# Chapter 4 Transportation

## 1 What policy direction from VISION 2040 guides Transportation 2040?

The VISION 2040 Regional Growth Strategy and multicounty planning policies provide the policy structure for the Metropolitan Transportation Plan – Transportation 2040. VISION 2040's goal for transportation states that the region will have a safe, cleaner, integrated, sustainable, and highly efficient multimodal transportation system that supports the Regional Growth Strategy and promotes economic and environmental vitality and better public health.

VISION 2040 provides a framework for long-range transportation planning in the region by integrating freight, ferries, highways, local roads, transit, airports, bicycling, and walking. The regional perspective for transportation recognizes the critical link between transportation, land use, economic development, and the environment. A safe and efficient transportation system is essential to the quality of our lives, supports the Regional Growth Strategy, and serves as the backbone of the region's economy. Improving mobility, while growing to a region of 5 million people with changing travel needs, will be a challenging task.

The multicounty planning policies serve as the "Regional Principles and Guidelines" for local comprehensive plan review and certification required for regional transportation plans under the Revised Code of Washington (RCW) 47.80.026. Hence, these policies guide Transportation 2040. The multicounty planning policies for transportation cover the following major areas of emphasis: (1) maintenance,

**Which elements of Washington Administrative Code (WAC) 197-11-444 are addressed in this chapter?**

This chapter addresses:

- Section (2)(c)(i) Transportation systems
- Section (2)(c)(ii) Vehicular traffic
- Section (2)(c)(iii) Waterborne, rail, and air traffic
- Section (2)(c)(iv) Parking
- Section (2)(c)(v) Movement/ circulation of people and goods
- Section (2)(c)(vi) Traffic hazards
- Section (2)(c)(i) Transportation systems
- Section (2)(c)(ii) Vehicular traffic
- Section (2)(c)(iii) Waterborne, rail, and air traffic
- Section (2)(c)(iv) Parking
- Section (2)(c)(v) Movement/ circulation of people and goods
- Section (2)(c)(vi) Traffic hazards

management, and safety; (2) supporting the growth strategy; and (3) greater options and mobility. The complete set of VISION 2040 multicounty planning policies are listed in Appendix C.

**VISION 2040 Policies**

Refer to Chapter 2: Introduction and Background for information about how the VISION 2040 Regional Growth Strategy and multicounty planning policies relate to Transportation 2040.

## 2 Why is the region's transportation system important?

Expanding and maintaining a safe, efficient, and reliable transportation system is critical to the regional and state economies. It is also important in maintaining the quality of life for the people who live in the Puget Sound region and throughout the state. State, local, and regional governments, agencies, and organizations face the challenge of maintaining, operating, and improving the existing transportation system to accommodate continued economic and population growth and the associated demands on the transportation system.

Population projections indicate that by 2040, over 5 million people will be living within the four-county region. This translates into more than 5.4 million additional daily trips from the growth of 1.5 million people and 1.2 million new jobs. This growth will add more travel demand to an already congested transportation network. Regardless of the transportation alternative chosen, congestion, especially during peak periods, will continue in some parts of our future transportation system. However, as described in Chapter 3: Plan Alternatives, the investments included in the Transportation 2040 alternatives have the following common objectives: to preserve the existing system, improve system efficiency, increase choices to users, and provide strategic capacity improvements to meet future travel needs.

The current regional transportation plan, Destination 2030, identified over $100 billion of investments to preserve, maintain, operate, and expand the region's transportation system. The region has begun implementing that plan. The first phase of Sound Transit is either operating or under construction, and in November 2008 voters approved the Sound Transit Phase 2 (ST2) plan. The Washington State Legislature is investing several billion dollars in highway

expansion, funded by the 2003 Nickel tax package and the 2005 Transportation Partnership Account tax program. Cities, counties, and local transit agencies are making key investments in their parts of the system. These investments are increasing accessibility and are improving traffic flow on critical transportation corridors and at key chokepoints, providing improved travel options for our growing population. Still, the region faces increasing travel demand between now and 2040 due to strong forecasted population and job growth.

## 3 What existing transportation facilities and services are in place to meet current travel needs?

The regional facilities and services that make up the existing Metropolitan Transportation System (MTS) were identified in the 1995 Metropolitan Transportation Plan and updated in 2001 with the adoption of Destination 2030.

MTS facilities and services are defined both functionally and geographically. A facility or service is part of the MTS if it provides access to any activities crucial to the social and economic health of the central Puget Sound region. Facilities that weave parts of the region together by crossing county or city boundaries are critical to the MTS. Any link that accesses major regional activity centers, such as the interstate highways and regional transit system, is also an element of the MTS. Components in the MTS include those from the following transportation systems and programs:

- Roadway system
- Ferry system
- Transit systems
- Nonmotorized system
- Freight and goods system
- Intercity passenger rail system
- Regional airport system
- Transportation system management
- Transportation demand management
- Congestion Management Process

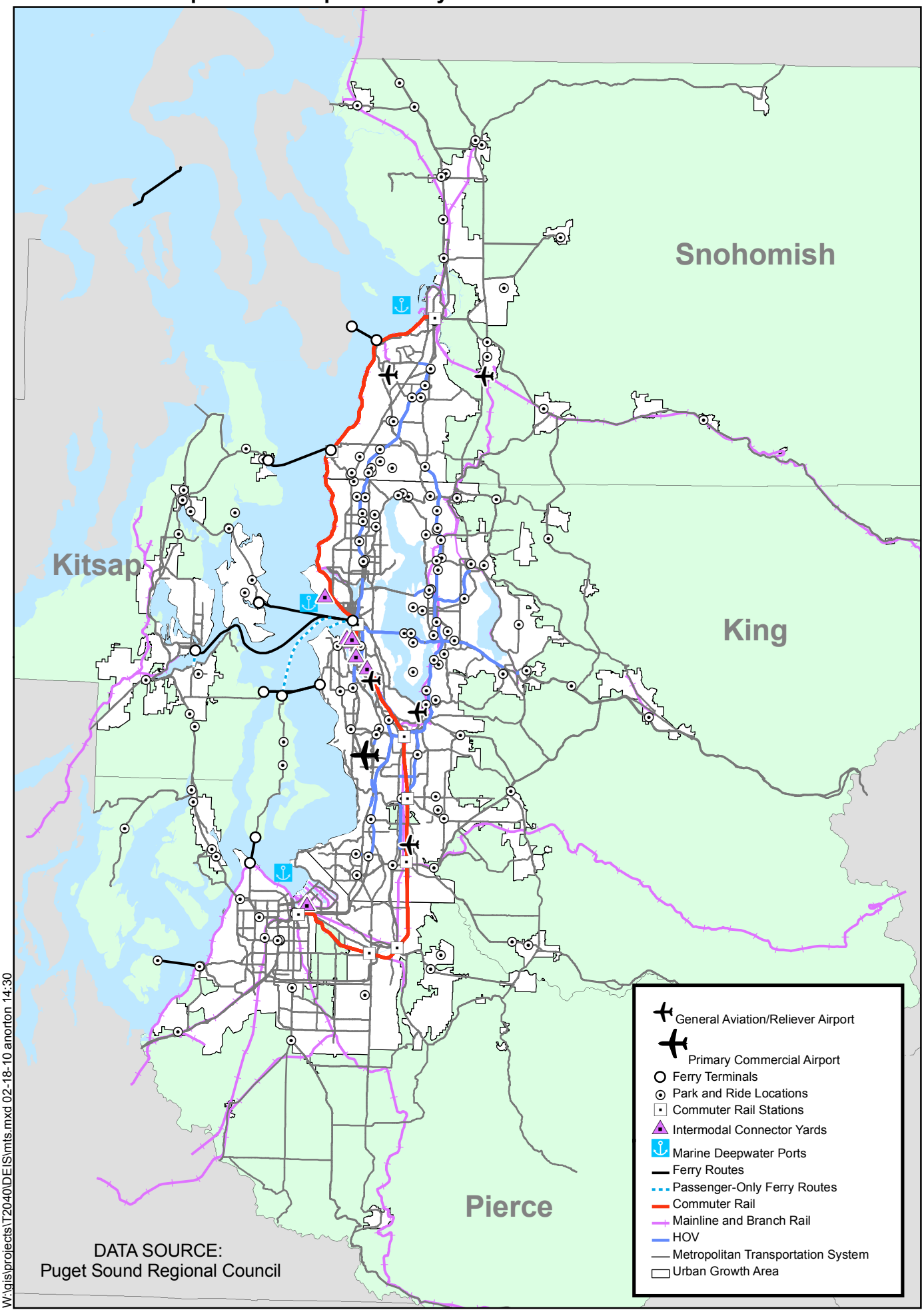
Responses to Questions 4 through 13 describe these different components of the region's existing transportation system and the planned improvements to the system as defined in Destination 2030. The existing MTS is illustrated in Exhibit 4-1. For more detailed maps of these MTS components, refer to Destination 2030's Technical Appendices, which can be viewed on PSRC's website at www.psrc.org/projects/mtp/index.htm. Exhibit 4-2 illustrates the nature and extent of the transportation improvements proposed in Destination 2030.

## 4 What does the existing roadway system include?

The regional roadway system includes nearly 50,000 miles of roadways ranging from interstate highways to residential streets. The region's roadways serve two primary functions: (1) mobility to move goods and people from one location to another, and (2) access to land (residences and businesses). The degree to which one of these functions predominates over the other determines a roadway's functional classification. These functional classifications are freeways, principal and minor arterials, collectors, and local streets. The regional roadway system (summarized in Exhibit 4-1) includes 2,616 lane miles of freeways, 10,189 lane miles of arterials, and over 30,000 lane miles of collector and local streets.

**New Tacoma Narrows Bridge**

## Exhibit 4-1. Metropolitan Transportation System



## Exhibit 4-2. Destination 2030 Map (2007)

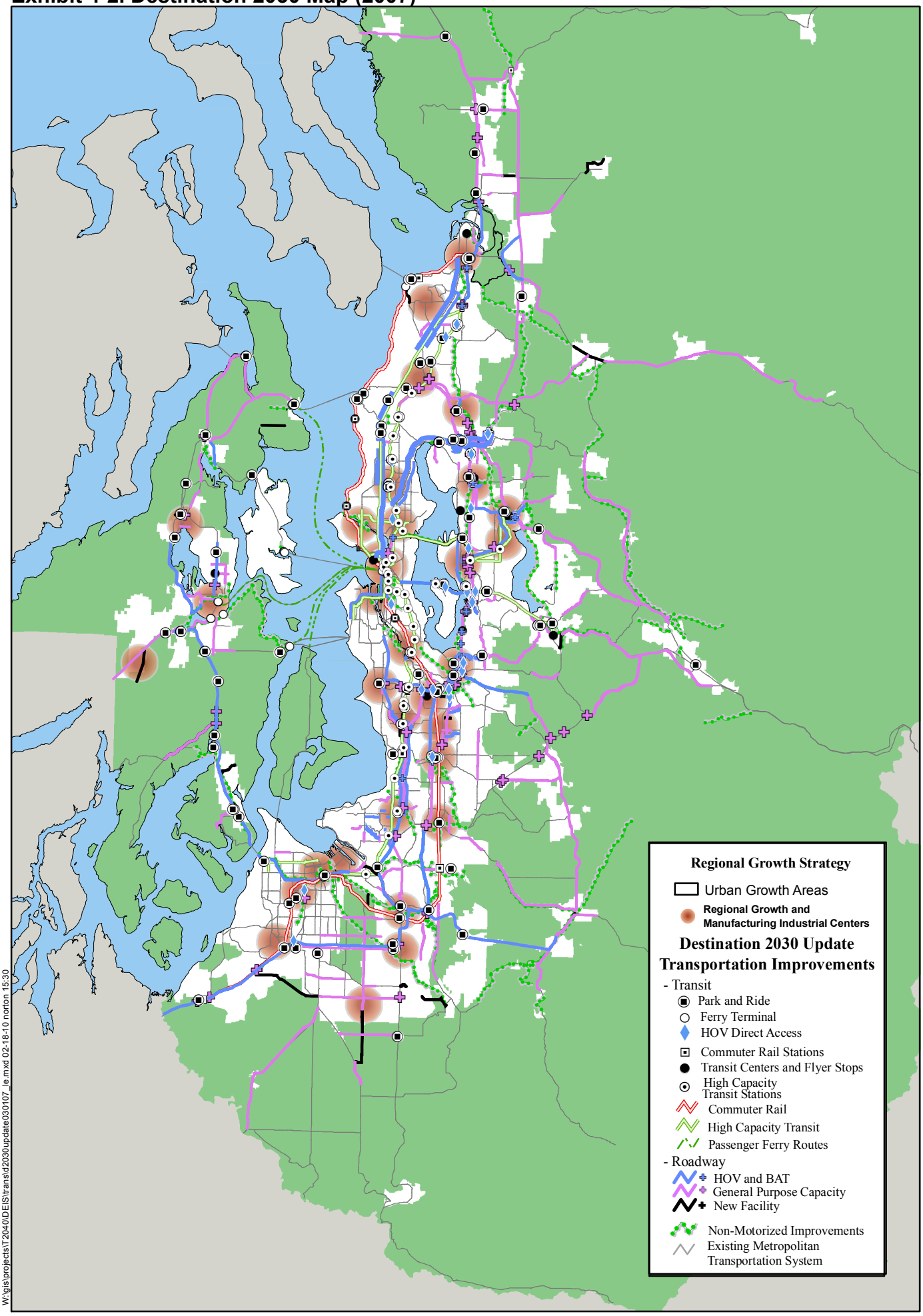


**Exhibit 4-3**
**Regional Roadway System – 2006 (in lane miles)**

| Freeway | Arterials | Total |
|---|---|---|
| 2,616 | 10,189 | 12,805 |

*Source: PSRC Geographic Information System (2006 data) based on county and WSDOT data.*

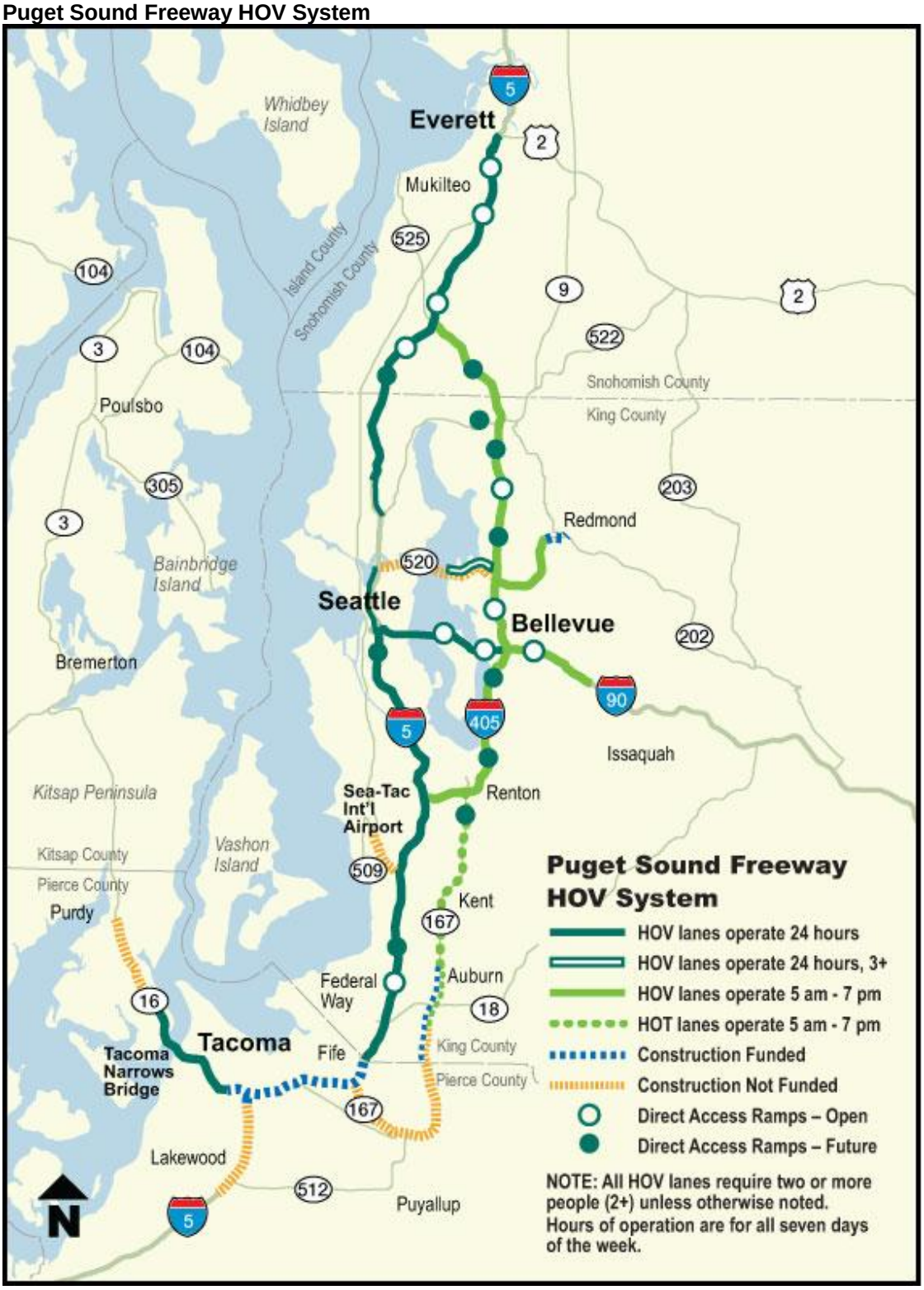
At one end of the scale, interstate highways primarily move goods and people from one population or economic center to another and have high traffic volumes and speeds. At the other end of the scale, local streets primarily provide direct access to residences and businesses and have lower traffic volumes and speeds. Arterials and collector roadways complete the system by connecting the interstate highway network to the local street system.

