride access, the transit travel times under this alternative would be shortened by one to nine minutes, compared with the No Action Alternative (Tables 3.12-6 and 3.12-7).

Freight

Alternative 4 is similar to Alternative 3 in terms of providing improved truck freight mobility within the corridor. Depending upon the management tool used, the express lanes could have the capability of further reducing travel times and improving reliability for longer-distance truck trips. The BNSF line is preserved for rail freight movement in this alternative.

Criterion: Reduce the Share of Peak-Period and Daily Trips Made by Single-Occupant Vehicles

Taken as a whole, the transit and TDM strategies contained in Alternative 4 could result in a reduction of peak-period single-occupant trips in the 10 percent range. These effects are comparable with the results of Alternatives 2 and 3.

The TDM program effects in Alternative 4 would be similar to Alternative 2. It is estimated that the combination of additional vanpools and carpooling incentives could result in up to a 10 percent increase in HOV (3+) mode share compared to the results shown above. Alternative 4 contains substantial TDM strategies to encourage and support transit use. It is estimated that these incentives could result in a 20 to 30 percent increase in peak-period transit usage, although these levels would be lower than the transit usage in Alternatives 1, 2, and 3.

Criterion: Provide Effective Connections to Regional and Local Transportation Systems

Alternative 4 would connect the existing I-405 HOV lanes with the regional HOV system using direct freeway-to-freeway HOV ramps. Since fewer exclusive transit facilities would be provided, the compatibility of Alternative 4 with the regional transit system would not be as good as Alternatives 1, 2, or 3. The express lanes would be connected with the regional freeways with new ramps and would match regional general purpose traffic systems.

Overall, Alternative 4 would have high levels of compatibility with local transportation plans similar to Alternatives 2 and 3. The compatibility problems existing in the No Action Alternative would be reduced or largely eliminated. Since many of the arterial improvements in this

alternative have been adopted in the local transportation plans, actions to implement those improvements would make this alternative more compatible with local transportation plans. Key arterial "missing links" would be added or improved to provide better roadway connectivity within the study area. Some additional arterial projects would need to be integrated into local plans.

Congestion Impacts

Criterion: Reduce Congestion on Study Area Freeways and Arterials Below Current Levels

The hours of traffic congestion with facility improvements in Alternative 4 are the same as or slightly less than Alternative 3. The hours of congestion would improve substantially over the No Action Alternative as shown in Table 3.12-8.

Along I-405, the average hours of congestion would be cut from seven to four hours, a major improvement from the No Action Alternative and current conditions. The hours of congestion for other freeways and arterials would be reduced by 1 to 2 hours. On a system-wide basis, Alternative 4 would reduce congestion to four hours, which is similar to current conditions.

Table 3.12-9 summarizes the changes in VMT and VHT for Alternative 4. Before the effects of TDM strategies are considered, the study area VMT would increase up to 16 percent (+2 percent regionally). Although the study area VHT would increase by around 2 percent, it would decrease regionally. The TDM program was estimated to reduce daily VMT 3 to 6 percent.

Since I-405 and study area VMT increase much more than VHT under this alternative, there is a substantial improvement in overall vehicle speeds within the corridor. Regional average speeds improve slightly. Average travel speeds are shown in Table 3.12-10.

Alternative 4 would perform similar to Alternative 3 with regard to addressing the concurrency problems facing local jurisdictions. With the identified facility investments on I-405 and the arterial system, the resulting levels of traffic congestion would be improved and local jurisdictions would be better able to manage their concurrency problems. Since Alternative 4 would likely require the longest implementation time, the concurrency issues may not be substantially addressed for several years.

Safety Impacts

Criterion: Improve the Safety for All Modes Above Current Levels

Alternative 4 would improve 62 percent of the total high accident locations (HALs) on I-5, I-90, I-405, with 80 percent of the HALs on I-405 improved, and 19 percent of the HALs on local streets improved.

Accidents and accident rates with Alternative 4, shown in Table 3.12-11, could be expected to reduce slightly, despite the 20 percent increase in study area VMT that occurs with this alternative. The improvement in accidents with Alternative 4 can be attributed to the shift of traffic from arterial routes to I-405 and the geometric improvements provided by the new construction of additional lanes. Also, a greater percentage of total traffic using a safer freeway system would result in a lower overall accident rate.

Express Lane Demand Management

A sensitivity test was run to determine if demand for the express roadway could be managed using a pricing mechanism. The test assumed that a toll would be charged on a per-mile basis,

with varying rates during the A.M., P.M., and off-peak periods. The analysis did not assume a variable rate by user type (e.g., HOV, freight, SOV), although this could be an option.

Overall, the volumes on the express lanes were reduced by 30 to 40 percent. A relatively small shift in volume occurred back to the mainline I-405 (less than 10 percent). The resulting volumes along I-405 with tolls would be similar to the volumes forecasted for Alternative 3. The forecasts showed a small diversion of traffic back to the I-5 corridor.

These results would indicate that the effects of tolling the express roadway on I-405 would cause minimal changes in regional travel patterns or corridor demands. One conclusion could be that trips removed from the express roadway due to tolls would show up as shorter trips within the study area, or trips rerouted to other destinations. Additional analysis of the toll sensitivities to travel behavior and trip patterns would be necessary should the toll concept be advanced further within the I-405 Corridor Program.

3.12.4.6 Preferred Alternative

The Preferred Alternative emphasizes mobility improvements through implementation of a bus rapid transit (BRT) system, substantial expansion of local bus service, and HOV and general purpose roadway improvements on I-405 and connecting arterials. Up to two additional lanes in each direction replace the auxiliary and climbing lanes contained in the No Action Alternative. The Preferred Alternative includes a bus rapid transit system using HOV lanes and direct access on I-405. Selected arterial missing links would be completed together with the planned arterial capacity improvements of local jurisdictions. A corridor-wide TDM program is recommended to provide incentives for carpooling, vanpooling, and transit.