The region's roadway system includes an HOV system (shown in Exhibit 4-4), which consists of HOV lanes on freeways and arterial roadways, limited-access ramps to highway HOV lanes, and HOV bypass lanes on metered highway ramps. This system provides a dedicated right of way for transit. Depending on vehicle volumes and the operational characteristics of the roadway, other HOVs share the system with transit. These HOVs include vanpools and carpools with two or more passengers (except on SR 520, where HOV lanes are limited to vehicles with three or more passengers). On many limited-access freeways, these HOV lanes are open to all users between 7 p.m. and 5 a.m.

The Washington State Department of Transportation (WSDOT) is responsible for the planning, construction, and operation of HOV lanes. WSDOT coordinates with PSRC, transit agencies, and local jurisdictions for HOV operations and management. WSDOT is implementing its HOV system in stages, with the core HOV lanes in the central Puget Sound region having a high priority.

**Exhibit 4-4**

## Puget Sound Freeway HOV System




*Source: WSDOT, 2009*

The core freeway HOV system is largely complete in Snohomish and King counties, but there are unfinished HOV lanes planned (both funded and unfunded) in Pierce County along I-5, SR 167, and SR 16. When complete, the planned HOV network will consist of 310 lane miles of continuous freeway HOV lanes, key arterial HOV lane segments, and access ramps and interconnections. While the existing HOV system already offers time savings and more reliable travel times for commuters using buses and carpools, additional time savings and reliability could be realized when the HOV system is complete.

It is likely that changes in vehicle occupancy requirements and/or some other management strategy, such as the implementation of high-occupancy toll (HOT) lanes, could be required to keep these lanes operating reliably for transit. The availability of a HOT lane for use by single-occupant vehicles (SOVs), and the amount of the toll, are related to travel demand and congestion. Both factors can be changed to keep traffic volume at a level that maintains reliable traffic flow. Current WSDOT policy aims to achieve average speeds of 45 miles per hour (mph) 90 percent of the time while a lane is restricted to HOV use. HOT lanes are currently in operation in only one corridor: along SR 167. In May 2008, WSDOT began the SR 167 HOT lane pilot project. The project includes one HOT lane in each direction for approximately 9 miles between Renton and Auburn. The highway's two general purpose lanes in each direction remain toll free and open to all users.

## 5 What existing transit systems serve the region?

The central Puget Sound region is served by both local and regional public transit service. Local transit service is provided by five transit operators serving five transit districts:

1. Community Transit (Snohomish County)
2. Everett Transit (City of Everett)
3. King County Metro Transit (King County)
4. Kitsap Transit (Kitsap County)
5. Pierce Transit (Pierce County)

External transit agencies to the region also run service in to the central Puget Sound region; these include Skagit Transit and Intercity Transit. The City of Seattle operates the monorail and streetcar services. These operators provide fixed-route and demand-responsive transit services, as well as vanpool and other alternative transportation services. Together, these operators and the private-sector providers offer the following local services (WSDOT, 2006):

- 459 local fixed transit routes
- Almost 5,000,000 annual fixed-route transit service hours
- A transit fleet of nearly 2,600 vehicles
- More than 2,000 vanpools with an average occupancy of over eight passengers
- One waterfront streetcar route (temporarily out of service, so the route is currently served by King County Metro buses) and one streetcar operated by the City of Seattle in the South Lake Union area
- One monorail route
- A park-and-ride inventory of roughly 38,000 parking spaces
- Over 1,000,000 annual demand-responsive or paratransit service hours

Other transit service improvements are currently underway or planned to come on line soon. As part of the *Transit Now* initiative, King County Metro will expand transit service in King County between 2007 and 2016 by increasing transit service hours throughout the county and with the creation of five rapid transit routes in heavily used transit corridors. These five lines, called ***RapidRide***, will provide bus rapid transit (BRT) service as follows: (1) between Tukwila and Federal Way on SR 99; (2) Bellevue to Redmond on NE 8th Street and 156th Avenue NE via Crossroads and Overlake; (3) West Seattle to downtown Seattle using Fauntleroy Way SW, California Avenue SW, and SR 99; (4) Ballard to uptown and downtown Seattle along 15th Avenue NW or 24th Avenue NW; and (5) Aurora Avenue N (SR 99) between Shoreline and downtown Seattle. Service during peak hours is planned to be every 10 minutes, and 15 minutes in off-peak hours. The first

line is scheduled to begin in 2010; all five routes are scheduled to be in operation by 2013.

In 2009, Community Transit, the largest transit service provider in Snohomish County, inaugurated their BRT service, called *SWIFT*, serving a 17-mile stretch of the SR 99/Evergreen Way/ Rucker Avenue/Pacific Avenue corridor between Aurora Village Transit Center in the south and Everett Station in the north. These termini are major transit hubs that offer many local and regional connections.

Regional transit service is provided by Sound Transit, the Central Puget Sound Regional Transit Authority. Sound Transit is responsible for creating and maintaining a mass transit system that connects regional economic and population centers in King, Pierce, and Snohomish counties. Sound Transit has made progress towards completing the following projects identified in Sound Move:

- **Light Rail Service**. A 1.6-mile light rail link between the Tacoma Dome and downtown Tacoma (Tacoma Link) has been in operation since August 2003. In July 2009, Sound Transit opened the 14-mile segment between the Tukwila-International Boulevard station and downtown Seattle. In December 2009, the 1.7-mile Airport Link opened, extending light rail service to Seattle-Tacoma International (Sea-Tac) Airport.
- **Commuter Rail Service**. The Sounder system currently provides 82 miles of peak-hour, weekday commuter rail service connecting points along existing railroad tracks between Everett, Seattle, and Tacoma. Tacoma-Seattle service began in the fall of 2000, serving seven stations: Tacoma Dome, Puyallup, Sumner, Auburn, Kent, Tukwila, and King Street (downtown Seattle). Each weekday there are currently six morning and two afternoon trips from Tacoma to Seattle, and two morning and six afternoon trips from Seattle to Tacoma. The Seattle-Everett service began in 2004 and serves four stations: Everett, Mukilteo, Edmonds, and King Street (downtown Seattle), with four morning and four afternoon trips. In addition, Amtrak

Sounder commuter rail train

Source: PSRC

serves three of the Seattle-Everett stations with one morning and afternoon trip in each direction. An extension to South Tacoma and Lakewood is under construction, with service being provided by express bus.

- **High-Occupancy Vehicle Expressway**. The region's vision is to build an HOV expressway network by combining the state-funded freeway HOV lane network with Sound Transit-funded direct HOV access ramps.
- **Regional Express Bus Routes**. Sound Transit's Regional Express bus system includes a regional network of express bus routes operating on freeways and major arterials that serve distant areas with limited stops. As of March 2009, Sound Transit operated 25 regional express bus routes that benefit from the improved speed and reliability of the HOV expressway facilities. Community Transit and Pierce Transit also provide regional express buses within their service areas and to downtown Seattle and Bellevue, along with service to the University of Washington's main campus in North Seattle.
- **Community Connections**. As part of *Sound Move*, Sound Transit committed to build numerous transit facilities called community connections—including transit centers, park-and-ride lots, and commuter rail and light rail stations—throughout the region to support easy connections between regional transit, local transit, and other travel modes.

In November 2008, voters approved a funding package for ST2. ST2 projects include extension of light rail north from the University of Washington to Lynnwood in Snohomish County; east from downtown Seattle via I-90 to Overlake Transit Center in Redmond; south from Sea-Tac Airport to S 272nd Street in north Federal Way; and a streetcar connector serving Seattle's International District, First Hill, and Capitol Hill neighborhoods. Commuter rail service from Tacoma to Seattle will increase by adding more daily trips and passenger cars for increased capacity, and permanent commuter stations will be built in Edmonds and Tukwila. Regional express bus service will be expanded by 17 percent (with a larger fleet), and new BRT service will begin on SR 520. Sound Transit's HOV

Expressway and Community Connections programs will also be expanded as part of ST2.

## 6 What existing ferry system facilities are in the region?

The central Puget Sound region's ferry system is both a marine highway and a high-capacity transit system. It functions as a vehicle-carrying marine highway that moves people and goods across Puget Sound and as a high-capacity transit system moving thousands of passengers in a single vessel. Washington State Ferries operates nine ferry routes in the four-county region. These routes provide service to a mixture of automobiles and walk-on passengers. In addition to Washington State Ferries-operated auto and passenger ferries, the following passenger only ferry service is provided:

- Kitsap Transit Foot Ferry – Bremerton to Port Orchard and Bremerton to Annapolis
- King County Ferry District – Vashon to downtown Seattle and West Seattle to downtown Seattle

Ferry terminals provide an important link between the ferry route and the landside transportation system on both sides of Puget Sound. Terminals are being improved to strengthen the connections between ferries and other forms of transportation, such as bus, rail, automobile, pedestrian, and bicycle. Terminals are also being improved to increase access for special needs populations (medically fragile) with preferential loading. Terminal facilities supporting these system connections include HOV lanes for preferential loading, park-and-ride lots, bicycle lockers, and ferry maintenance facilities.

Since the adoption of Destination 2030 in 2001, several major events affect future planning for the region's ferry system:

- Reductions in Motor Vehicle Excise Taxes have reduced ferry system revenues, resulting in reduced service, increased fares, decreased ferry system ridership, and lower forecasts of future demand. Planning for the future ferry system now reflects this significantly changed environment.
- Washington State Ferries has ceased funding passenger ferries.

- King County Ferry District was created to operate the King County Water Taxi, offering service on two routes: Vashon-Downtown Seattle and West Seattle-Downtown Seattle.
- Ferry system finance studies and user surveys have been completed and will inform the Legislature about future organizational, operations, planning, and investment decisions affecting the state ferry system.
- In late 2008 PSRC completed a Regional Passenger-Only Ferry Study, which makes recommendations for investments in passenger ferries. These recommendations have been incorporated into Transportation 2040, and they are included in the analysis of alternatives contained in this final environmental impact statement (FEIS).

## 7 What existing bicycle and pedestrian facilities are in the region?

The regional system consists of approximately 470 miles of off-road shared-use paths and bicycle lanes. To date, more emphasis has been put into building separated off-road facilities than on-road facilities, resulting in a widespread yet fragmented regional bicycle network.

In Snohomish County, the Interurban Trail extends north/south from the county line to South Everett, except for a few missing segments. King County is home to one of the largest trail systems in the United States. An example is the Burke/Gilman Trail, which connects to the Sammamish River Trail near Bothell, providing a continuous, relatively flat route from Seattle to downtown Redmond. Significant numbers of people commute to work using these two trails. In southeast Pierce County, the Foothills Trail links McMillan to South Prairie, with future plans to link to the Interurban Trail in King County at its current southern terminus in Auburn. Once completed, Kitsap County's Mosquito Fleet Trail will result in approximately 100 miles of roadside bicycling lanes along the shores of the Kitsap Peninsula. The first complete segment starts at the Kingston Ferry Terminal, extending west to Miller Bay Road.

Another 16,500 miles of local, collector, and arterial roadways are shared roadways legally used for bicycle and pedestrian use. Some of these roadways are more suitable than others for bicycling and walking. Those that are less suitable typically lack sidewalks and bicycle lanes and/or have high vehicle speeds.

The existing system of paths and bicycle lanes is fragmented, with individual facilities often existing in isolation rather than being connected into a network. The region's sidewalk system is also piecemeal, with varying requirements in different communities. While the more urbanized areas of the region generally have more complete sidewalk systems and supporting pedestrian facilities, many of the region's growth centers have sparse sidewalk networks and relatively unfriendly pedestrian environments. Incomplete networks result in difficulty for bicyclists and pedestrians wishing for a safe, continuous route between locations.

The regional network includes both bicycle and pedestrian facilities. The following three concepts guide the development of the regional nonmotorized transportation system:

- Link communities at the regional level.
- Substitute walking and bicycling trips for vehicle trips at the local level.
- Provide intermodal connections at rail, ferry, and other transit station areas.

There are five general types of bicycle and pedestrian facilities, each with varying levels of separation from adjacent roadways:

- Shared-use bicycle/pedestrian paths are facilities that are separate from roadways.
- Bicycle lanes are portions of roadways that are designated for exclusive bicycle travel by signs and pavement markings.
- Bicycle routes are portions of roadways that are signed as preferred routes for bicycle travel but not striped for exclusive bicycle use.

- Bikeways are portions of roadways that are not signed or marked, but are accessible to bicycle travel and identified by the local jurisdiction as a preferred bicycle route.
- Walkways are pedestrian facilities that can be either separated from roadways, such as sidewalks and paths, or part of roadways, such as crosswalks or wide shoulders.

Facilities within the Destination 2030 regional nonmotorized system meet one or more of the following criteria:

- Multi-use trails/paths and bicycle lanes within the corridors of the roadway component of the MTS
- Multi-use trails/paths and bicycle lanes that connect designated regional growth centers
- Multi-use trails/paths and bicycle lanes that are within, or provide direct access to, designated regional growth centers or high-capacity transit station areas
- Pedestrian facilities that provide circulation within, access to, or enhance designated regional growth centers or high-capacity transit station areas

## 8 What existing freight systems are available in the region?

The regional freight and goods system consists of roadways, port facilities, railroads and rail yards, and airport facilities, all of which serve to move freight within and through the region.

### Freight Roadways

The state of Washington uses the Freight and Goods Transportation System to designate certain roadways as critical for freight movement. This designation was first made in 1995, and has been updated in 1998, 2001, 2003, 2005, and 2007. The system consists of five roadway classifications (T-1 through T-5) based on annual freight tonnage carried by trucks. The heaviest tonnage routes, those designated for 4 million annual tons and above (T-1 and T-2), may receive priority for funding improvements. Within the central Puget Sound region, the following interstate highways and state routes have segments classified as T-1 (more than 10 million annual tons): Interstates 5, 405, and 90 and State Routes 2, 3, 7, 16, 18, 99, 161, 167, 169, 410, 512, 515, 518, 522, 526, 599, and 900.

**What is the FAST Corridor program?**

The regional freight and goods program includes a Freight Action Strategy (FAST) Corridor program that has 15 FAST Corridor Phase I projects. These projects were identified by a public/private partnership as strategic investments in the region's transportation system to improve port access and reduce rail/highway conflicts along the I-5 corridor from Tacoma to Everett. In addition, a group of projects designed to improve surface street access to multimodal freight facilities, identified as the FAST Corridor Phase II projects, are included in the region's freight and goods program. In addition, the *Regional Air Cargo Strategy* (PSRC, 2006) and *Regional Airport Ground Access Plan* (PSRC, 2005) provide a planning framework for meeting the region's air cargo needs.

### Ports

Everett, Seattle, and Tacoma provide marine deepwater ports that accommodate ocean-going container ships used for moving cargo in and out of the region. The ports of Seattle and Tacoma continue to be two of the busiest ports along the West Coast, and all three ports are continuously improving their facilities to accommodate growing demand.

### Airports

Air freight is accommodated at two major airports in the region: Sea-Tac International Airport and King County International Airport (Boeing Field). Sea-Tac handles the majority of freight (about 80 percent), although Boeing Field has captured a growing percentage. A limited amount of freight is moved by the "sea-air" link; that is, cargo is transferred from ships, loaded onto aircraft, and flown to the East Coast, Europe, or other international destinations. Roadways providing truck access to Sea-Tac and Boeing Field are important parts of the freight roadway system.

### Railroads

Two major national Class 1 railroads serve the central Puget Sound region and provide intercontinental service: Burlington Northern Santa Fe (BNSF) and Union Pacific. Each maintains significant yard and on-dock capacity to serve the ports.

## 9 What existing intercity passenger rail services are in the region?

Amtrak passenger rail trains currently provide service between Eugene, Oregon, and Vancouver, B.C. (Amtrak Cascades), Seattle and Los Angeles (Coast Starlight), and between Seattle and Chicago (Empire Builder). Stations within the four-county region are located in Everett, Edmonds, Seattle, Tukwila, and Tacoma. Washington State is committed to safer, faster, more frequent, and reliable north-south Amtrak intercity passenger rail service through western Washington. To meet these long-term commitments, the state is working with Amtrak to finance capital investments in train station facilities, new train

equipment, improvements to existing tracks, and improved track crossings and signalization.

Currently, Amtrak Cascades passenger rail service includes five daily round-trip trains between Seattle and Portland and one daily round-trip train between Vancouver, B.C., and Seattle, with one more daily round trip planned to begin in summer 2009. Total ridership on the Amtrak Cascades route between Vancouver, B.C., and Eugene, Oregon, increased from 676,000 passengers in 2007 to 774,000 passengers in 2008. Amtrak's Coast Starlight and Empire Builder routes also serve the central Puget Sound region.