Construction Impacts

The process of adding two lanes in each direction on I-405 would increase the duration and extent of impacts to traffic throughout the study area. Construction would require rebuilding or modifying most bridges and interchanges. Construction would require some temporary narrowing of lanes and shoulders. Temporary detours and lane closures would occur. Although efforts would be made to maintain the existing number of lanes during construction, most traffic control measures would likely result in some decrease in capacity and increases in roadway congestion during the construction periods.

Parallel arterials such as Coal Creek Parkway, Bellevue Way, 148th Avenue, SR 202, and Lake Washington Boulevard would likely experience some traffic increases. There would also be the potential for short-term increases in local street traffic to avoid construction-related traffic impacts such as interchange or arterial connection closures.

The number of years required for the freeway widening construction in the Preferred Alternative will be highly dependent on funding availability. Construction within any given segment of freeway would likely be limited to a 3- to 4-year period, during which localized impacts to connecting arterials and interchanges would be sequenced. Impacts to travelers would vary according to the specific location, time, and length of their trip.

During the construction period, travel time reliability for general traffic would be difficult to manage. However, extensive use of evening, night, and weekend construction times and innovative construction techniques would help maintain reliability during these periods. The bus transit system portion of the Preferred Alternative can also begin service in the short term on the existing HOV lanes and can provide opportunities to accommodate the corridor travel demand that is affected during freeway

construction. Implementation of an expanded TDM program and local transit service would also be essential to provide mobility choices to travelers during major construction along I-405. The north-south arterial improvements included in the Preferred Alternative could also occur earlier in the construction period to provide some traffic relief to persons affected by the freeway construction.

Operational Impacts

Transportation operational impacts are defined with respect to three categories of criteria:

1. Mobility impacts: Travel demand by mode, travel times, compatibility
2. Congestion impacts: Hours of congestion, system performance
3. Safety impacts: High accident locations, accident rates

The key findings from the technical studies are identified in the following sections.

Mobility Impacts

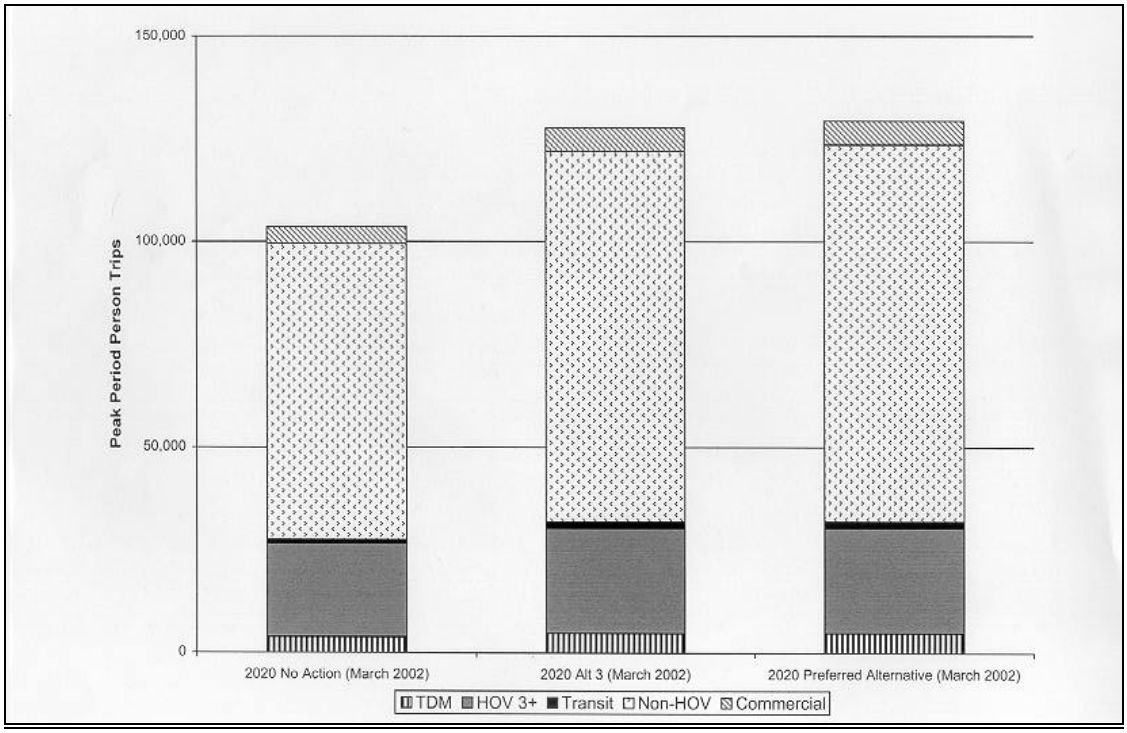
Mobility was evaluated by using six criteria.

Criterion: Serve as Much of the 2020 Peak-Period Travel Demand Within the Corridor as Possible