## 10 What existing regional airport facilities are in the region?

The existing regional airport system consists of 26 public use airports and two military airfields within the four central Puget Sound counties. The airport system includes Sea-Tac International Airport (the region's primary commercial service airport), McChord Air Force Base, Gray Army Airfield at Fort Lewis, five general aviation reliever airports, 14 general aviation airports, three seaplane bases, and three state-owned emergency airfields. A subset of this regionwide aviation system is considered regionally significant and is part of the MTS. This subset consists of Sea-Tac Airport plus the region's five general aviation reliever airports: Boeing Field, Paine Field, Renton Municipal Airport, Harvey Field, and Auburn Municipal Airport.

In 2005, WSDOT's Aviation Division began a 4-year statewide study of airport capacity needs, including those in the central Puget Sound region. The results of this study, completed in July 2009, are incorporated into the Transportation 2040 plan.

## 11 What Transportation System Management programs exist in the region?

Most components of the MTS include transportation system management (TSM) to actively manage the transportation system to ensure safe and effective day-to-day operations on the MTS. TSM provides communication linkages between

**What is included in the Metropolitan Transportation System (MTS)?**

The MTS consists of facilities and services that provide access to any activities crucial to the social and economic health of the central Puget Sound region. The MTS includes the following components:

- Roadway system
- Ferry system
- Transit systems
- Nonmotorized system
- Freight and goods system
- Intercity passenger rail system
- Regional airport system
- Transportation System Management
- Transportation Demand Management
- Congestion Management Process

travelers, vehicles, operation centers, and the field to serve and operate the various elements of the MTS. The existing TSM system includes management centers, communications infrastructure, and roadside equipment that make up the regional Intelligent Transportation System (ITS) architecture.

Many jurisdictions and agencies are responsible for operation of the Puget Sound region's multimodal transportation system. For instance, WSDOT has an extensive freeway management system on the region's freeways, and many of the region's transit operators are using technology to provide transit information, count passengers, and collect fares. The ITS program promotes the application of modern computer and communications technology to improve transportation operations and transportation demand management.

### Intelligent Transportation System Projects and Programs

The following ITS projects and programs applied in this region are regionally significant:

- Freeway Management Systems
- Arterial Management Systems
- Transit Management Systems
- Electronic Fare Payment System
- Commercial Vehicle Information Systems and Networks
- Incident Management and Response Teams
- Toll Collection
- Traveler Information

### Freeway Management Systems

WSDOT has traffic management centers in Shoreline and Lakewood to manage the Seattle area and Tacoma area freeways, respectively. A system of vehicle detectors, television cameras, ramp meters, variable message signs or reader boards, and highway advisory radio systems, called the Surveillance, Control and Driver Information System, has been installed on the region's freeways. The ramp meters improve freeway flow and reduce merging-related congestion and accidents. The surveillance equipment helps to improve incident response and provides travel information. Many agencies in the region have

their own traffic management centers that operate synchronized traffic signal systems and respond to traffic demand, thereby reducing vehicle delay during nonpeak periods.

### Arterial Management Systems

There are approximately 3,500 traffic signals within the region that are operated and owned by local jurisdictions to manage the arterial system. Many of these signals are operated from ten existing traffic management centers. In addition to the ten existing centers, five new traffic management centers are planned.

### Transit Management Systems

King County Metro has implemented an Automatic Vehicle Location system to track its buses. Community Transit and Pierce Transit are in the process of installing and testing their Automatic Vehicle Location systems to track their buses. The system allows for improved scheduling and increased security. Data from the system are also used to provide real-time transit information to riders. Transit signal priority has also been implemented by most transit agencies in the region to improve schedule reliability and reduce travel time.

### Electronic Fare Payment System

The region's transit agencies, including Washington State Ferries, have collaborated on a "Smart Fare Card" project to allow transit passengers to use a single fare card to pay transit fares.

### Commercial Vehicle Information Systems and Networks

Commercial vehicle operations on I-5 and I-90 are being improved with weigh-in-motion scales, vehicle tags (called transponders), and roadside readers that allow truck weights and credentials to be checked without requiring the truck to stop. This reduces the delay for safe and legal trucks and helps focus enforcement efforts on problem truckers. Similar systems are being used at the international border and the ports of Seattle and Tacoma to help track and secure containers being imported and exported.

### Incident Management and Response Teams

To help lessen the effects of traffic accidents, stalled cars, and other roadway blocking incidents, incident management and response teams have been established. These teams assist drivers and help clear vehicles to restore the normal flow of traffic as safely and quickly as possible. There are approximately 38 Incident Response Teams with peak traffic period roving vehicles. These vehicles typically rove on the following highly traveled state-owned facilities: I-405, I-5, US 2, SR 520, I-90, SR 512, SR 167, and SR 16.

### Toll Collection

There are two tolled roadway facilities in the region: the Tacoma Narrows Bridge and the SR 167 HOT lanes. These tolled facilities currently use toll collection technology to lessen delays at toll booths and make travel on the tolled facilities more efficient.

### Traveler Information

Traveler information systems are already being used throughout the region. Examples include the WSDOT 511 telephone information system, the WSDOT Internet FLOW map, and the dynamic message signs, which provide information to travelers in route. Local jurisdictions, including Bellevue, King County, and the City of Seattle, are beginning to provide more traveler information through the Internet as well. Real-time transit arrival information is also available from King County Metro Transit and the South Lake Union Streetcar, and will soon be available for Sound Transit, Pierce Transit, and Community Transit's bus and rail systems.

## 12 What transportation demand management policies, programs, and strategies exist in the region?

Transportation demand management (TDM) is not focused on facilities but instead on policies, programs, and strategies to improve transportation system efficiency by (1) promoting alternatives to driving alone, (2) shifting trips out of peak travel periods, or (3) eliminating the need for trips altogether. These

efforts are implemented at the employer, local, regional, and state levels and can have a significant impact on congestion. A wide array of programs are being implemented throughout the region, including numerous commuter financial incentives offered through employers or jurisdictions, calendaring software to track commutes, education and promotion, employer outreach, and parking management and other land-use decisions. TDM programs are considered part of the MTS if they are designed to reduce transportation demand on roadway facilities specifically identified on the MTS and affect three or more regional growth centers, or if they have an overall project impact of reducing 1,500 daily peak period trips from the system.

### Commute Trip Reduction

The Washington State Legislature passed the Commute Trip Reduction (CTR) Law in 1991 as a part of the Washington Clean Air Act. The goals of the program are to reduce traffic congestion, air pollution, and petroleum consumption through employer-based programs that encourage workers to ride the bus, vanpool, carpool, walk, bicycle, work from home, or compress their work week. Central Puget Sound employees covered by this law made more than 14,200 fewer vehicle trips each weekday morning in 2005 than they had when their employers entered the program. It is estimated that this reduced delay by 11.6 percent during the peak travel period on average mornings in the region (WSDOT, 2005). The CTR Law was streamlined in 2006 when the Legislature enacted the CTR Efficiency Act. The changes focused investment into urban growth areas and centers where it is expected to have the greatest impact and provided a regional coordination role for Regional Transportation Planning Organizations (RTPOs).

### Growth and Transportation Efficiency Centers

As a part of the CTR Efficiency Act, the Legislature also created the Growth and Transportation Efficiency Center (GTEC) program to increase the efficiency of the transportation system in areas with the greatest concentrations of employment and housing. As an extension of the CTR Law, GTECs are geographically defined areas containing major

employers, small businesses, and residential units with targeted strategies to reduce the number of commute trips made by people driving alone. During the 2006–2008 biennium, WSDOT provided over $1.3 million to help fund the implementation of GTEC programs in Seattle, Bellevue, Redmond/Overlake, and Tacoma. Additionally, the cities of Kirkland, Tukwila, and Puyallup showed their support for the program and designated GTECs without state funding. All are in various stages of implementation.

### Vanpool Program

Puget Sound transit agencies operate one of the largest vanpool programs in the country. In 2006, the four transit agencies combined had over 2,000 vans in operation, with King County Metro's operational fleet comprising approximately 60 percent of the total. Vanpoolers tend to have longer commutes, averaging over 28 miles one way. Since vanpools appeal to those with longer than average commutes, the program produces significant vehicle miles traveled (VMT) reductions per rider, and passengers are on the rise. Between 2004 and 2006, regional vanpool ridership was up nearly 20 percent. As of 2008, transit development plans call for the expansion of vanpools through 2016.

Kitsap Transit has been successful in continuing a version of the vanpool program known as "Worker-Driver," which started initially during World War II. These buses are driven by full-time employees ("workers") of the military facilities (Puget Sound Naval Shipyard, Naval Station Bremerton, and Sub Base Bangor) who are also part-time employees of Kitsap Transit ("drivers").

### Transportation Management Associations

Transportation Management Associations (TMAs) are member-based, nonprofit agencies designed to provide transportation services for their members. Employer membership ranges from completely voluntary to being required by law, and membership can be delineated by geography or by business sector. TMAs in the central Puget Sound region provide a wide range of services, including CTR support, bicycle facilities,

outreach events, news, and updates. These associations also provide a direct linkage to the private-sector businesses and agencies they represent. TMAs in the central Puget Sound region include the Urban Mobility Group and Duwamish TMA in Seattle, TransManage in downtown Bellevue, and the Greater Redmond TMA.

## 13 How is PSRC currently addressing congestion through the Congestion Management Process?

Congestion is an everyday occurrence in the central Puget Sound region, and it will likely increase, because regional population and employment are forecast to grow by 1.5 million people and 1.2 million jobs between 2006 and 2040. Not only does congestion cause delay and personal frustration, it also affects the movement of people and goods, results in excess greenhouse gas emissions, and increases stress on critical infrastructure. Through federally mandated and related Washington state laws, PSRC is tasked with addressing congestion through a Congestion Management Process (CMP).

Improving the region's mobility is a top priority for PSRC and is directed by policies in VISION 2040.

PSRC has developed a four-part congestion relief strategy within its CMP that combines the following components:

1. Land use planning
2. Managing system demand
3. Operational strategies (technology and active traffic management)
4. Strategic expansion (when feasible)

The most recent federal transportation funding bill, the Safe, Accountable, Flexible, Efficient, Transportation Equity Act: a Legacy for Users (SAFETEA-LU), expanded upon previous requirements by more directly addressing congestion management "through a process that provides for effective management and operation, based on a cooperatively developed and implemented metropolitan-wide strategy, of new and existing transportation facilities." This new CMP "presents a systematic process for managing congestion that

**Congestion Management**

For more information about Congestion Management, refer to Appendix I: Transportation 2040 Alternatives Analysis Congestion Management Process Report

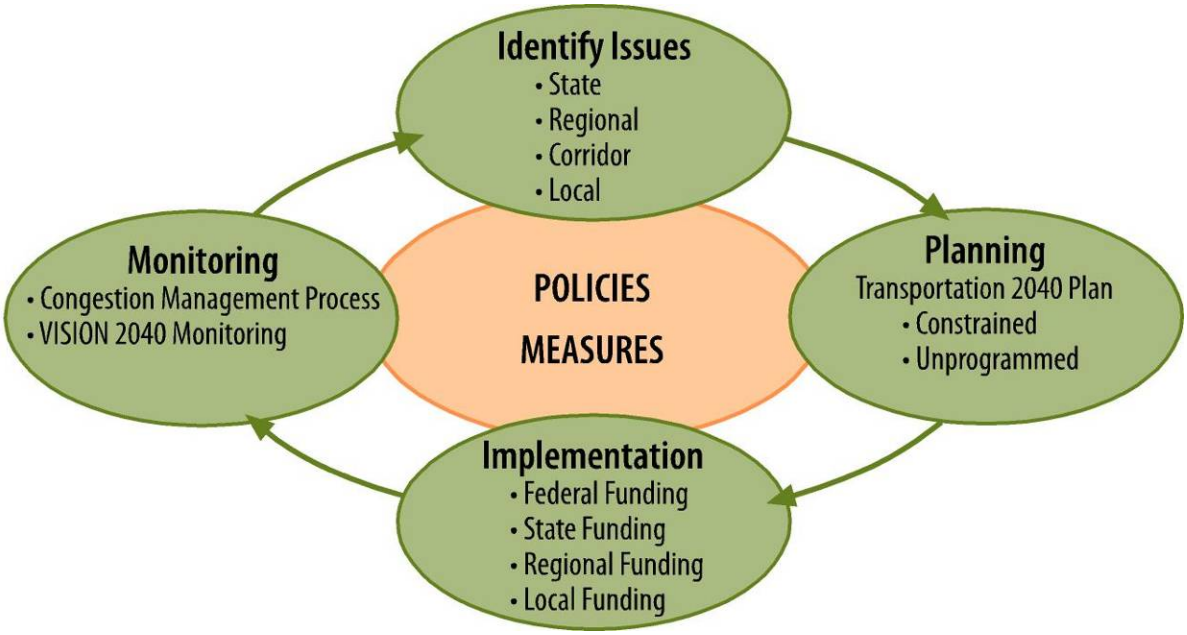
provides information on transportation system performance and on alternative strategies to alleviate congestion and enhance the mobility of persons and goods to levels that meet state and local needs."

Federal requirements describe an ongoing CMP that includes the following elements:

1. Measure multimodal transportation system performance
2. Identify the causes of congestion
3. Assess alternative actions
4. Implement cost-effective actions
5. Evaluate the effectiveness of implemented actions

PSRC's CMP process is shown in Exhibit 4-5.

**Exhibit 4-5**
**Congestion Management Planning, Implementation, and Monitoring Relationship**



In addition to monitoring regionwide congestion performance, the CMP focuses on the most congested travel corridors in the region, listed in Exhibit 4-6. PSRC has identified 12 corridors and is currently identifying facilities and needs on each one. PSRC has developed a four-part congestion relief strategy that combines land use planning, managing system demand, operational strategies (technology and active traffic management), and when feasible, adding more system capacity. This strategy is designed to produce "SMART" Corridors, which are safe and sustainable, multimodal, accessible, reliable and resilient, and use technology.

**Exhibit 4-6**
**SMART Corridors**

| Corridor | Major Roadways |
|---|---|
| Cross-Lake Washington | SR 520, I-90 |
| Kitsap County | SR 3, SR 303 |
| North Seattle | I-5, SR 99, Greenwood/15th Avenue NW, Roosevelt Way, Lake City Way |
| South King County | I-5, SR 99/Pacific Highway South, SR 509, SR 518, SR 167, West Valley Highway, Auburn Way |
| East King County | I-405, SR 522, Coal Creek Parkway, SR 900, NE 148th Avenue, Lake Washington Boulevard |
| Pierce County West | SR 512, I-5 south, SR 7, SR 167, Meridian Street (SR 161), S. Tacoma Way |
| Pierce County East | SR 162 |
| Southeast King County | SR 169, SR 164, SR 18 |
| West Snohomish County | I-5, SR 99 |
| East Snohomish County | SR 9, SR 2 |
| Cross Puget Sound | Ferries, Tacoma Narrows Bridge |
| Outer Northeast King County | SR 202, I-90 |

In February 2010, PSRC issued a *Draft SMART Corridor/ Congestion Management Process (CMP) Report* to illustrate the multimodal and freight existing conditions data assembled to date for each of the 12 SMART Corridors. Beginning with a fall 2010 update of this SMART Corridor/CMP report, these data will be used as the basis for regional needs assessment and as a baseline against which PSRC will measure changes in system performance.

## 14 What services exist for special needs transportation in the region?

Special needs populations are those whose mobility is affected due to age, income, disability, or physical condition. In the central Puget Sound region, special needs transportation is designed to improve mobility for those who are unable to transport themselves by other means. Service is generally provided by three types of agencies: public transportation providers, which operate both fixed-route and demand-response services, and community-based and private operators, providing mostly demand-response service.

Fixed-route transit service provides most of the region's non-automobile transportation and includes local and regional buses, commuter and light rail, and ferry service. The buses used by public transportation providers are accessible for those with mobility needs, and most stops, and all transit stations and centers, are required to be accessible. However, streets near transit stops may not be accessible, which leaves the network inaccessible in some places.

Demand-response services differ from fixed-route services. Instead of using predetermined bus stops at scheduled times, eligible individuals may call ahead and arrange to be picked up and taken to their destination (door-to-door service). The Americans with Disabilities Act (ADA) requires that public transportation providers operate this complementary door-to-door (often called paratransit) service to within three-quarters of a mile of a fixed route. ADA also establishes eligibility criteria for users of the complementary paratransit service.

Due to increasing costs associated with providing paratransit service, many public transportation providers are opting to use the minimum ADA requirement to control costs through the number of trips they are required to provide. The movement towards minimum standards creates gaps and unmet essential transportation needs for those eligible to receive paratransit service. For example, traveling three-quarters of a mile may not be possible for all users due to physical barriers in travel (such as no sidewalks) or specific mobility conditions. Some of

**Special Needs Transportation Planning**

PSRC's *Coordinated Transit-Human Services Transportation Plan* outlines how transit agencies, social service agencies, school districts, and other transportation providers can most efficiently and effectively work together to improve regional mobility for individuals with special transportation needs throughout King, Kitsap, Pierce, and Snohomish counties. The quadrennial update is currently underway and is scheduled for completion in spring 2010.