P.M. Peak-Period Person Volumes by Mode Across 3 Screenlines

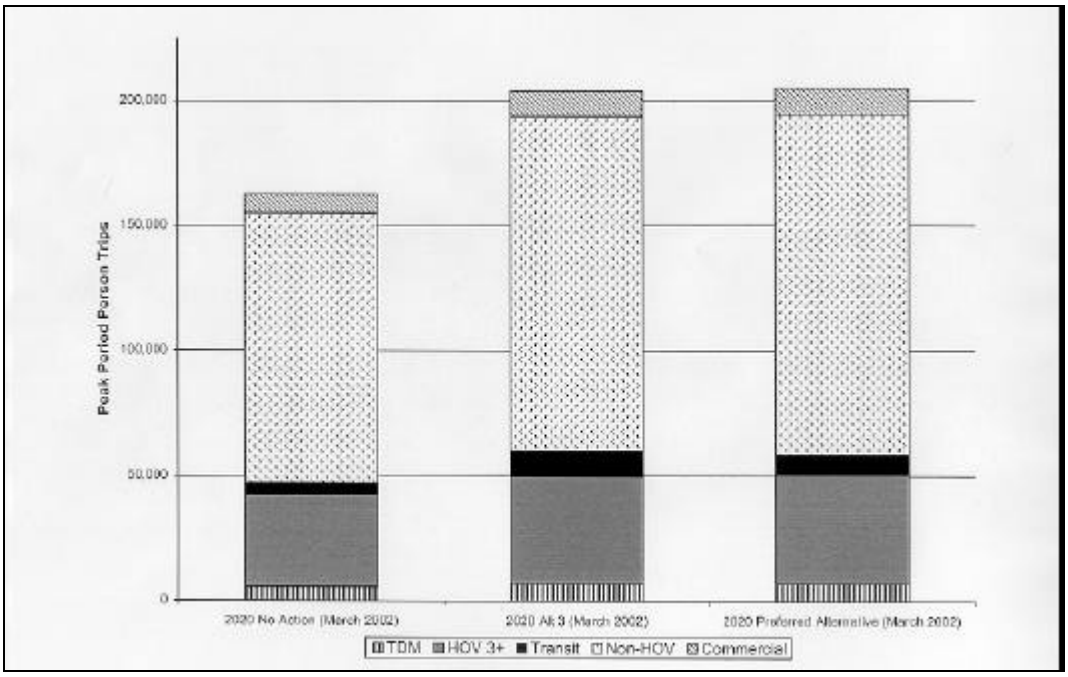
On average, the peak person demand in the Preferred Alternative increases by around 25 percent compared with No Action Alternative conditions and is virtually unchanged from Alternative 3. These trends are shown in Figures 3.12-4A, 3.12-4B, and 3.12-4C. Person demand on I-405 would increase by 55 percent on average and up to 75 percent on some segments, as in Alternative 3. Most of the increase in demand occurs due to the added freeway capacity and expanded transit service.

Figure 3.12-4A: Peak Period Person Demand Comparisons for Preferred Alternative: Bothell Screenline



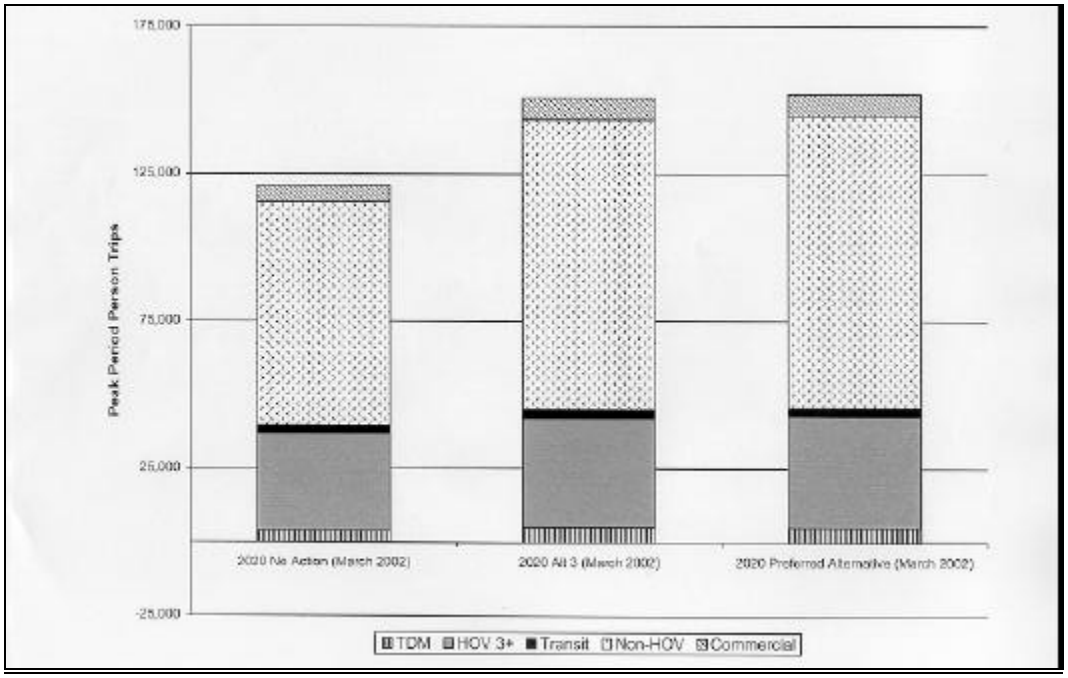
Source: PSRC Model, Parsons Brinckerhoff

Figure 3.12-4B: Peak Period Person Demand Comparisons for Preferred Alternative: Bellevue Screenline



Source: PSRC Model, Parsons Brinckerhoff

Figure 3.12-4C: Peak Period Person Demand Comparisons for Preferred Alternative: Renton Screenline