**ADA Information**

For more information on the Americans with Disabilities Act (ADA) and accessibility requirements, please refer to http://www.ada.gov.

these service gaps are filled by community- or faith-based organizations and other governmental agencies, but there is still a large and increasing demand on special needs services. With a population that is growing and aging, the central Puget Sound region is expected to experience increased demand for special needs services through 2040.

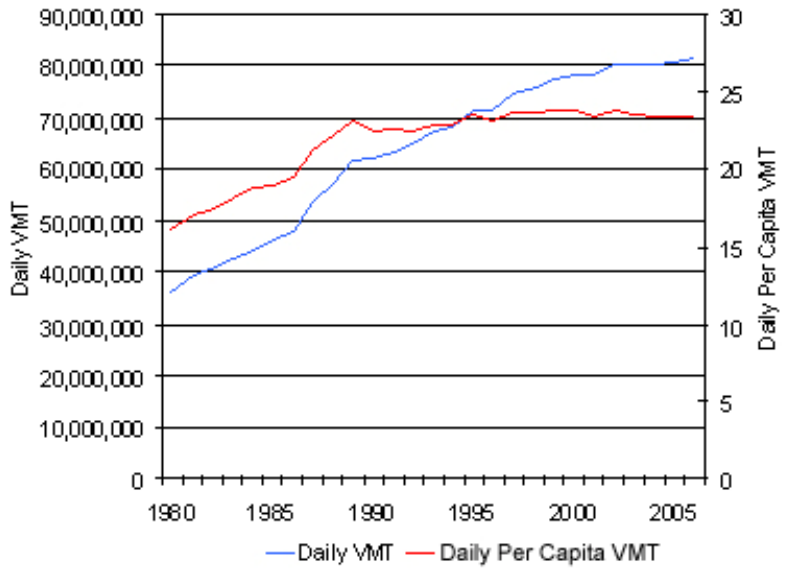
## 15 How are existing transportation system conditions evaluated?

In assessing the condition of the existing transportation system, numerous measures are used. These include the number of daily VMT, average travel speeds and delay, congestion on major corridors, daily trip making (persons and vehicles), mode share (SOVs and HOVs, transit, and walking and bicycling), trip time and distance, jobs-housing balance, and activity in other modes, such as ferries and airports.

### Vehicle Miles Traveled

Travel demand in the central Puget Sound region has increased substantially over the past decades, spurred by population and economic growth. The number of daily VMT grew from 36 million in 1980 to about 80 million in 2006 (shown in Exhibit 4-7). However, per capita VMT has slowed in recent years. While per capita VMT increased from about 16 miles per day in 1980 to 23 miles per day in 1990, this figure has held fairly constant for the past 16 years.

**Exhibit 4-7**
**Daily and per Capita Vehicle Miles Traveled in Puget Sound**




In 2006, of the 80 million miles of daily travel in the region, 38 million miles (48 percent) were on freeways and 42 million miles (52 percent) were on the region's arterial and local roadways. These travel demands are forecast to grow to 45 million miles of freeway travel (44 percent of the total) and 58 million miles of arterial roadway travel (up to 56 percent of the total), for a total of 103 million miles by 2040 under the Baseline Alternative. Data for 2006 show that the average person travels 10 miles per day on freeways and 13 miles per day on arterial roadways. These figures are forecast to be 9 miles per day on freeways and 12 miles per day on arterials (a decrease from 2006).

### Travel Speeds, Delay, and Congestion on Major Corridors

In 2006, the region's average daily vehicle travel speed was 41 mph on freeways and 22 mph on arterials, for an average of 27 mph. Each day (in 2006) the region experienced 280,000 hours of delay on the freeways and 560,000 hours of delay on arterial streets, a total of 841,000 hours of delay each day. This translates to an average daily delay of 14.4 minutes per person.

Exhibit 4-8 (Most Congested Facilities) displays the region's most congested roadways. These corridors are identified and monitored through the region's CMP. The region's most congested commutes occur on I-5, I-405, I-90, SR 520, SR 167, U.S. 2, SR 9, SR 512, SR 161, SR 18, SR 522, SR 522, SR 527, and SR 305.

As shown on Exhibit 4-9, over the past 5 years (from 2003, 2005, and 2007) average peak travel times on the region's major commute corridors have generally increased, in both the morning and evening peak periods. From 2003 to 2005, average travel time on the region's major corridors changed between -2 percent and 19 percent. From 2005 to 2007, travel times increased by a maximum of 11 percent, and in several cases declined by up to 12 percent. The morning and evening commutes with the largest increases from 2005 to 2007 were Tukwila to Bellevue (10 percent) and Bellevue to Seattle via I-90 (11 percent), respectively.

### Daily Trip Making

In Exhibit 4-10, information on average daily person trips for the nation and the PSRC region shows increased trip making since 1961. At the national level, there was a slight drop from 1977 to 1983, but increases to 1990 and again to 2001. At the regional level, person trips peaked in 1988 at 4.25, dropped to 3.48 in 1999, and then increased slightly to 3.6 in 2006. The 1988 trip rates shown here are higher than the trend, but were not weighted to adjust for sampling bias, and therefore may be overestimated as a result. National trends also show increases during this timeframe, but data are not yet available to determine if the stable trend holds true at the national level (no national data are available for 2006).

## Exhibit 4-8 Most Congested Facilities


Source, WSDOT 2006 Highway Performance Monitoring System Data

**Exhibit 4-9**

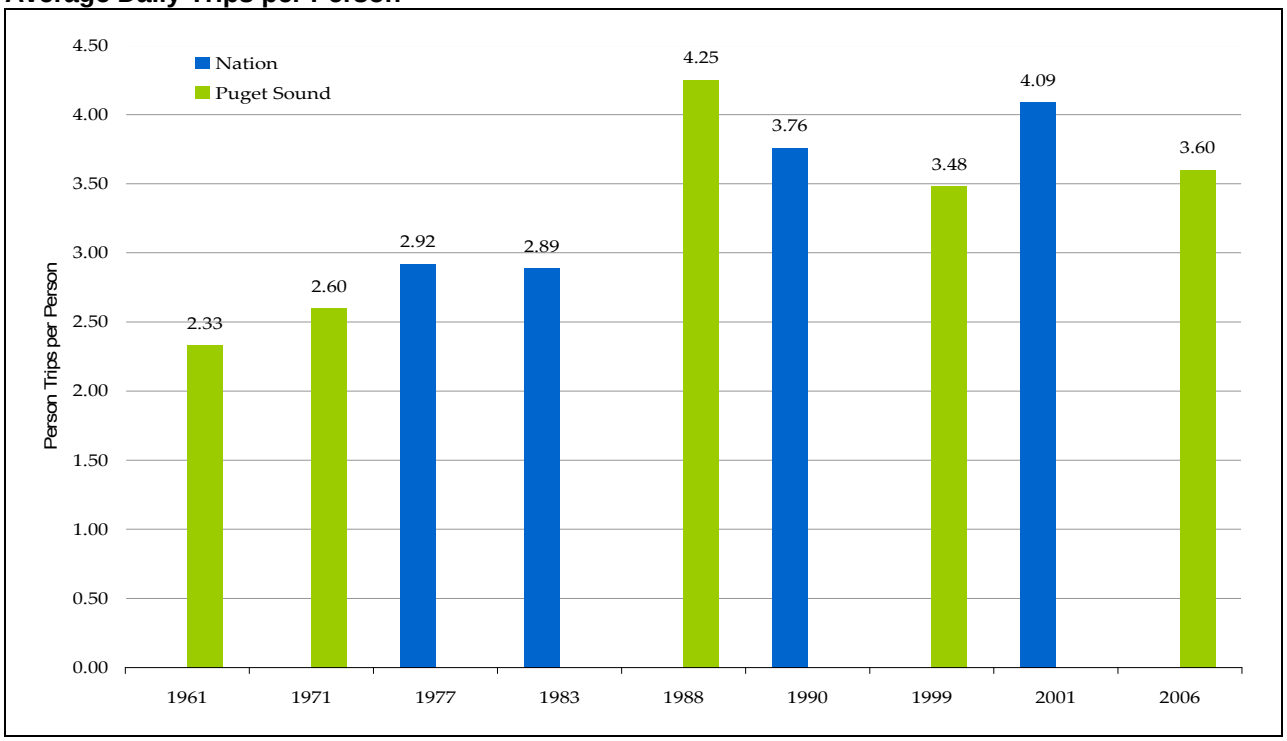
## Average Peak Travel Times by Commute (Minutes)

| Route Description | 2003 | 2005 | 2007 | % Change 2003 to 2005 | % Change 2005 to 2007 |
|---|---|---|---|---|---|
| **Morning Commutes:** | | | | | |
| Tukwila to Bellevue | 31 | 38 | 42 | 18% | 10% |
| Lynnwood to Bellevue | 35 | 41 | 39 | 15% | -5% |
| Seattle to Bellevue via SR 520 | 18 | 22 | 23 | 18% | 4% |
| Federal Way to Seattle | 40 | 43 | 47 | 7% | 9% |
| Everett to Bellevue | * | 51 | 49 | * | -4% |
| SeaTac to Seattle | 23 | 25 | 27 | 8% | 7% |
| Everett to Seattle | 47 | 46 | 47 | -2% | 2% |
| Auburn to Renton | 16 | 17 | 18 | 6% | 6% |
| Seattle to Redmond via SR 520 | 24 | *26* | 27 | 8% | 4% |
| Issaquah to Bellevue | 17 | 19 | 17 | 11% | -12% |
| Bellevue to Seattle via SR 520 | 18 | 18 | 18 | 0% | 0% |
| Weighted Average Differences | | | | 9% | 3% |
| **Evening Commutes:** | | | | | |
| Bellevue to Seattle via I-90 | 21 | 25 | 28 | 16% | 11% |
| Bellevue to Tukwila | 25 | 31 | 14 | 19% | *9%* |
| Redmond to Seattle via SR 520 | 29 | 36 | 37 | 19% | 3% |
| Bellevue to Seattle via SR 520 | 22 | 26 | 26 | 15% | 0% |
| Bellevue to Redmond | 12 | 14 | 15 | 14% | 7% |
| Bellevue to Lynnwood | 28 | 31 | 34 | 10% | 9% |
| Seattle to Redmond via SR 520 | 27 | 29 | 29 | 7% | 0% |
| Renton to Auburn | 16 | 18 | 19 | 11% | 5% |
| Bellevue to Issaquah | 15 | 17 | 18 | 12% | 6% |
| Bellevue to Everett | * | 42 | 45 | .. | 6% |
| Seattle to Bellevue via SR 520 | 18 | 20 | 19 | 10% | -5% |
| Weighted Average Differences | | | | 14% | 5% |

*Source: Washington State Department of Transportation "Gray Notebook Annual Congestion Report," 2009*

*Note: *= Data not available for 2003*

**Exhibit 4-10**
**Average Daily Trips per Person**




## Travel Mode Shares

Between 1999 and 2006 the region saw a steady shift in travel mode shares (refer to Exhibit 4-11). The percentage of trips in SOVs dropped slightly, from 43.7 to 43.5 percent, and HOV trips decreased from 42.8 percent in 1999 to 40.3 percent in 2006. All other modes increased. Transit grew from 3.3 percent to 4.1 percent, and walking trips increased from 5.9 percent to 7.6 percent, the largest percentage increase by mode.

**Exhibit 4-11**
**Mode Share**

| Travel Mode (all trips) | 1999 | 2006 |
|---|---|---|
| Single-Occupant Vehicle (SOV) | 43.7% | 43.5% |
| High-Occupancy Vehicle (HOV) | 42.8% | 40.3% |
| Transit | 3.3% | 4.1% |
| Walk | 5.9% | 7.6% |
| Other | 4.3% | 4.5% |
| **TOTAL** | **100.0%** | **100.0%** |

*Source: PRSC Household Survey, 2006. These numbers differ slightly from results of the PSRC regional travel demand model used to evaluate the Transportation 2040 alternatives. Transit ridership data in the PSRC Household Surveys are a relatively small sample size. These data are merged with other transit survey data to estimate ridership for the regional travel demand model.*

Exhibit 4-12 shows trends in home-based work trips and total trips using transit for Kitsap, Pierce, and Snohomish counties and the three King County sub-areas. Between 1988 and 2006, the region's home-based work trips using transit nearly doubled (from 6.3 to 12.3 percent). In 2006, Central King County had the region's highest proportion of work trips using transit (23.4 percent) and total trips using transit (8.6 percent). The region's highest rates of transit ridership are in the Central King/Seattle, East King, and Kitsap areas (Kitsap numbers include ferry riders who walk on board).

**Exhibit 4-12**
**Percent of Trips Using Transit (by county and sub-area)**

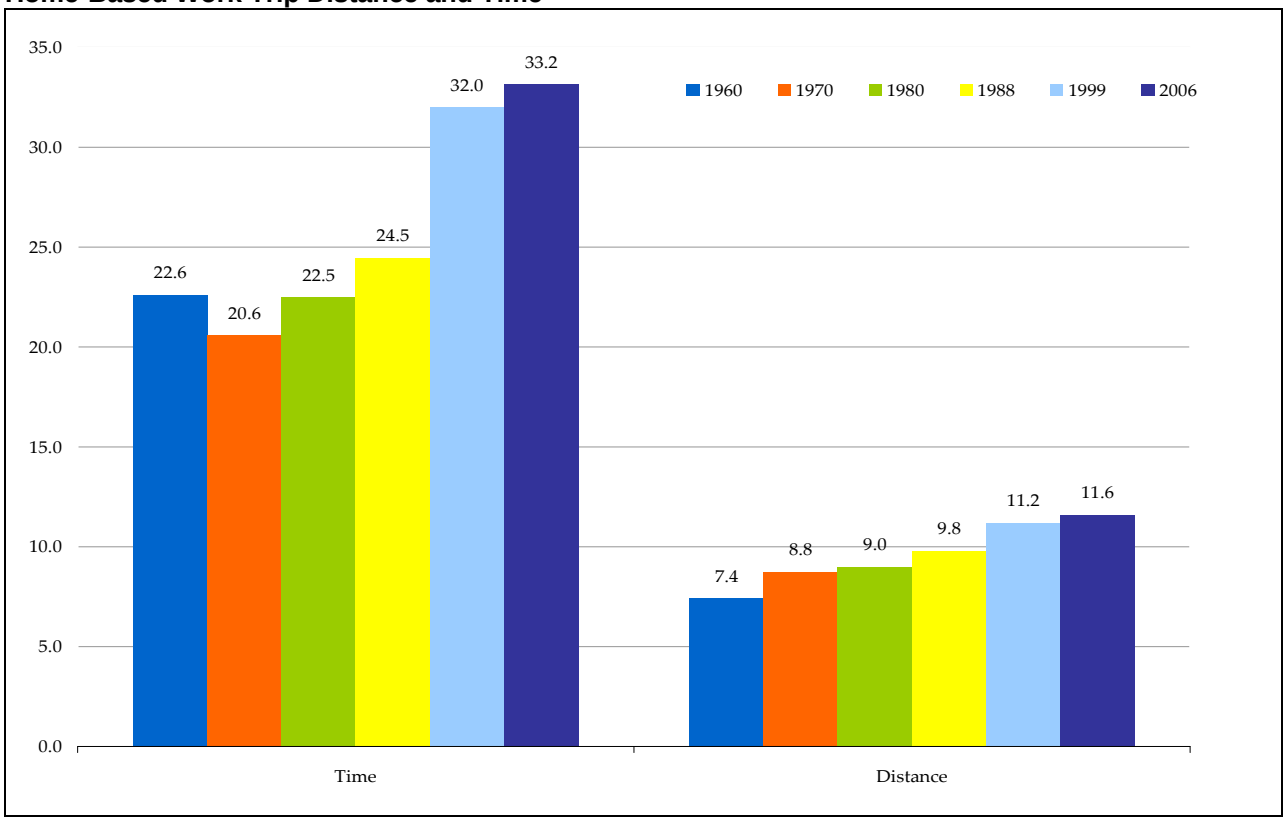
| County/ Sub-area | Home-Based Work Trips | | | Total Trips | | |
|---|---|---|---|---|---|---|
| | 1988 | 1999 | 2006 | 1988 | 1999 | 2006 |
| Pierce | 1.2% | 6.0% | 6.0% | 1.7% | 1.7% | 2.4% |
| South King | 3.0% | 7.0% | 8.8% | 2.2% | 2.2% | 3.2% |
| East King | 6.5% | 9.4% | 11.5% | 1.7% | 2.4% | 3.3% |
| Central King/ Seattle | 19.1% | 22.0% | 23.4% | 11.0% | 7.1% | 8.6% |
| Snohomish | 3.1% | 5.6% | 8.7% | 1.2% | 1.8% | 2.5% |
| Kitsap | 4.4% | 17.4% | 11.7% | 1.6% | 4.5% | 3.6% |
| **Region** | **6.3%** | **11.2%** | **12.3%** | **3.3%** | **3.3%** | **4.1%** |

*Source: PSRC Household Survey, 2006. This chart shows historical trends in mode share for the region's sub-areas. These numbers differ slightly from results of the PSRC regional travel demand model used to evaluate the Transportation 2040 alternatives. Transit ridership data in the PSRC Household Surveys are a relatively small sample size. These data are merged with other transit survey data to estimate ridership for the regional travel demand model, which shows total regional transit mode share at 10.4% of all work trips in 2006.*

## Trip Times and Distances

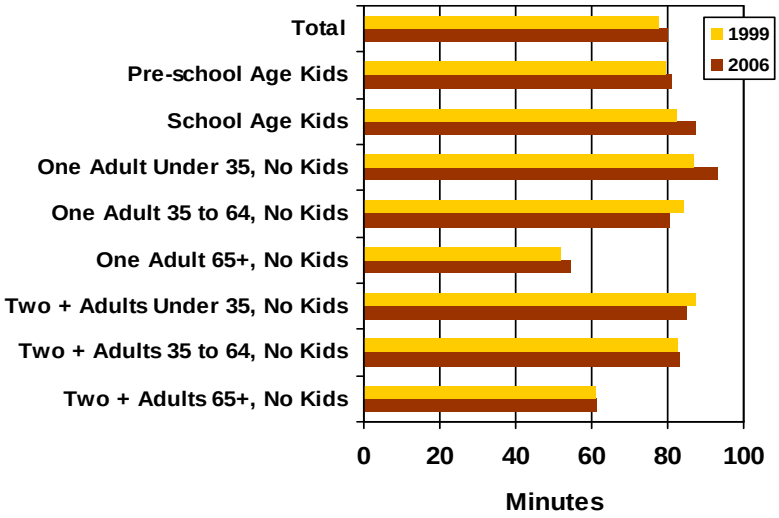
As shown in Exhibit 4-13, with the exception of the decrease in trip time between 1960 and 1970, the region has experienced increasing average trip time and trip distance for the past 45 years. The largest increase in trip time occurred between 1988 and 1999, when the average work trip increased from 24.5 minutes to 32 minutes. The average work trip increased just over 1 minute between 1999 and 2006. Average work trip distance has increased steadily over this same time period, from 7.4 miles in 1960 to 11.6 miles in 2006.