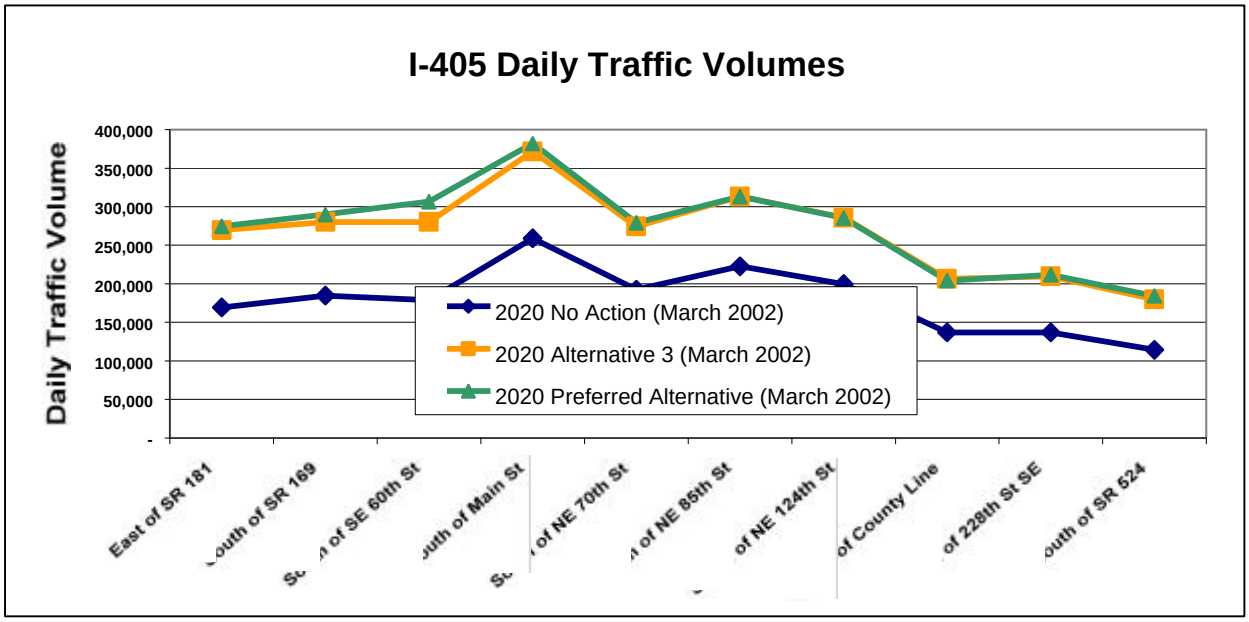


Source: PSRC Model, Parsons Brinckerhoff

Daily and P.M. Peak Period Traffic Volumes by Types of Vehicles (SOVs, HOVs, and Trucks)

The peak vehicle demand across the screenlines in the Preferred Alternative increases by 27 percent compared with No Action Alternative conditions. Figure 3.12-5 compares the daily traffic volumes along I-405 for the Preferred Alternative, No Action Alternative, and Alternative 3. Daily vehicle demand on I-405 increases by around 55 percent at the Bothell and Bellevue screenlines and by over 70 percent in Renton. The highest volumes remain in downtown Bellevue, where the Preferred Alternative adds substantial capacity in collector-distributor lanes combined with one additional through lane on I-405.

Figure 3.12-5: I-405 Daily Traffic Volume Comparisons for Preferred Alternative



Source: PSRC Model

Daily Traffic Volume Shifts between Facilities

The major widening of I-405 in the Preferred Alternative results in substantial increases in peak-period travel demand across the three screenlines within the study area. These results are comparable with the findings from Alternative 3, with the exception that the Preferred Alternative shifts a slightly greater amount of travel from the I-5/SR 99 corridor through Seattle. The daily volumes in north/south travel within Seattle were shown be reduced by 5 to 8 percent, compared with around a 4 to 5 percent reduction with Alternative 3. The net reduction along I-5 was 15,000 to 20,000 vehicles per day. Some of this shift can be attributed to the effects of the additional auxiliary lanes along I-405 to the south of I-90 and improved accessibility along the length of I-405. A related effect of the widening of I-405 is the increase in travel demand on roadways connecting to I-405. Increases of around 10 percent were estimated on the east/west arterials and freeways (e.g., SR 520, I-90) that provide primary access to I-405.

Trip lengths for the Preferred Alternative will be the same as Alternative 3.

Criterion: Improve Reliability of Travel Times for all Modes

The Preferred Alternative would provide higher levels of general traffic travel time reliability than the No Action Alternative. The expansion of I-405 mainline capacity under this alternative would improve general traffic reliability. While I-405 would handle a higher proportion of the corridor travel demand, each mainline section would be reconstructed to current standards, and many interchanges along I-405 would be upgraded to meet standards. As a result, this alternative would greatly improve the ability to manage incidents and provide additional opportunities for vehicles on the freeway to bypass those incidents. The Preferred Alternative also includes additional use of auxiliary and hill-climbing lanes in the heavily traveled section of I-405 between I-90 and SR 900. These actions will provide improved reliability in that section of I-405 compared with Alternative 3. Several north-south arterials would be improved to provide motorists with better travel options should I-405 become blocked or slowed. The duration of traffic congestion would also be reduced, leading to better travel time reliability for both general traffic and freight.

HOV (3+) and transit travel time predictability would improve due to additional HOV direct access ramps that allow HOVs and transit to bypass congestion. Transit will also have exclusive access to certain stations within the bus rapid transit system, together with transit priority treatments on key arterial routes. The reliability of HOV/transit travel along I-405 is dependent upon managing the demand in the HOV lanes by restricting their use to three-or-more-person carpools.

The Preferred Alternative also includes a provision for a 4-foot buffer that could separate the HOV lane from the general traffic lanes. A buffer separation would improve transit and HOV travel time reliability and safety. The buffer and potential for future managed lanes along I-405 provides maximum flexibility for WSDOT to maintain reliability of travel for HOV and transit vehicles.

Criterion: Provide Flexibility to Accommodate Post-2020 Travel Demands

Available Capacity in 2020

The Preferred Alternative would have available corridor travel capacity remaining after 2020. The Preferred Alternative would accommodate 2020 person demand that is up to 25 percent higher than No Action Alternative conditions.

The bus rapid transit element of the Preferred Alternative would operate at up to 45 percent of available capacity in 2020. The BRT system would be able to meet additional post-2020 ridership demand in the corridor by providing additional bus equipment, and park-and-ride and transit center capacity improvements. Additional transit exclusivity could also be provided after 2020 to meet demand.

I-405 congestion levels would improve to better than current conditions in 2020 with the added capacity provided in the Preferred Alternative. By 2030, however, daily traffic volumes within the study area would likely use up most of this capacity, unless other transportation facilities are developed in the region.

Potential for Adaptability

The Preferred Alternative contains a BRT system that offers limited post-2020 opportunities for physical facility expansion within the I-405 right-of-way. However, the 4-foot buffer strip and

provision for a future managed lane option within the corridor could offer long-range BRT system enhancement opportunities. In addition, ITS innovations would help to maximize the efficiency for present and future systems.

Criterion: Reduce Travel Times for all Modes Door-to-Door Compared with Current Conditions

General Purpose Traffic

Compared with the No Action Alternative travel times, the Preferred Alternative would substantially reduce travel times for the general purpose traffic, including freight. The travel time reduction would be from 7 to 14 percent (from 4 to 10 minutes). These travel time changes are very similar to the results for Alternative 3 as shown in Table 3.12-13.

Table 3.12-13: General Traffic Travel Time Comparisons for Preferred Alternative (P.M. Peak Period)

Trips	General Traffic[a] Travel Time (Minutes)				
	2020 No Action (March 2002)	2020 Alternative 3 (March 2002)	2020 Preferred Alternative	Change from NA[b]	Change from Alternative 3
Bellevue CBD to Federal Way/Kent	71	63	61	-10	-2
Renton to Mill Creek	74	66	65	-9	-1
Bellevue CBD to Edmonds/Lynnwood	50	43	43	-7	0
Tukwila/Sea-Tac to Redmond/Overlake	49	44	43	-6	-1
Issaquah/Cougar Mtn. to Bothell/Kenmore	54	49	49	-5	0
Issaquah/Cougar Mtn. to Federal Way/Kent	67	63	62	-5	0

[a] Single occupant vehicles, 2-person carpools, trucks
[b] Change compared to 2020 No Action Alternative (March 2002)
Source: Puget Sound Regional Council (PSRC) Model, Parsons Brinckerhoff

HOVs

The travel times for HOVs (3+) under the Preferred Alternative conditions would be very similar to the No Action Alternative and Alternative 3 results as shown in Table 3.12-14.

Table 3.12-14: HOV Traffic Travel Time Comparisons for Preferred Alternative (P.M. Peak Period)

Trips	HOV 3+ Travel Time (Minutes)				
	2020 No Action (March 2002)	2020 Alternative 3 (March 2002)	2020 Preferred Alternative	Change from NA[a]	Change from Alternative 3
Bellevue CBD to Federal Way/Kent	41	40	40	-1	0
Renton to Mill Creek	49	49	49	0	0
Bellevue CBD to Edmonds/Lynnwood	36	36	36	0	0
Tukwila/Sea-Tac to Redmond/Overlake	38	38	38	0	0
Issaquah/Cougar Mtn. to Bothell/Kenmore	42	42	42	0	0
Issaquah/Cougar Mtn. to Federal Way/Kent	48	48	48	0	0

[a] Change compared to 2020 No Action Alternative (March 2002)
Source: Puget Sound Regional Council (PSRC) Model, Parsons Brinckerhoff

Transit

Transit travel times were revalidated during the development of the Preferred Alternative forecasts and resulted in considerably higher travel time estimates for all transit trips. However, the relative travel time changes between the No Action Alternative and the Preferred Alternative are similar to those previously reported for Alternative 3. The Preferred Alternative would improve transit travel times by up to 21 percent compared to the No Action Alternative, as shown in Tables 3.12-15 and 3.12-16. Actual transit travel time savings are in the 10- to 16-minute range for park-and-ride access, and up to a 12- to 22-minute range for walk access trips. Much of the travel time improvements are due to reductions in in-vehicle transit times. Walk access times also decrease due to added transit routes and more frequent service. The small variations in transit travel times between Alternative 3 and the Preferred Alternative are due to changes in transit routes and service levels.

Table 3.12-15: Transit (Walk-and-Ride) Travel Time Comparisons for Preferred Alternative (P.M. Peak Period)

Trips	Transit Travel Time with Walk-and-Ride Access (Minutes)				
	2020 No Action (March 2002)	2020 Alternative 3 (March 2002)	2020 Preferred Alternative	Change from NA[a]	Change from Alternative 3
Bellevue CBD to Federal Way/Kent	113	96	99	-14	3
Renton to Mill Creek	149	137	138	-11	1
Bellevue CBD to Edmonds/Lynnwood	101	91	92	-9	1
Tukwila/Sea-Tac to Redmond/Overlake	128	117	115	-13	-2
Issaquah/Cougar Mtn. to Bothell/Kenmore	156	133	135	-21	2
Issaquah/Cougar Mtn. to Federal Way/Kent	164	153	154	-10	1

[a] Change compared to 2020 No Action Alternative (March 2002)
Source: PSRC Model, Parsons Brinckerhoff

Table 3.12-16: Transit (Park-and-Ride) Travel Time Comparisons for Preferred Alternative (P.M. Peak Period)

Trips	Transit Travel Time with Park-and-Ride Access (Minutes)				
	2020 No Action (March 2002)	2020 Alternative 3 (March 2002)	2020 Preferred Alternative	Change from NA[a]	Change from Alternative 3
Bellevue CBD to Federal Way/Kent	98	86	88	-10	2
Renton to Mill Creek	133	120	121	-12	1
Bellevue CBD to Edmonds/Lynnwood	95	76	79	-16	3
Tukwila/Sea-Tac to Redmond/Overlake	115	106	105	-10	-1
Issaquah/Cougar Mtn. to Bothell/Kenmore	135	117	119	-16	2
Issaquah/Cougar Mtn. to Federal Way/Kent	147	135	135	-12	0

[a] Change compared to 2020 No Action Alternative (March 2002)
Source: PSRC Model, Parsons Brinckerhoff

Freight

The Preferred Alternative provides significant capacity increases in the system that would be beneficial to truck freight travel time and reliability. Truck travel time savings would be comparable to general traffic conditions shown in Table 3.12-13. Rail freight movements would not be affected along the BNSF rail line.