**Exhibit 4-13**
**Home-Based Work Trip Distance and Time**




On average, in 2006, people of driving age in the central Puget Sound region spent nearly 80 minutes per day traveling (refer to Exhibit 4-14). This figure is up nearly 3 percent since 1999, when the average was 78 minutes. Time spent traveling is slightly higher for households with school-age children (87 minutes per day) and single adults (93 minutes) and significantly less for adults over 65 years of age (55 to 61 minutes). On average, 39 percent of all travel time is spent traveling to or from work, with the exception of adults over 65 years of age, who spend between 9 percent and 15 percent of their travel time traveling to and from work.

**Exhibit 4-14**
**Daily Travel Times by Lifecycle Category**



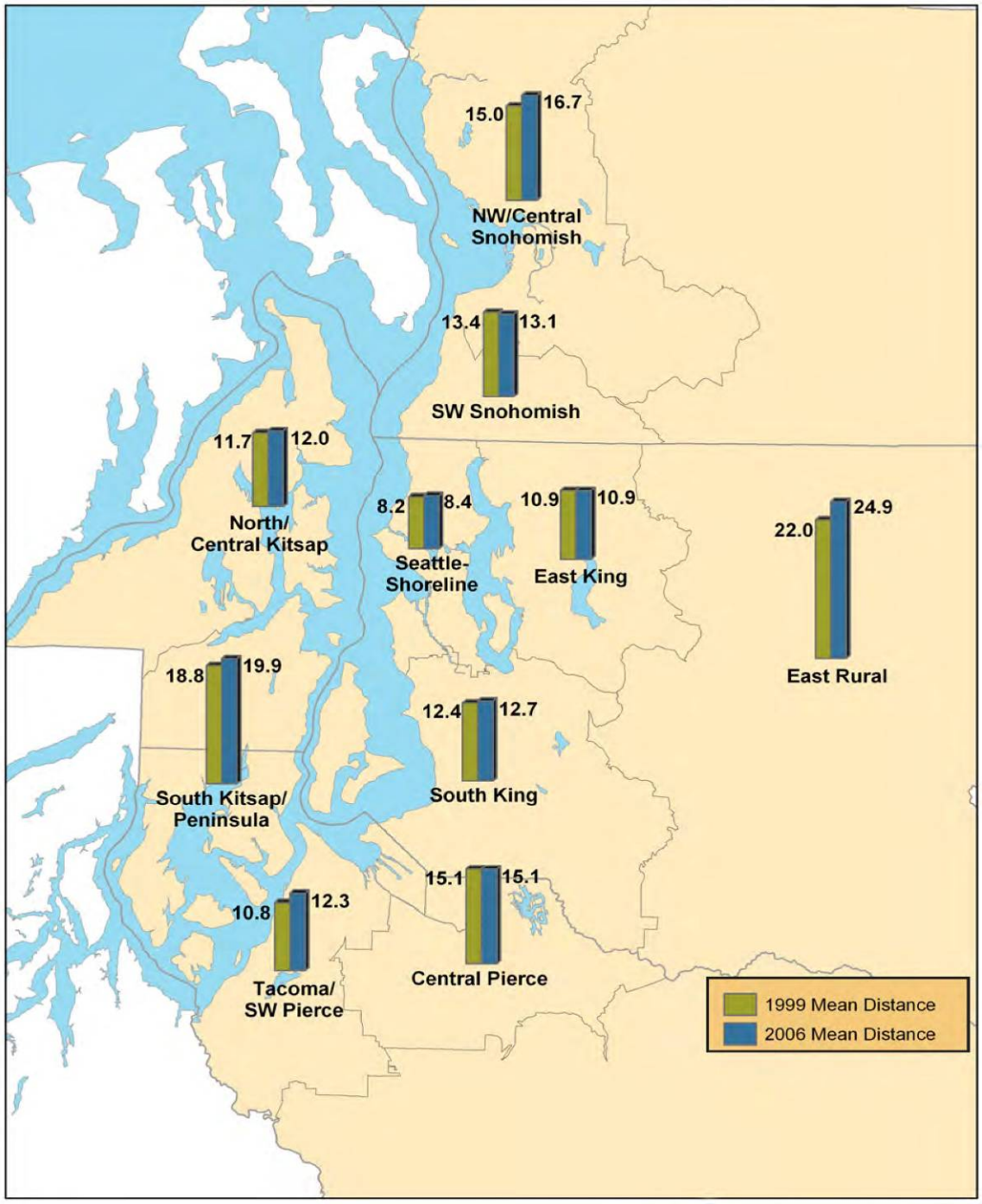

*Source: PSRC, 1999, 2006 and 2006 Household Travel Survey*

The average commute distance for the region's residents increased by 5 percent between 1999 and 2006, from 12.2 to 12.8 miles (refer to Exhibit 4-15). Three sub-areas experienced the largest increases in distance to work: Northwest/Central Snohomish, the East Rural areas, and the Tacoma/Southwest Pierce sub-area increased by over a mile each. These increases were more pronounced in areas farther from the region's main employment centers. Income and the number of working members in a household influence distance to work by constraining or enhancing home location options.

Not surprisingly, the shortest commute distances in the region (8.2 to 8.4 miles) are in Seattle-Shoreline, an area located within the geographic heart of the region, and an area which is also close to the region's largest job center, downtown Seattle. The second shortest average commutes in the region are in the East King area, with a consistent 10.9-mile average commute between 1970 and 2000. This area's proximity to downtown Seattle, and the growing number of jobs in Bellevue and Redmond, contributes to these shorter commutes.

**Exhibit 4-15**

**Average Commute Distance to Work (1999 and 2006 in miles)**

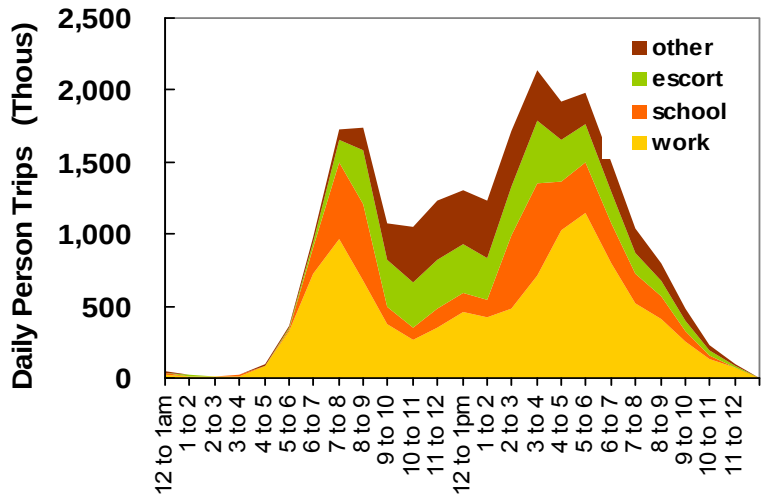



*Source: PSRC, Puget Sound Trends, December 2007*

### Time of Day and Trip Purpose

Slightly less than half of daily travel to or from work occurs in the morning and evening peak periods (45 percent). This includes stops made for other purposes on the way to or from work, which are referred to collectively as work tours, as shown in Exhibit 4-16. School tours also include stops made on the way to or from school, and occur primarily in the morning and evening peak periods. Escort tours, which involve picking up or dropping off someone, compose a significant portion of daily travel, but are somewhat equally spread throughout the day. Other trips cluster during the midday (between 9:00 a.m. and 1:00 p.m.) and continue throughout the evening.

**Exhibit 4-16**
**Average Weekday Travel by Time Period and Trip Purpose**



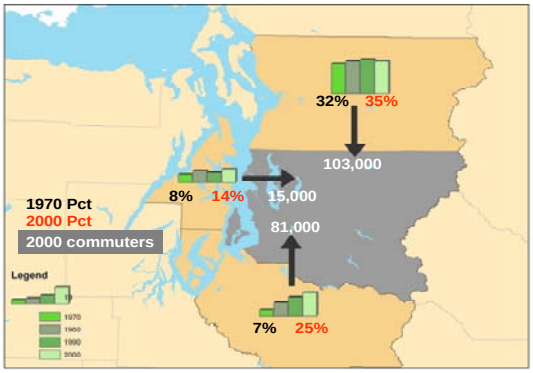

*Source: PSRC, 2006*

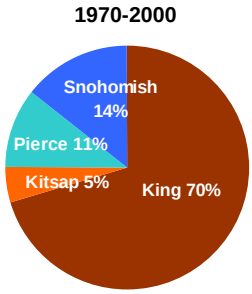
### Jobs and Housing Balance

Regional travel patterns have changed over the past several decades, in part due to differential growth rates for population and employment. Between 1970 and 2000, King County saw 70 percent of the region's total job growth but only 43 percent of new housing, as shown in Exhibit 4-17. By comparison, Pierce County captured 23 percent of the region's housing growth but only 11 percent of new jobs. Similarly, Snohomish County captured 25 percent of the region's housing growth but only 14 percent of new jobs. These shifts in the regional jobs-

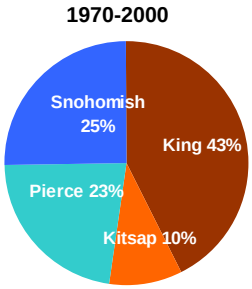
housing balance are fueling an increase in daily commute travel from the other three counties into King County. The result is that commuting from Kitsap, Pierce, and Snohomish counties into King County has been steadily increasing over time, as shown in Exhibit 4-17. The largest increase in inter-county commutes into King County is from Pierce County, which increased from 7 percent in 1970 to 25 percent in 2000. Still, the largest share of a county's work force traveling into a neighboring county is from Snohomish County, where one in three workers now commutes into King County to work. For Kitsap County this ratio is 1 in 7. This ratio could be higher but for the relatively large presence of military jobs within Kitsap County.

**Exhibit 4-17**
**Regional Commute Trends and Jobs and Housing Growth by County**




Jobs



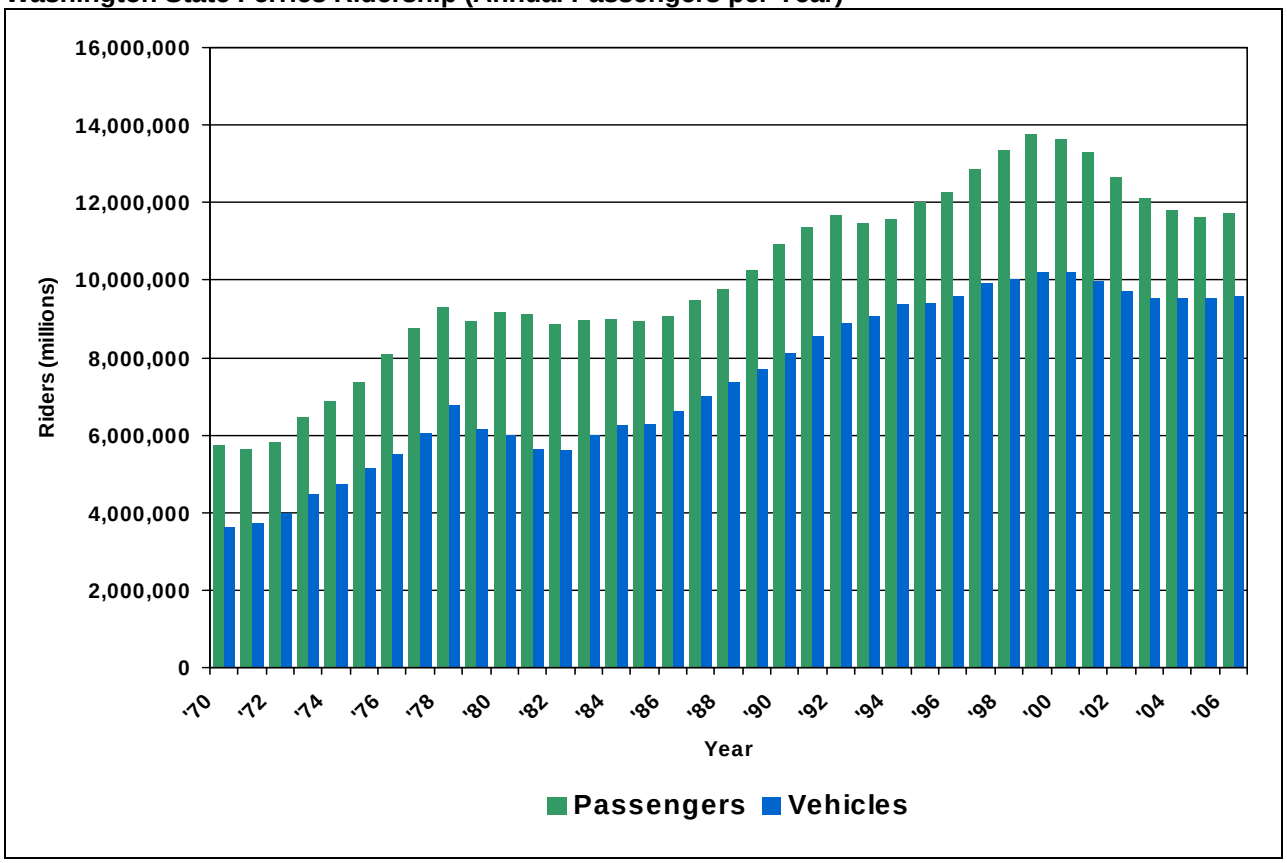

Housing

*Sources: Bureau of Economic Analysis, 2004; PSRC, 2006*

## Ferry System Use

Annual passengers carried on the Washington State Ferries system has doubled since 1970 to nearly 12 million passengers, while the vehicles carried increased by 160 percent to nearly 9.6 million in 2006 (Washington State Ferries, 2006). This trend (refer to Exhibit 4-18) shows a dip in business and eventual recovery after the Hood Canal Bridge sank in 1979 and a more recent decrease in ridership due to reduced service and fare increases (since 2000 fares have increased by between 37 and 122 percent) and the economic recession from 2000 to 2006 and again in 2008. Since 2006, total traffic (vehicles and passengers) has continued to decline, reaching a total of 23 million in 2008.

**Exhibit 4-18**
**Washington State Ferries Ridership (Annual Passengers per Year)**

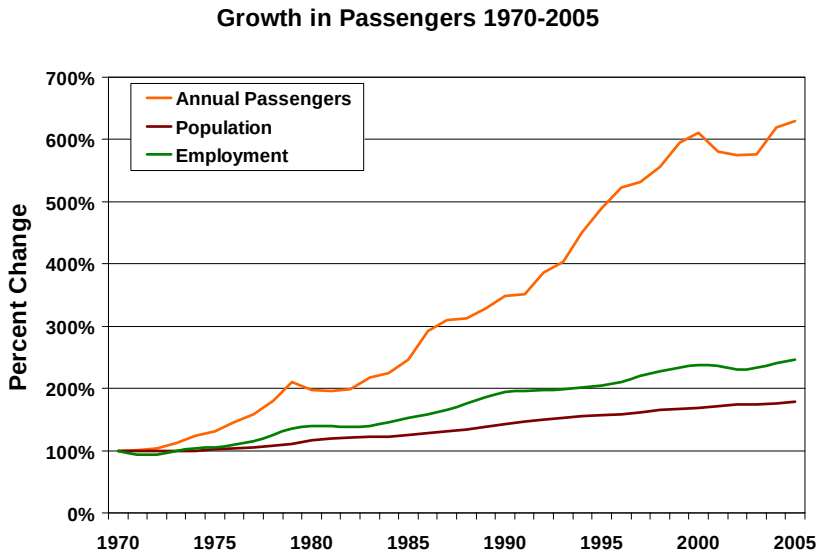



*Source: Washington State Ferries, 2006*

## Air Travel

Commercial air passenger transportation has grown more than any other mode, with a 580 percent increase from 1970 to 2005, as shown in Exhibit 4-19. Traffic at Sea-Tac Airport has grown from less than 5 million passengers in 1970 to over 29 million in 2005. The airport continues to grow, and in 2008 it served over 32 million passengers. Between 1970 and 2005, growth in air passengers has been significantly higher than growth in either population (78 percent) or employment (148 percent).