Criterion: Reduce the Share of Peak-Period and Daily Trips Made by Single-Occupant Vehicles

HOV usage in the Preferred Alternative increases by around 15 percent compared with the No Action Alternative. Transit usage at all three screenlines also increases in the Preferred Alternative at levels comparable to Alternative 3. Figure 3.12-6 illustrates the transit usage of the BRT system. Highest ridership forecasts include over 30,000 daily riders across Lake Washington (on SR 520 and I-90) and 15,000+ riders through Bellevue. BRT segments into Kirkland, Redmond, and north Renton carry ridership in the 5,000 to 10,000 daily range, with volumes tapering off outside of these central portions of the study area. Along SR 520 to the west of I-405, transit volumes are highest across Lake Washington. Volumes on SR 520 decrease to the east of Bellevue Way where major cross-lake routes join the corridor from Bellevue and Kirkland. These results are similar to the HCT ridership in Alternatives 1 and 2 and the BRT system analyzed in Alternative 3.

Combined P.M. peak-period mode shares for HOV and transit at the three screenlines are 24 percent, compared with 26 percent in the No Action Alternative. Although HOV/transit persons increase by 18 percent overall, the total screenline person volumes increase by 25 percent due to the expansion of person capacity in the corridor. This results in the slight reduction in HOV/transit mode share (as a percent), even though the actual number of HOV/transit persons increases. These findings are comparable to those reported for Alternative 3.

The TDM program effects in the Preferred Alternative would be similar to Alternatives 2 and 3. It is estimated that the combination of additional vanpools and carpooling incentives could result in up to an additional 10 percent increase in HOV 3+ mode share and a 20 to 30 percent additional increase in peak-period transit use. Overall, the combination of the transit and TDM strategies contained in the Preferred Alternative could result in a reduction of corridor peak-period single-occupant trips in the 10 percent range.

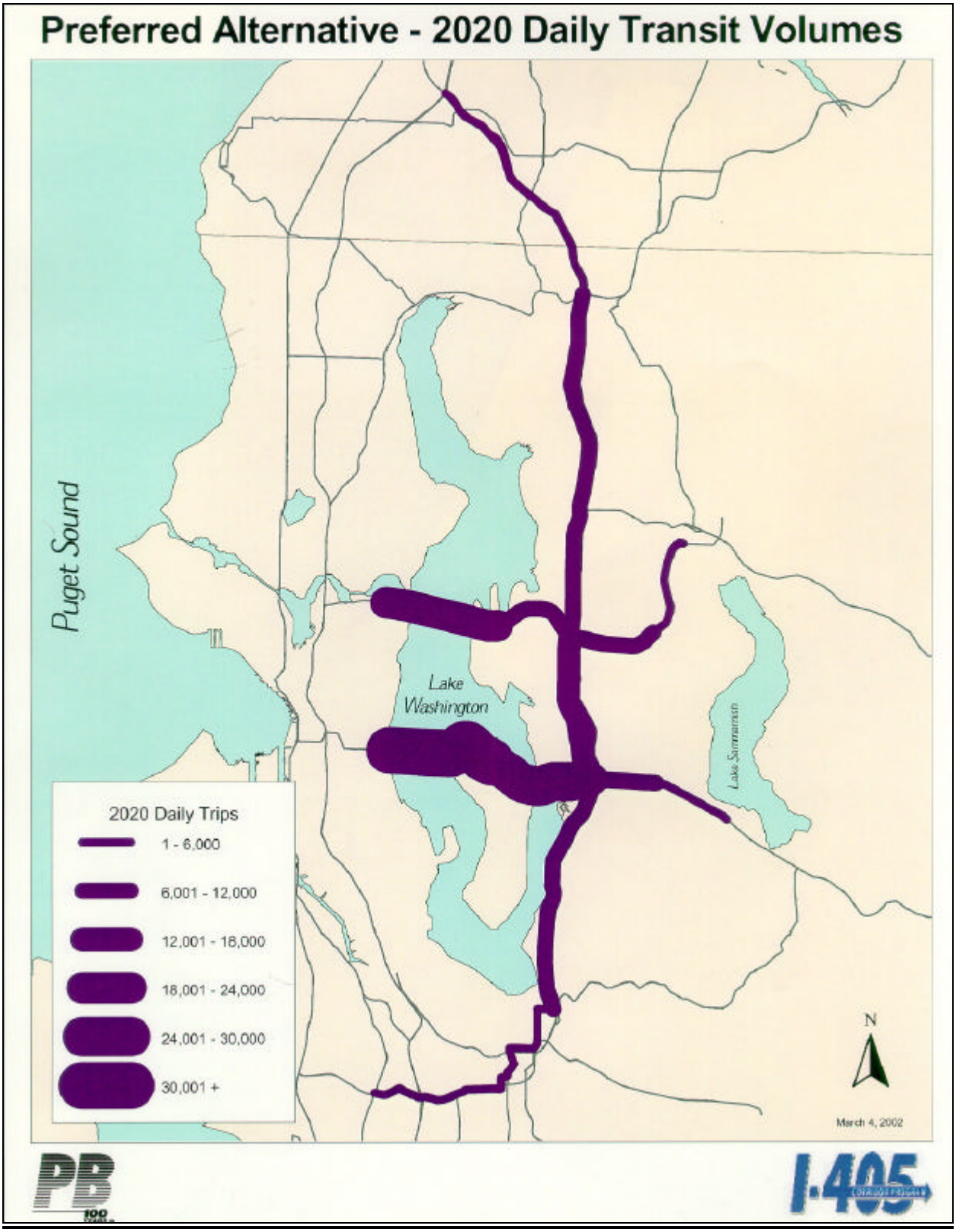
Criterion: Provide Effective Connections to Regional and Local Transportation Systems

Overall, the transit system compatibility with the regional system is much better in the Preferred Alternative than under the No Action Alternative and is comparable with Alternative 3.

This alternative assumes that the urban centers would be served by a bus rapid transit system using the HOV lanes and direct HOV access interchanges. These HOV interchanges would also allow interface with the regional passenger rail network. The freeway-to-freeway direct HOV ramp connections would also be provided. The general purpose traffic capacity of I-405 would be expanded substantially under this alternative, as well as the connecting freeway capacity. As a result, the compatibility with the regional general purpose transportation network would be better than under the No Action Alternative.

The compatibility problems existing under the No Action Alternative would be reduced or largely eliminated. General purpose traffic, including truck freight movement, would be improved substantially. Since many of the arterial improvements in this alternative have been adopted in the local transportation plans, actions to implement those improvements would make this alternative more compatible with local transportation plans. Key arterial "missing links" would be added or improved to provide better roadway connectivity within the study area. Some of the identified arterial projects would need to be integrated into local plans.

Figure 3.12-6: 2020 Daily Transit Volumes for Preferred Alternative



Congestion Impacts

Criterion: Reduce Congestion on Study Area Freeways and Arterials Below Current Levels

The Preferred Alternative would reduce the hours of traffic congestion substantially as shown in Table 3.12-17. In the southern sections of I-405, the hours of congestion would be shortened by up to seven hours a day between SR 167 and I-5. Most of the segments in the north section would operate with less than five hours of congestion, which would be better than conditions today. Congestion is reduced, compared with Alternative 3, in the I-405 section between NE 44th Street and I-90. This is primarily due to auxiliary and hill-climbing lanes added to this section as part of the Preferred Alternative. There is also an improvement in congestion through Kirkland due to slight shifts in travel patterns, possibly caused by added arterial capacity in the Sammamish River valley.

When hours of traffic congestion for all the I-405 segments are averaged, four hours of congestion are projected, two hours less than the No Action Alternative and one hour less than Alternative 3. Average hours of congestion on arterials and other freeways also improve by one hour a day. The average congestion total for all roads would improve to levels similar to current conditions.

Table 3.12-17: Hours of Traffic Congestion by I-405 Segment for Existing, No Action, and Preferred Alternative

I-405 Segment	Hours of Congestion and the Change from No Action Alternative				
	1999[a]	No Action (NA)[a]	Alternative 3[a]	Preferred Alternative[b]	Change from NA[c]
I-5 to SR 167	12	13	6	6	-7
SR 167 to NE Park Dr.	10	14	10	11	-3
NE Park Dr. to 44th[d]	7	8	5	5	-3
44th to I-90[d]	10	9	10	5	-4
I-90 to SR 520	9	8	5	5	-3
SR 520 to NE 85th St.	5	5	4	5	0
NE 85th Street to NE 124th St.	5	9	5	3	-6
NE 124th St. to SR 522	4	8	5	5	-3
SR 522 to SR-527[d]	4	6	0	1	-5
SR 527 to I-5[d]	0	2	0	0	-2
Average of I-405	7	7	5	4	-3
Average of Other Freeways	3	5	4	4	-1
Average of Arterials	3	5	4	4	-1
Average of All Facilities	4	5	4	4	-1

[a] Data from DEIS table 3.12-8
[b] Preferred Alternative results were normalized to be comparable to DEIS data.
[c] Change compared to No Action Alternative
[d] Segments split from original data
Source: Puget Sound Regional Council (PSRC) Model, Mirai Associates

Table 3.12-18 shows that the study area vehicle miles of travel (VMT) would increase by up to 12 percent (+2 percent regionally), before the effects of TDM strategies are considered. Study area vehicle hours of travel (VHT) would increase about 2 percent, while regional VHT would increase slightly. The TDM program could result in reducing daily VMT by 3 to 6 percent. The TDM reduction would offset part of the VMT increase created by the added capacity provided

on I-405 and connecting facilities. Although not estimated, VHT reductions due to TDM strategies could be expected to be similar to those shown for VMT.

Table 3.12-18: VMT and VHT Comparisons for Preferred Alternative

Alternative	VMT (Daily)		VHT (Daily)	
	Study Area (trips within)	Region-wide	Study Area (trips within)	Region-wide
2020 No Action Alternative (Mar 2002)	23,927,000	102,770,000	834,000	3,389,000
2020 Alternative 3 (Mar 2002)	26,356,000	104,274,000	848,000	3,367,000
Change vs. No Action Alternative (%)	10.2%	1.5%	1.7%	-0.6%
2020 Preferred Alternative (Mar 2002)	26,680,000	104,459,000	853,000	3,366,000
Change vs. No Action Alternative (%)	11.5%	1.6%	2.3%	0.7%

Source: PSRC Model

As shown in Table 3.12-19, average speeds on I-405 and in the study area improve substantially in the corridor, but only slightly region-wide. Overall travel speeds are higher than reported in the DEIS due to changes in modeling procedures described previously.

Table 3.12-19: Average Travel Speeds Comparisons for Preferred Alternative

Alternative	Average Speeds in mph (A.M. Peak Period/P.M. Peak Period/Daily)		
	I-405	Study Area (Trips Within)	Region-Wide
2020 No Action Alternative (Mar 2002)	42/30/38	31/23/29	32/26/30
2020 Alternative 3 (Mar 2002)	51/37/47	34/26/31	33/26/31
2020 Preferred Alternative (Mar 2002)	52/38/47	34/26/31	33/26/31

Source: PSRC Model

The Preferred Alternative actions would assist local jurisdictions to better manage level of service and concurrency. The capacity expansions on I-405 assumed in the Preferred Alternative would shift some traffic back to I-405 from the arterials. The Preferred Alternative also adds more arterial capacity than was considered in Alternative 3. Since the Preferred Alternative would take several years to implement, short-term concurrency issues would remain.