**Exhibit 4-19**
**Commercial Air Demand**




*Source: PSRC, 2001, 2004*

## 16 What state and federal rules and regulations affect planning for Transportation 2040?

### Federal Requirements

#### Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU)

SAFETEA-LU was signed into law in 2005. The law reauthorized highway, highway safety, transit, and other surface transportation programs for 5 years (2005 through 2009), totaling $244.1 billion. SAFETEA-LU has been temporarily extended into 2010 pending congressional approval of a new transportation bill. In particular, SAFETEA-LU elevated the importance of improving safety on the nation's highways, allows states more options for using road pricing to address congestion, and specified new provisions to strengthen project financial integrity, project delivery, and major project oversight.

#### Metropolitan Planning – General Federal Requirements

Under SAFETEA-LU, the U.S. Department of Transportation requires metropolitan planning organizations (MPOs), such as

PSRC, to prepare long-range metropolitan transportation plans (MTPs), and these plans must be updated every 4 years. The primary federal requirements for MTPs are addressed in the metropolitan transportation planning rules—Title 23 Code of Federal Regulations (CFR) Part 450 and 49 CFR Part 613. Key federal requirements for long-range transportation plans include the following:

- MTPs must be developed through an open and inclusive process that ensures public input, seeks out and considers the needs of those traditionally underserved by existing transportation systems, and consults with resource agencies to ensure potential problems are discovered early in the MTP planning process.
- MTPs must be developed for a period of not less than 20 years into the future; MTPs must reflect the most recent assumptions for population, travel, land use, congestion, employment, and economic activity.
- MTPs must have a financially constrained element, transportation revenue assumptions must be reasonable, and the long-range financial estimate must take into account construction-related inflation costs.
- MTPs may include, for illustrative purposes, additional projects that would be included in the adopted MTP if reasonable additional resources beyond those identified in the financial plan were to become available.
- MTPs must conform to the applicable federal air quality plan, called the State Implementation Plan, for ozone and other pollutants for which an area is not in attainment.
- MTPs must consider planning factors and strategies in the local context.

**What are the MTP and the RTP?**

Destination 2030 serves as the region's Metropolitan Transportation Plan (MTP) under federal law and as the Regional Transportation Plan (RTP) under state law. The plan satisfies all state and federal requirements. For this reason, the terms MTP and RTP may be used interchangeably in the Transportation 2040 FEIS.

### National Environmental Policy Act

The National Environmental Policy Act of 1969 (NEPA) requires federal agencies to assess the possible environmental consequences of projects they propose to undertake, fund, or approve. Under NEPA rules, the MTP is not subject to NEPA. This FEIS has been prepared as a plan-level environmental document under the Washington State Environmental Policy Act (SEPA).

## State Requirements

### Growth Management Act and Regional Transportation Planning Organizations

In 1990, as part of the state Growth Management Act (GMA) (Chapter 36.70A RCW), the Legislature authorized the creation of RTPOs (RCW 47.80). RTPOs are voluntary organizations composed of local governments whose purpose is to coordinate transportation planning on a regional basis, and to develop a Regional Transportation Plan (RTP). This program is intended to parallel the metropolitan planning program already required by the federal government in urbanized areas of the state, and to provide broad guidance in developing the transportation element of local comprehensive plans for those cities and counties planning under GMA.

**What are the RTPO requirements contained in RCW 47.80?**

For more information about the Regional Transportation Planning Organization (RTPO) requirements, please refer to Revised Code of Washington (RCW) 47.80 online:

http://apps.leg.wa.gov/rcw/default.aspx?cite=47.80.030

### State Environmental Policy Act

SEPA provides a way to identify possible environmental impacts that may result from governmental decisions. These decisions may be related to issuing permits for private projects; constructing public facilities; or adopting regulations, policies, or plans. Information provided during the SEPA review process helps agency decision-makers, applicants, and the public understand how a proposal will affect the environment.

SEPA (Chapter 43.21C RCW) provides requirements and guidelines for preparation of environmental documents and the environmental evaluation process that apply to both planning programs and individual construction projects. According to SEPA:

> *An environmental impact statement [EIS] shall be prepared on proposals for legislation and other major actions having a probable significant, adverse environmental impact …. An environmental impact statement is required to analyze only those probable adverse environmental impacts which are significant. Beneficial environmental impacts may be discussed. The responsible official shall consult with agencies and the public to identify such impacts and limit the scope of an environmental impact statement.*

Chapter 197-11 WAC provides a set of rules for implementing SEPA. The purpose of the rules is to establish uniform requirements for compliance with SEPA. Each agency must have its own SEPA procedures consistent with statewide rules. PSRC adopted its own SEPA procedures in 1997 through resolution EB-97-01.

## 17 What is considered in the analysis of alternatives?

The responses to Questions 18 to 32 evaluate how each of the Transportation 2040 alternatives would accommodate growth, enhance mobility, address congestion, and affect transportation system performance. These responses also consider how the region's transportation system might perform over the next 30 years as the region adds another 1.5 million people and 1.2 million new jobs.

## 18 How will the Transportation 2040 alternatives affect the transportation system compared to today, and how do they compare with one another?

### Measures Used in the Transportation Analysis

The analysis of impacts contained in this FEIS was done using a broad evaluation framework consisting of technical evaluation criteria and policy measures considered to be of importance in evaluating the Transportation 2040 alternatives. The following measures were used in the alternatives evaluation process:

- Vehicle trips by time of day
- Average daily trip times and lengths
- Freeway and arterial VMT, vehicle hours traveled (VHT), and delay
- Peak, off-peak, freeway, and arterial speeds
- Mode share for work, non-work, and all trips
- Person trips by mode
- AM and midday transit service
- Increase in AM and midday transit service hours

**Appendix D: Policy Analysis and Evaluation Criteria Report**

For a description of the evaluation methods and results, refer to Appendix D.

- Daily transit boardings
- Auto and passenger ferry routes
- Auto and passenger ferry boardings
- Investment in walking and bicycling facilities
- Nonmotorized trips
- Annual benefits to commercial and passenger users
- Annual transportation mobility benefits
- Annual accident reduction benefits
- Annual user benefits by regional sub-area
- Annual benefits by income
- Annual benefits by user type
- Annual benefits to environmental justice populations

### Strategies Included in the Transportation 2040 Alternatives

Transportation 2040 alternatives include a broad range of infrastructure investments, system and demand management strategies, and financing (including tolling) approaches, each designed to meet common objectives, but in different ways.

Some alternatives focus more investment in system efficiency; others would invest more heavily in expanding capacity. The alternatives vary in the amount of investment provided for roadways, transit, ferries, bicycle and pedestrian facilities, and other programs. The alternatives also differ in the location and extent of tolling. This section of the FEIS reports on the transportation system impacts of the Transportation 2040 alternatives, comparing the alternatives to one another, against a set of transportation system performance criteria and measures. In addition to the evaluation criteria and measures, information will be provided on performance measures such as the number of vehicle and person trips, trip length, VMT, VHT, vehicle travel speeds, congestion and delay, mode share, transit boardings, and walking and bicycling trips.

Much of the following analysis is based on the results of PRSC's integrated regional land use and travel models. While many elements of the alternatives vary, and therefore represent a varied range of possible transportation futures for alternatives

analysis, they also contain many consistent land use and transportation assumptions. These assumptions constrain the range of impacts.

### Regionwide Infrastructure

Exhibit 4-20 displays a summary of transportation system investments for the plan alternatives in the year 2040 compared with 2006 (where comparable information is available). This information, included here to provide context for the analysis of impacts, includes the major physical infrastructure and service characteristics contained within the seven plan alternatives (the Baseline Alternative plus the six action alternatives).

The remainder of this section reports on the transportation system impacts of the plan alternatives. It compares the alternatives to conditions in 2006 and to one another in 2040 using a set of transportation system performance information. This information includes the number of vehicle and person trips, trip length, VMT, VHT, vehicle travel speeds, congestion and delay, mode share, transit boardings, and walking and bicycling trips. Much of the following analysis is based on the results of PRSC's regional travel models. For more information about these models, refer to Appendix E of this FEIS. Two key assumptions were made in completing the transportation analysis of the alternatives:

1. Total regional population and employment forecasts for the year 2040 were held constant, and did not change among the alternatives.
2. VISION 2040 forecasts of land use and growth patterns did not change among the alternatives as an input to the model analysis.

**Exhibit 4-20**[1]
**Summary of Roadway and Transit Infrastructure, 2006–2040**

| | 2006 | Transportation System (2040) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | **Baseline** | Alt. 1 | Alt. 2 | Alt. 3 | Alt. 4 | Alt. 5 | Preferred Alt. (Constrained) | **Preferred Alt.** |
| Freeway lane miles | 2,616 | 2,741 | 2,856 | 3,138 | 3,001 | 2,957 | 2,824 | 2,964 | 3,011 |
| New freeway lane miles | - | 124 | 240 | 522 | 384 | 341 | 208 | 347 | 395 |
| Percent increase from 2006 | - | 5% | 9% | 20% | 15% | 13% | 8% | 13% | 15% |
| Arterial lane miles | 10,189 | 10,412 | 10,495 | 10,875 | 10,540 | 10,532 | 10,505 | 10,588 | 10,752 |
| New arterial lane miles | - | 223 | 306 | 686 | 350 | 342 | 315 | 398 | 563 |
| % increase from 2006 | - | 2% | 3% | 7% | 3% | 3% | 3% | 4% | 6% |
| Freeway and arterial lane miles | 12,805 | 13,153 | 13,352 | 14,013 | 13,540 | 13,489 | 13,329 | 13,551 | 13,764 |
| New freeway and arterial lane miles | - | 348 | 546 | 1,208 | 735 | 683 | 523 | 746 | 958 |
| % increase from 2006 | - | 3% | 4% | 9% | 6% | 5% | 4% | 6% | 7% |
| Light rail miles | 2 | 55 | 55 | 82 | 55 | 82 | 82 | 82 | 86 |
| New light rail centerline miles | | 53 | 53 | 80 | 53 | 80 | 80 | 80 | 85 |
| % increase from 2006 | | 3,421% | 3,421% | 5,151% | 3,421% | 5,151% | 5,151% | 5,151% | 5,431% |
| Commuter rail centerline miles | 74 | 82 | 82 | 82 | 82 | 82 | 128 | 82 | 128 |
| New commuter rail centerline miles | | 8 | 8 | 8 | 8 | 8 | 54 | 8 | 54 |
| % increase from 2006 | | 11% | 11% | 11% | 11% | 11% | 74% | 11% | 74% |
| High-capacity transit (mode to be determined) centerline miles | 0 | 0 | 0 | 0 | 0 | 0 | 66 | 0 | 66 |
| New high-capacity transit (mode to be determined) centerline miles | 0 | 0 | 0 | 0 | 0 | 0 | 66 | 0 | 66 |
| % increase from 2006 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Off-road trail centerline miles | 570 | 600 | 747 | 745 | 740 | 745 | 1,058 | 918 | 1,123 |
| New off-road trail centerline miles | | 30 | 177 | 175 | 170 | 175 | 488 | 348 | 553 |
| % increase from 2006 | | 5% | 31% | 31% | 30% | 31% | 86% | 61% | 97% |

Source: PSRC Geographic Information System (Travel Model for Rail Miles).
Notes: Figures above tabulate the portion of the regional transportation networks included in the EIS analysis.
There are additional roadways in the region.
"Non-Freeway Roads" include all principal arterials plus selected minor arterials, collectors, and local roads sufficient to support the analysis.
Changes from DEIS are the result of new spatial data obtained during FEIS analysis preparation.
High-capacity transit (mode to be determined) were all modeled as light rail.
Light rail transit centerline mile figures do not add due to rounding.

However, transportation investments included in the alternatives were analyzed using the UrbanSim model to determine the extent of impacts to future land use. These

[1] This exhibit has changed since the DEIS.

analysis results are discussed in Chapter 5: Land Use, Population, Employment, and Housing.

This transportation impact section of the FEIS reports on a series of transportation system performance characteristics and impacts. It is divided into two primary sections: (1) impacts similar across all alternatives, and (2) impacts specific to individual alternatives.

## 19 What impacts are similar across all alternatives?

This section focuses on how the alternatives accommodate regional growth and travel demand, and it reports impact categories that are similar for each alternative.

Compared to 2006 conditions, for all alternatives, there will be more person and vehicle trips, higher total VMT and VHT, and increased delay on arterials. At the same time, compared to today's conditions, there will be similar vehicle occupancy levels, vehicle trip lengths, and travel time. Finally, compared to today's conditions, there will be lower per capita VMT, increased bicycling and walking trips, and lower total miles per trip.

Alternatives 1 through 5, by definition, include all investments contained within the Baseline Alternative. The Preferred Alternative (Constrained) and the full Preferred Alternative also contain these same investments (refer to Chapter 3: Plan Alternatives). All plan alternatives estimate an increase in person and vehicle trips, as well as total VMT, resulting from growth in population and employment. The six action alternatives include all the investments made in the Baseline Alternative. All plan alternatives would invest in numerous major transportation projects and would share both the environmental impacts and ongoing operational benefits of these projects. These include ST2, which would expand Regional Express Bus service, add more service to Sounder commuter rail, and build Link light rail north to Lynnwood, south to Federal Way, and east to Overlake. In addition, major projects on the state highway system would be completed, including improvements on I-405, SR 518, Alaskan Way Viaduct, HOV improvements on I-5 and SR 16 in Pierce

County, SR 9, SR 202, and SR 522. BRT service would also be implemented in numerous parts of the region for all alternatives.

The following conditions would be similar across all of the alternatives:

- Total daily person trips are projected to increase from 13.4 million from the base year of 2006 to about 18.9 million in 2040 for all alternatives. The full Preferred Alternative is projected to have the fewest daily person trips (18,861,000), while Alternative 2 would have the most (18,995,000). This difference (less than 1 percent) is considered insignificant.
- From 2006 to 2040, the estimated number of vehicles owned within the region would increase with every alternative, and the differences among alternatives are insignificant. Total vehicles owned in the year 2040 would range from 3,759,000 to 3,847,000 vehicles, a difference of about 2 percent.
- Daily vehicle trips would increase from 8.7 million trips in 2006 to 12 million trips in 2040, but differences among the future 2040 alternatives would not be significant.
- Average vehicle occupancy would remain fairly stable or increase slightly for each alternative. Compared to the 2006 base year average of 1.6 persons per vehicle, in 2040 vehicle occupancy is projected to range from 1.5 to 1.6 occupants per vehicle for the different plan alternatives.
- From 2006 to 2040, the average work trip length (in miles) would remain relatively steady at between 12 and 13 miles per work trip, compared to the base year average of 13 miles per work trip in 2006. Non-work trip lengths would decrease for all alternatives, to between 4 and 5 miles per non-work trip, compared to the base year's average of 6 miles per trip in 2006. Non-work trip length for the Preferred Alternative (Constrained) and the full Preferred Alternative would be about 5 miles.

- Average work trip times (in minutes) would increase for all alternatives, compared to the base year 2006 trip times. The full Preferred Alternative would maintain the same trip times experienced in 2006, at 36 minutes.
- Average travel time for all trips would remain steady, at between 20 and 22 minutes for all the alternatives, compared with 21 minutes in 2006. This holds also for the Preferred Alternative (Constrained) and the full Preferred Alternative.
- Travel delay on the region's arterials would increase for all alternatives.
- Average vehicle travel speeds on the region's arterial streets are forecast to decline from 2006 to 2040. Differences in arterial travel speeds among the alternatives are not significant. In the year 2040, all alternatives would yield average daily speeds of about 20 mph on arterial streets during peak hours and 26 mph during off-peak hours. The same is true for the Preferred Alternative (Constrained) and the full Preferred Alternative.
- The number of ferry passengers would increase between 2006 and 2040 in all alternatives, and each alternative would add several new passenger-only ferry routes.
- Walking and bicycling trips would increase for each alternative.
- Freight mobility is considered to be an important element in all major projects. Investments specific to truck freight are part of all action alternatives.
- All action alternatives would produce time savings benefits to SOVs, HOVs, transit, and commercial users compared to the Baseline Alternative.
- All alternatives would generate benefits to each regional sub-area.
- Each action alternative would provide net positive benefits to environmental justice populations compared to the Baseline Alternative.

**What are user benefits?**

Benefits to users include travel time savings, travel reliability benefits, changes to vehicle ownership, and operating costs and other changes to consumer surplus that result from tolling and pricing policies.

For more information about the methods used to calculate user benefits, refer to the DEIS Appendix D: Policy Analysis and Criteria Evaluation Report.

## 20 How are the alternatives different from one another?

Sections 20 to 32 discuss the differences among the alternatives by comparing the six action alternatives with the Baseline Alternative.