Safety Impacts

Criterion: Improve the Safety for All Modes Above Current Levels

The Preferred Alternative would be similar to Alternative 3 in improving high accident locations (HALs) on I-5, I-90, I-405, and other state routes. The addition of two general purpose (GP) lanes and other basic improvements would generally improve the geometrics of the freeway corridor. The inclusion of a buffer separation between the GP and HOV lanes would result in safer operations for transit and HOV, while also providing better travel time reliability.

Accidents rates in the study area would improve with the Preferred Alternative in comparison with No Action. Total accidents would increase by 1 percent, even though vehicle miles traveled

would increase by 18 percent. Injury accidents would decrease slightly due to a shift in traffic away from more hazardous arterial streets **(**Table 3.12-20**).**

Several nonmotorized hazard locations would be improved with the Preferred Alternative.

Table 3.12-20: Study Area Accident Comparison for the Preferred Alternative (March 2020)

Alternative	Total Accidents (per million VMT)	Injury Accidents (per million VMT)	Fatal Accidents (per 100 million VMT)
No Action Alternative	13,689 (1.99)	7,951 (1.15)	51 (0.63)
Alternative 3	16,500 (1.70)	7,623 (0.96)	50 (0.63)
Preferred Alternative	13,861 (1.71)	7,835 (0.96)	51 (0.63)

Source: PSRC Model, Mirai Associates

3.12.5 Mitigation Measures

3.12.5.1 Construction

The No Action Alternative involves no additional construction beyond what is planned and committed within the corridor. Beside the usual and customary detours and other construction scheduling set for these projects, no additional mitigation is anticipated.

Each of the action alternatives and the Preferred Alternative will require mitigation of construction impacts. Efforts in all cases will be made to maintain existing traffic lanes during construction.

Roadway Construction

Depending on the specific project element for each of the action alternatives and the Preferred Alternative, one or more construction mitigation measures will be employed for roadway construction where appropriate, such as:

- Providing a construction traffic manager and traffic management team with full-time responsibilities to develop traffic management plans that minimize traffic delays and disruptions. Public input would be sought in developing the traffic management plans. This team would be in place throughout the design and construction phases of the project. Responsibilities would include:
  - Coordinating traffic control with local agencies and other transportation projects in the region.
  - Coordinating construction activities with transit agencies, police, fire, and emergency service providers.
  - Disseminating information to local businesses and the general public regarding construction activities, roadway closures, and alternative modes of travel through direct mail, radio, and other advertising such as roadway signs, transit billboards, etc.
  - Holding community information and status report meetings prior to and/or during construction.

- Maintaining a construction information hotline to resolve problems and respond to questions from the public regarding construction activities.
- Implementing TDM and transit investments necessary to provide alternative means and routes for travel in the impacted sections prior to roadway construction.
- Maintaining an HOV lane for transit and carpool utilization throughout construction zones.
- Enhancing intelligent transportation system (ITS) facilities and systems in advance of and during construction to inform the public, reduce demand, and manage traffic flow.

- Implementing transportation system management (TSM) and transportation demand management (TDM) strategies aimed at increasing vehicle occupancy and reducing travel demand.
- Sequencing construction packages to assure related systems in corridor segments are complementary, for example widening an arterial prior to widening an adjacent freeway section.
- Utilizing construction experts to evaluate methods that can shorten contract duration and minimize impacts during the design phase.
- Providing monetary incentives to contractors to shorten construction times, and monetary penalties for exceeding allowed time.
- Allowing full-time road closures to speed construction when appropriate.
- Providing construction staging areas and access to work sites that minimize disruption to general traffic.
- Leasing existing parking lots for park-and-ride use to assist with local access and advance the implementation of additional park-and-ride facilities.
- Restricting lane closures and construction activities that impact traffic during peak commuter hours.
- Utilizing moveable barriers for lane closures where appropriate to allow full roadway utilization during peak periods.
- Restricting construction activities during peak holiday travel periods.
- Maintaining access to local business and residences.

Construction Duration

- Maintaining 5-year construction duration for the major project segments, where possible.

Construction Techniques:

- Considering outside widening first to allow for shifting of traffic.
- Doing all widening on one side or the other of centerline.
- Using contra flow lanes.
- Considering closure of cross-freeway traffic in interchanges while maintaining ramp movements.

- Temporarily narrowing existing lanes and shoulders to provide work zones.
- Building in width needed for maintaining traffic early in the design process.

Transit Construction

Construction of the major transit elements (fixed-guideway) of Alternatives 1 and 2 may involve work on the BNSF Railroad right-of-way, as well as on the I-405 freeway adjacent arterial network. Unlike roadway construction, HCT sections would most likely be opened at one time. Park-and-ride facilities would be dispersed throughout the study area with shorter-term impacts. Methods to lessen traffic impacts for HCT segments include the methods described above for roadways, and would also include:

- Delivering roadbed materials and other components by rail and/or truck using the HCT right-of-way when feasible.
- Using standard designs and construction methods for stations that result in quick completion.
- Allowing for road closures during non-peak periods to complete critical segments faster.

3.12.5.2 Operations

Because the No Action Alternative does not include transportation effects beyond the baseline projects, it would not require operations mitigation beyond that already incorporated into these planned and programmed projects.

Each of the action alternatives improves overall transportation performance, to varying degrees, relative to the No Action Alternative. No additional transportation operations mitigation is required to meet the objectives embodied in each of the action alternatives.

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