The range of capacity and efficiency investments contained within each alternative would produce a range of impacts on performance of the region's roadway system. This section discusses trip length, trip time, trip speeds, and delay for the plan alternatives, in both absolute terms and in comparison with 2006 and the Baseline Alternative.

## 21 What effects on the roadway system are specific to individual alternatives?

The regional roadway system consists of an integrated network of local, county, and state highways, which form a hierarchy of local roads, collectors, minor and principal arterials, and freeways. At the regional scale used in this EIS analysis, the focus is on freeways and arterial roadways, which are fundamental components of the system.

In 2006 the region had 2,616 lane miles of freeways and 10,189 lane miles of arterials, for a system total of 12,805 lane miles. New freeway and arterial lane miles are included in each alternative (refer to Exhibit 4-20):

- The Baseline Alternative would add 124 lane miles of new freeways and 223 lane miles of arterials by 2040. This is the smallest roadway investment of the plan alternatives, including the Preferred Alternative (Constrained) and full Preferred Alternative.
- Of the six action alternatives, by 2040, Alternative 2 would add the most new roadways (522 lane miles of freeways and 686 lane miles of arterials, for a total of 1,208 lane miles). Alternative 5 would add the least total lane miles: 523 (208 lane miles of freeways and 315 lane miles of arterials). The Preferred Alternative (Constrained) would add a total of 746 miles of new roadways, while the full

Preferred Alternative would add 958 lane miles of new roadways.

- As a percentage of the existing 2006 roadway system, the Baseline Alternative would expand freeways by 5 percent and arterials by 2 percent; Alternative 2 would expand the region's freeway system 20 percent and arterials 7 percent; the Preferred Alternative (Constrained) would increase the freeway system by 13 percent and arterials by 4 percent; the full Preferred Alternative would expand freeways by 15 percent and arterials by 6 percent.
- Alternative 5 would expand freeways by 8 percent and arterials by 3 percent. Alternatives 1, 3, and 4 would expand freeways between 9 percent and 15 percent, and each would expand the arterial system about 3 percent.
- In total roadway system improvements, the Baseline Alternative would expand the system by 3 percent, Alternative 2 would expand it by 9 percent, and Alternative 5 would expand it by 4 percent. The Preferred Alternative (Constrained) would expand the total roadway system by 6 percent, while the full Preferred Alternative would add 7 percent to the region's roadway system.

Exhibit 4-21 displays summary results of the roadway system performance analysis, showing information for 2006 and comparing results for the Baseline Alternative and six action alternatives for the year 2040. These results are described on the following pages.

**Exhibit 4-21**[2]

## Roadway System Analysis Summary Results – 2040

| | 2006 | Alternatives Analysis for the Year 2040 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | **Baseline** | Alt. 1 | Alt. 2 | Alt. 3 | Alt. 4 | Alt. 5 | **Preferred Alt. (Constrained)** | **Preferred Alt.** |
| Daily person trips | 13,446,000 | 18,954,000 | 18,981,000 | 18,995,000 | 18,973,000 | 18,973,000 | 18,957,000 | 18,901,000 | 18,861,000 |
| Daily vehicle trips | 8,691,000 | 12,169,000 | 12,151,000 | 12,306,000 | 12,153,000 | 12,089,000 | 11,864,000 | 11,986,000 | 11,835,000 |
| Daily vehicle miles traveled (VMT) | 79,457,000 | 102,519,000 | 106,628,000 | 110,801,000 | 104,059,000 | 101,643,000 | 94,063,000 | 102,539,000 | 99,511,000 |
| Daily vehicle hours traveled (VHT) | 2,962,000 | 4,241,000 | 4,220,000 | 4,274,000 | 4,007,000 | 4,037,000 | 3,685,000 | 3,843,000 | 3,607,000 |
| Daily per capita VMT | 22.5 | 20.6 | 21.4 | 22.2 | 20.9 | 20.4 | 18.9 | 20.6 | 19.9 |
| Average vehicle occupancy | 1.55 | 1.56 | 1.56 | 1.54 | 1.56 | 1.57 | 1.60 | 1.58 | 1.59 |
| Average daily trip length (mi.) | | | | | | | | | |
| Work trips | 13 | 13 | 13 | 13 | 13 | 12 | 13 | 13 | 13 |
| Non-work trips | 6 | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 5 |
| Total trips | 7 | 6 | 7 | 7 | 6 | 6 | 6 | 6 | 6 |
| Average daily trip time (min.) | | | | | | | | | |
| Work trips | 36 | 42 | 38 | 38 | 39 | 41 | 42 | 37 | 36 |
| Non-work trips | 18 | 18 | 18 | 18 | 18 | 18 | 16 | 17 | 17 |
| Total trips | 21 | 22 | 21 | 21 | 21 | 21 | 20 | 21 | 20 |
| Daily delay (hours) | | | | | | | | | |
| Freeways | 281,000 | 513,000 | 469,000 | 458,000 | 224,000 | 215,000 | 136,000 | 190,000 | 141,000 |
| Arterials | 560,000 | 932,000 | 884,000 | 884,000 | 943,000 | 1,011,000 | 897,000 | 866,000 | 749,000 |
| Total daily delay | 841,000 | 1,445,000 | 1,353,000 | 1,342,000 | 1,167,000 | 1,226,000 | 1,033,000 | 1,055,000 | 890,000 |
| Average daily delay per capita (min.) | 14.3 | 17.4 | 16.3 | 16.1 | 14.0 | 14.7 | 12.4 | 12.7 | 10.7 |
| Average daily speed (MPH) | | | | | | | | | |
| Freeways | 41 | 35 | 38 | 39 | 45 | 45 | 48 | 47 | 49 |
| Arterials | 22 | 20 | 20 | 20 | 20 | 20 | 21 | 21 | 22 |
| Peak hour | 24 | 22 | 22 | 23 | 23 | 23 | 23 | 24 | 25 |
| Non-peak hour | 29 | 25 | 27 | 28 | 28 | 26 | 26 | 28 | 29 |

*Source: PSRC*

[2] This exhibit has changed since the DEIS.

### Vehicle Trips by Time of Day

All plan alternatives include TSM measures, which are designed to improve the efficiency of the region's existing roadways. Examining the distribution of trips throughout the day is one way to measure efficiency. A system that is overburdened during peak hours and underutilized during non-peak periods is not as efficient as a system that is more evenly utilized throughout the day.

Each plan alternative would accommodate significantly more daily vehicle trips during all times of day, compared to 2006:

- The increase in daily vehicle trips in 2040 varies from a high of 42 percent for Alternative 2 to a low of 36 percent for the Preferred Alternative.
- All six action alternatives would accommodate more PM peak period trips than the Baseline Alternative.

Exhibit 4-22 displays the impacts of each alternative on vehicle trips by time of day.

**What is peak spreading?**

Peak spreading is increase in the duration of a peak period, or rush hour. It results from individual travelers deliberately changing their travel behavior to avoid congestion or higher tolls associated with peak periods or to comply with policies enacted to encourage people to avoid traveling during peak periods.

### Trip Times and Lengths

Average trip times and trip lengths are ways to measure the performance of the transportation networks contained in each of the Transportation 2040 alternatives. The effects of each alternative on average daily trip times and lengths are shown in Exhibit 4-23 and summarized as follows:

- When all trips are combined, the Baseline Alternative would have the longest average trip time (22 minutes), and Alternative 5 and the full Preferred Alternative would each have the shortest average trip time (20 minutes).
- Work trip times are generally double non-work trip times for all the alternatives.
- Work trip lengths (in miles) are between 2 and 3 times longer than non-work trips for all alternatives.
- All action alternatives have shorter work trip times than the Baseline Alternative. Compared to the Baseline Alternative

(42 minutes), the full Preferred Alternative would result in average work trips of 36 minutes (14 percent less).

- Both work and non-work trip lengths are fairly consistent across the alternatives.

**Exhibit 4-22**[3]
**Average Daily Vehicle Trips (Trips by Time Period and Change from Baseline)**

| | 2006 | Baseline | Alt. 1 | Alt. 2 | Alt. 3 | Alt. 4 | Alt. 5 | Preferred Alt. (Constrained) | Preferred Alt. |
|---|---|---|---|---|---|---|---|---|---|
| AM peak period | 1,469,000 | 1,984,000 | 1,985,000 | 2,014,000 | 1 ,997,000 | 1,974,000 | 1 ,882,000 | 1,976,000 | 1,932,000 |
| Midday | 3,277,000 | 4,742,000 | 4,609,000 | 4,653,000 | 4 ,604,000 | 4,596,000 | 4,424,000 | 4,514,000 | 4,442,000 |
| PM peak period | 1,910,000 | 2,512,000 | 2,632,000 | 2,636,000 | 2,631,000 | 2,591,000 | 2,545,000 | 2,617,000 | 2,579,000 |
| Evening | 1,441,000 | 2,015,000 | 2,020,000 | 2,072,000 | 2,025,000 | 2,007,000 | 2,004,000 | 2,002,000 | 1,990,000 |
| Night | 594,000 | 916,000 | 904,000 | 931,000 | 897,000 | 921,000 | 1 ,010,000 | 878,000 | 893,000 |
| **Total** | **8,691,000** | **12,169,000** | **12,151,000** | **12,306,000** | **12,153,000** | **12,089,000** | **11,864,000** | **11,986,000** | **11,835,000** |
| **Percent change from 2006** | | | | | | | | | |
| AM peak period | | 35% | 35% | 37% | 36% | 34% | 28% | 35% | 32% |
| Midday | | 45% | 41% | 42% | 40% | 40% | 35% | 38% | 36% |
| PM peak period | | 32% | 38% | 38% | 38% | 36% | 33% | 37% | 35% |
| Evening | | 40% | 40% | 44% | 41% | 39% | 39% | 39% | 38% |
| Night | | 54% | 52% | 57% | 51% | 55% | 70% | 48% | 50% |
| **Total** | | **40%** | **40%** | **42%** | **40%** | **39%** | **37%** | **38%** | **36%** |

*Source: PSRC travel demand model.*

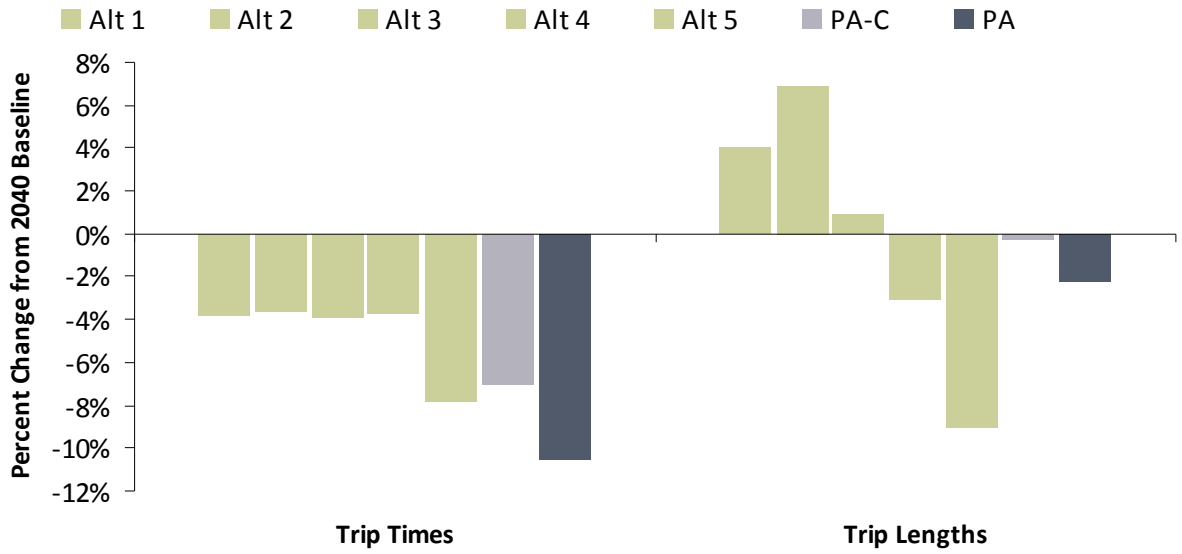
*Note: Figures above for freeway and arterial lane miles are from PSRC's travel demand model and differ from other lane mile data derived from PSRC's Geographic Information System or other sources.*

[3] This exhibit has changed since the DEIS.

**Exhibit 4-23**[4]

## Average Daily Trip Times and Lengths (Times in Minutes, Lengths in Miles)

| | 2006 | Baseline | Alt. 1 | Alt. 2 | Alt. 3 | Alt. 4 | Alt. 5 | Preferred Alt. (Constrained) | Preferred Alt. |
|---|---|---|---|---|---|---|---|---|---|
| **Trip Times (minutes)** | | | | | | | | | |
| Work | 36 | 42 | 38 | 38 | 39 | 41 | 42 | 37 | 36 |
| Non-work | 18 | 18 | 18 | 18 | 18 | 18 | 16 | 17 | 17 |
| Total | 21 | 22 | 21 | 21 | 21 | 21 | 20 | 21 | 20 |
| **Trip Lengths (miles)** | | | | | | | | | |
| Work | 13 | 13 | 13 | 13 | 13 | 12 | 13 | 13 | 13 |
| Non-work | 6 | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 5 |
| All trips | 7 | 6 | 7 | 7 | 6 | 6 | 6 | 6 | 6 |
| **Percent Change from 2006 in Trip Times** | | | | | | | | | |
| Work | | 16% | 7% | 5% | 10% | 14% | 16% | 4% | 1% |
| Non-work | | 1% | -1% | 0% | -2% | -4% | -10% | -5% | -9% |
| All trips | | 6% | 2% | 2% | 2% | 2% | -3% | -2% | -5% |
| **Percent Change from 2006 in Trip Lengths** | | | | | | | | | |
| Work | | -2% | -1% | 0% | -2% | -6% | -5% | -4% | -3% |
| Non-work | | -11% | -7% | -3% | -10% | -14% | -22% | -11% | -14% |
| All trips | | -8% | -4% | -1% | -7% | -10% | -16% | -8% | -10% |




[4] This exhibit has changed since the DEIS.

### Vehicle Miles Traveled, Vehicle Hours Traveled, and Delay

Total daily VMT are the total number of cumulative miles traveled by all vehicles during an average day. Per capita VMT are the total VMT per person per day for a region. Total VHT are a product of total VMT and average travel speed. Delay is the difference between the travel time actually required to traverse a roadway segment and the unconstrained travel time. Together, these measures provide information about the total distance traveled (VMT) by all vehicles using the transportation system, the total duration of their trips (VHT), and the portion of those trips that was due to congestion (delay).

Effects of the alternatives on VMT, VHT, and delay are shown in Exhibit 4-24 and summarized as follows:

- Total daily VMT is projected to grow through the year 2040 for each alternative. Compared to the base year 2006, total daily VMT would increase from 79 million miles to between 94 million and 111 million miles. Total regional VMT growth would be the least (18 percent) in Alternative 5 and the most (39 percent) in Alternative 2.
- From 1990 to 2006, the region's per capita VMT remained fairly stable, at about 22.5 miles per day. Results of the travel demand model for the action alternatives indicate that this trend will continue and will actually decrease over the coming 30 years. Daily VMT per capita is projected to decrease from 22.5 miles in 2006 for all alternatives. Contributing factors to this decrease may include increases in transit service, more ridesharing, increased walking and bicycling trips, the effects of tolling, and shorter average trip lengths.
- Alternative 5 would result in the greatest per capita VMT decrease (16 percent), from the current 22.5 miles to 18.9 miles.
- Alternative 2 would have only a very slight reduction in per capita VMT (1 percent) from 22.5 to 22.2 miles.
- All other plan alternatives would reduce per capita VMT by 5 to 12 percent by the year 2040.

- All alternatives would increase daily VHT from 3 million hours per day in the base year 2006 to between 3.6 million hours and 4.3 million hours in the year 2040.
- Alternative 2 would experience the highest level of VHT (4.3 million, an increase of 44 percent), while the full Preferred Alternative would have the lowest (3.6 million, an increase of 22 percent).
- All alternatives would increase daily VHT, from 3 million hours in 2006 to a range from 3.6 million to 4.3 million in the year 2040.
- Total combined delay on freeways and arterials in the year 2040 would increase with all the alternatives, from a low of 6 percent in the full Preferred Alternative to a high of 72 percent in the Baseline Alternative.
- Delay on the region's arterial streets would also increase with each alternative. The full Preferred Alternative would result in the lowest increase in delay (34 percent more than the base year but 20 percent below the Baseline Alternative). Alternative 4 would create the greatest increase in arterial delay (81 percent above the base year 2006 and 8 percent above the Baseline Alternative).

Performance of the region's freeway system differs substantially among the alternatives. As shown in Exhibit 4-24, the six action alternatives would each reduce average freeway delay below the levels of the Baseline Alternative.

- The Baseline Alternative and Alternatives 1 and 2 would increase freeway delay between 63 and 83 percent over 2006 levels. The freeway delay increases for these alternatives are a result of several factors, including increased vehicle trips and the lack of emphasis on tolling or TDM strategies.
- Alternatives 3 and 4 would perform substantially better, reducing daily freeway delay from the 2006 base year by 20 percent for Alternative 3 and 23 percent for Alternative 4, due primarily to freeway tolls.
- The Preferred Alternative (Constrained) would reduce average freeway delay by 32 percent below 2006 levels.

- The best performing alternatives for freeway delay are Alternative 5 and the full Preferred Alternative. These alternatives would reduce average daily freeway delay by about 50 percent below the 2006 base year, or from 281,000 hours to between 136,000 and 141,000 hours in 2040.

### Vehicle Speeds

Vehicle speeds are also a measure of transportation system performance and are a component of VHT, which is the product of vehicle speeds and vehicle volumes. Exhibit 4-25 displays average daily freeway and arterial speeds, plus peak and off-peak speeds on the region's combined freeways and arterials.

- Arterial speeds are predicted to decrease from 22 mph in the base year 2006 to a range from 20 to 21 mph for all alternatives in 2040.
- Differences in speeds by time of day among the alternatives are not significant, with all peak hour speeds ranging from 22 to 23 mph (compared to 24 mph in 2006), and non-peak speeds ranging from 25 to 28 mph. (compared to 29 mph in 2006).

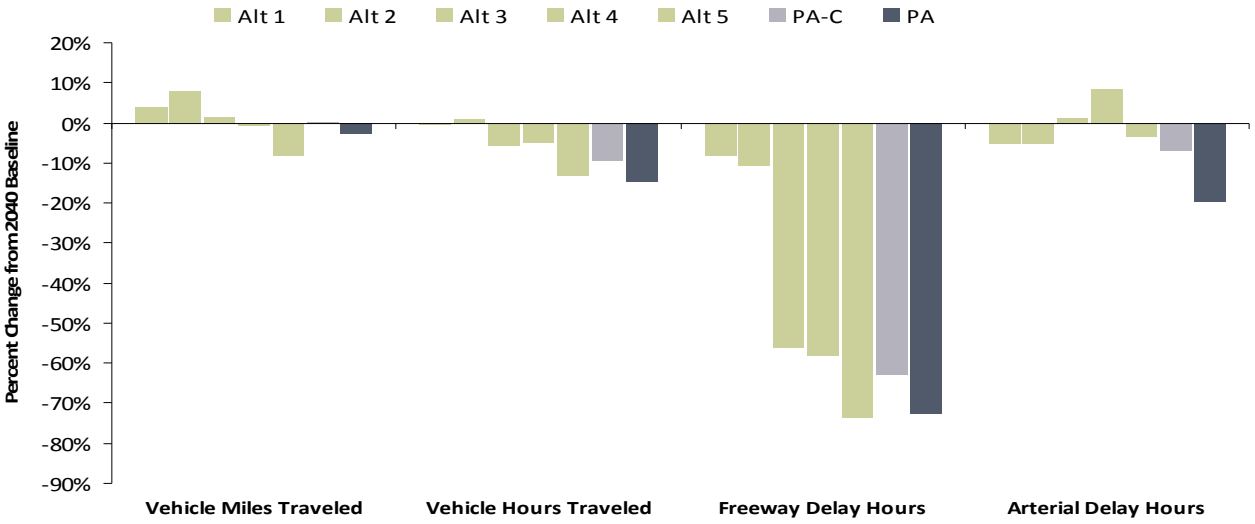
In contrast, freeway travel speeds are projected to vary considerably across the alternatives. From 2006, some alternatives show a decrease in speed and others show an increase.

- Alternatives 3, 4, and 5, the Preferred Alternative (Constrained), and the full Preferred Alternative all show freeway speed increases from both the 2006 base year and the Baseline Alternative. Average daily freeway speeds for these alternatives would range from 45 to 49 mph in the year 2040 compared to 41 mph for the base year 2006 and 35 mph for the Baseline Alternative. The freeway speed increases are a result of several factors, including transit system improvements, tolling, and other TDM and TSM strategies.

**Exhibit 4-24**[5]

**Auto Travel (Average Daily Vehicle Miles Traveled, Vehicle Hours Traveled, Delay Hours)**

| | 2006 | Baseline | Alt. 1 | Alt. 2 | Alt. 3 | Alt. 4 | Alt. 5 | Preferred Alt. (Constrained) | Preferred Alt. |
|---|---|---|---|---|---|---|---|---|---|
| **Vehicle Miles and Hours Traveled** | | | | | | | | | |
| VMT | 79,457,000 | 102,519,000 | 106,628,000 | 110,801,000 | 104,058,000 | 101,642,000 | 94,063,000 | 102,539,000 | 99,511,000 |
| VMT per Capita | 22.5 | 20.6 | 21.4 | 22.2 | 20.9 | 20.4 | 18.9 | 20.6 | 19.9 |
| VHT | 2,962,000 | 4,241,000 | 4,220,000 | 4,274,000 | 4,007,000 | 4,037,000 | 3,685,000 | 3,843,000 | 3,607,000 |
| **Vehicle Daily Hours** | | | | | | | | | |
| Freeway | 281,000 | 513,000 | 469, 000 | 458,000 | 224, 000 | 215,000 | 136,000 | 190,000 | 141,000 |
| Arterial | 560,000 | 932,000 | 884,000 | 884,000 | 943,000 | 1,011,000 | 897,000 | 866,000 | 749,000 |
| Total Delay | 841,000 | 1,445,000 | 1,353, 000 | 1,341, 000 | 1,167, 000 | 1,226, 000 | 1,034,000 | 1,055,000 | 890,000 |
| Delay per Capita (min.) | 14.3 | 17.4 | 16.3 | 16.1 | 14.0 | 14.7 | 12.4 | 12.7 | 10.7 |
| **Change from 2006 in Vehicle Miles and Hours Traveled** | | | | | | | | | |
| VMT | | 29% | 34% | 39% | 31% | 28% | 18% | 29% | 25% |
| VMT per Capita | | -9% | -5% | -1% | -7% | -10% | -16% | -9% | -12% |
| VHT | | 43% | 42% | 44% | 35% | 36% | 24% | 30% | 22% |
| **Change from 2006 in Vehicle Delay Hours** | | | | | | | | | |
| Freeway | | 83% | 67% | 63% | -20% | -24% | -52% | -32% | -50% |
| Arterial | | 66% | 58% | 58% | 68% | 81% | 60% | 55% | 34% |
| Total | | 72% | 61% | 60% | 39% | 46% | 23% | 25% | 6% |
| Delay per Capita | | 21% | 14% | 13% | -2% | 3% | -13% | -11% | -25% |

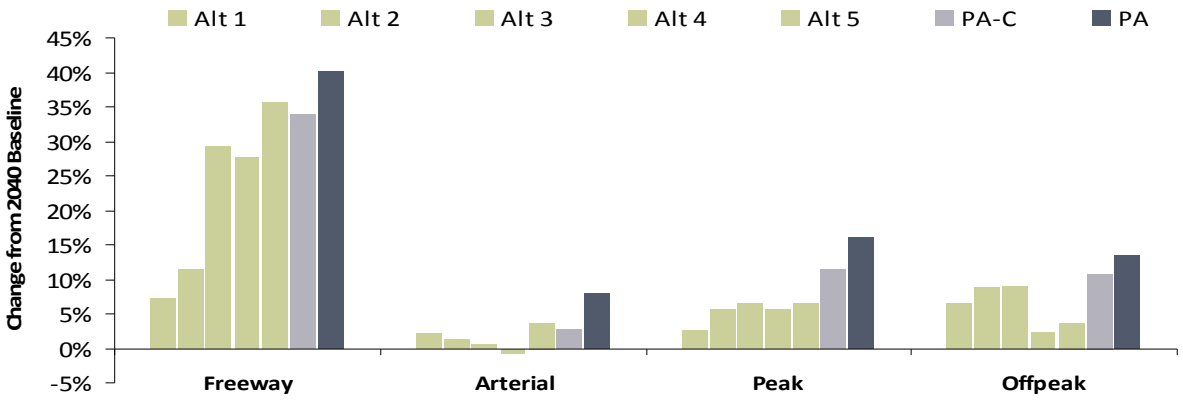



[5] This exhibit has changed since the DEIS.

**Exhibit 4-25**[6]

**Auto Performance (Average Daily Speeds by Facility Type and Time Period)**

| | 2006 | Baseline | Alt. 1 | Alt. 2 | Alt. 3 | Alt. 4 | Alt. 5 | Preferred Alt. (Constrained) | Preferred Alt. |
|---|---|---|---|---|---|---|---|---|---|
| **Auto Speeds** | | | | | | | | | |
| Daily: Freeway | 41 | 35 | 38 | 39 | 45 | 45 | 48 | 47 | 49 |
| Daily: Arterial | 22 | 20 | 20 | 20 | 20 | 20 | 21 | 21 | 22 |
| Peak: Freeways and arterials | 24 | 22 | 22 | 23 | 23 | 23 | 23 | 24 | 25 |
| Off-peak: Freeways and arterials | 29 | 25 | 27 | 28 | 28 | 26 | 26 | 28 | 29 |
| **Change from 2006 in Speeds** | | | | | | | | | |
| Daily: Freeway | | -14% | -8% | -4% | 11% | 10% | 17% | 15% | 21% |
| Daily: Arterial | | -8% | -6% | -7% | -8% | -9% | -5% | -6% | -1% |
| Peak: Freeways and arterials | | -10% | -8% | -5% | -4% | -5% | -4% | 0% | 4% |
| Off-peak: Freeways and arterials | | -11% | -5% | -3% | -3% | -9% | -8% | -1% | 1% |




The Baseline Alternative and Alternatives 1 and 2 would produce freeway speed decreases (ranging from 38 to 39 mph) compared to 41 mph in the 2006 base year.

## Mode Share

Exhibit 4-26 shows percentage mode share for work trips, non-work trips, and all trips combined, summarized as follows:

[6] This exhibit has changed since the DEIS.

- Work trips by transit accounted for 10.4 percent of all trips in 2006. This share is projected to increase for all alternatives, increasing to 15.4 percent in Alternative 2 to 19 percent in Alternative 5 and the full Preferred Alternative.
- For non-work trips, transit's share is forecast to reach between 2 and 2.5 percent for all alternatives by 2040. For the base year, the 2006 transit share of non-work trips was 1.4 percent.
- When work and non-work trips are combined, transit's share is forecast to vary from a low of 4.2 percent for the Baseline Alternative and Alternative 2, to a high of 5.3 percent for the full Preferred Alternative.
- Transit's share of all trips in the base year 2006 was 2.9 percent.
- Work trips by carpool, HOV, and walking and bicycling are also projected to increase their shares in the action alternatives compared to the Baseline Alternative.
- Walking and bicycling modes are projected to increase their mode shares for work and non-work trips with all action alternatives compared to 2006.
- For work trips, SOV mode share is projected to decrease from 75 percent in 2006 to between 70 percent in Alternative 2 and 65 percent in Alternative 5 and the full Preferred Alternative. For non-work and total trips, SOV share is predicted to remain fairly constant under all the alternatives. A goal of Transportation 2040 alternatives is to provide alternatives to driving alone. Mode share is one way to measure the degree to which each alternative achieves this goal.
- Carpools as a mode choice show a mixed result for the alternatives in 2040. For work trips, carpools are predicted to lose mode share under the Baseline Alternative and Alternatives 1 and 2, but they gain mode share in the other four alternatives. For non-work and total trips, carpools

would be a smaller share of trips under all the alternatives, when compared to 2006.

- For non-work trips, the differences among the alternatives are more subtle. Alternative 5 and the full Preferred Alternative show the most difference from the Baseline Alternative, with the lowest share for SOV and carpool trips and the highest share for transit and walking and bicycling trips. At the regional level, these differences are not significant.

**Exhibit 4-26**[7]
**Mode Share for Work, Non-work, and All Trips**

| | 2006 | Baseline | Alt. 1 | Alt. 2 | Alt. 3 | Alt. 4 | Alt. 5 | Preferred Alt. (Constrained) | Preferred Alt. |
|---|---|---|---|---|---|---|---|---|---|
| **Mode Share Work Trips** | | | | | | | | | |
| Single-occupant vehicle (SOV) | 75.3% | 69.5% | 68.2% | 70.3% | 68.5% | 67.5% | 65.2% | 67.1% | 65.1% |
| Carpool – HOV | 8.9% | 8.6% | 8.3% | 8.3% | 9.1% | 9.4% | 9.0% | 9.1% | 9.4% |
| Transit | 10.4% | 16.0% | 16.7% | 15.4% | 16.2% | 16.9% | 19.0% | 17.4% | 19.0% |
| Walk/Bike | 5.5% | 5.9% | 6.8% | 6.0% | 6.2% | 6.3% | 6.8% | 6.5% | 6.6% |
| **Total** | **100.0%** | **100.0%** | **100.0%** | **100.0%** | **100.0%** | **100.0%** | **100.0%** | **100.0%** | **100.0%** |
| **Mode Share Non-work Trips** | | | | | | | | | |
| SOV | 37.2% | 38.6% | 38.4% | 38.9% | 38.3% | 38.0% | 37.4% | 37.9% | 37.4% |
| Carpool – HOV | 49.9% | 46.3% | 46.5% | 46.6% | 46.6% | 46.6% | 45.6% | 46.6% | 46.6% |
| Transit | 1.4% | 1.8% | 2.4% | 2.0% | 2.0% | 2.1% | 2.4% | 2.4% | 2.5% |
| Walk/Bike | 11.4% | 13.3% | 12.7% | 12.6% | 13.0% | 13.3% | 14.6% | 13.1% | 13.5% |
| **Total** | **100.0%** | **100.0%** | **100.0%** | **100.0%** | **100.0%** | **100.0%** | **100.0%** | **100.0%** | **100.0%** |
| **Mode Share All Trips** | | | | | | | | | |
| SOV | 43.4% | 43.7% | 43.4% | 44.2% | 43.4% | 43.0% | 42.0% | 42.8% | 42.0% |
| Carpool – HOV | 43.3% | 40.0% | 40.1% | 40.1% | 40.3% | 40.4% | 39.5% | 40.3% | 40.4% |
| Transit | 2.9% | 4.2% | 4.8% | 4.2% | 4.4% | 4.5% | 5.2% | 4.9% | 5.3% |
| Bike/walk | 10.4% | 12.0% | 11.7% | 11.5% | 11.9% | 12.1% | 13.3% | 12.0% | 12.3% |
| **Total** | **100.0%** | **100.0%** | **100.0%** | **100.0%** | **100.0%** | **100.0%** | **100.0%** | **100.0%** | **100.0%** |

When the six action alternatives are compared directly to the Baseline Alternative, the differences in mode share are more apparent:

- SOV trips decline as a share of all work trips under all but Alternative 2 when compared to the Baseline Alternative, and

[7] This exhibit has changed since the DEIS.

the full Preferred Alternative and Alternative 5 show the largest decrease in SOV mode share, down from 75.3 percent in 2006 to about 65 percent in 2040.

- For non-work trips, the differences among the alternatives are more subtle. The full Preferred Alternative shows the most difference from the Baseline Alternative, with the lowest share for SOV and carpool trips, while Alternative 5 has the highest share for transit and walking and bicycling trips. At the regional level, these differences are not significant.

## 22 What effects on the transit system are specific to individual alternatives?

The level of investment in the transit system (both capital infrastructure and service) varies considerably across the alternatives.

Changes to transit infrastructure for the alternatives can be summarized as follows (refer to Exhibit 4-20):

- The Baseline Alternative and Alternatives 1 and 3 would expand the Link light rail program to 55 miles by the year 2040.
- Alternatives 2, 4, 5, the Preferred Alternative (Constrained), and the full Preferred Alternative would each provide additional Link light rail, expanding the system to between 82 and 86 miles, with extensions to Everett, downtown Redmond, and Tacoma.
- The full Preferred Alternative and Alternative 5 would include additional high-capacity transit extensions (mode has not been determined), each adding 66 miles of new high-capacity transit service by the year 2040.
- For the Sounder commuter rail system, the Baseline Alternative and Alternatives 1 through 4, as well as the Preferred Alternative (Constrained), would expand the system from 74 to 82 miles with the planned extension from Tacoma to Lakewood.
- The full Preferred Alternative and Alternative 5 would each expand commuter rail to 128 miles by 2040, with an

extension to DuPont and construction of commuter rail on the BNSF corridor from Renton to Snohomish.

### Average Daily Trips by Mode

Exhibit 4-27 shows total average daily work, non-work, and total trips by mode (SOV, carpool, transit, and walk/bike). Total daily trips are projected to increase from 13.7 million in 2006 to about 19 million in 2040. Work trips compose about 18 percent of all daily trips, while non-work trips are the remaining 82 percent.

#### Work Trips

Average daily SOV work trips will increase between 25 and 38 percent by 2040. Carpool trips will grow by between 37 and 54 percent. Walk and bike trips will increase by between 56 and 82 percent. Transit work trips show the largest growth as a percentage under all the alternatives. Between 2006 and 2040, total average daily transit trips are forecast to increase by 115 percent under Alternative 2 and 168 percent under Alternative 5.

#### Non-work Trips

Non-work trips via SOV will increase consistently under each alternative, by between 40 and 46 percent. Carpool trips will grow more slowly, between 28 and 31 percent. Transit trips will grow most, increasing by between 78 percent (Baseline Alternative) and 147 percent (full Preferred Alternative). Walking and bicycling trips will also grow strongly, between 54 and 79 percent under the alternatives.

Exhibit 4-28 shows the assumed transit service increases (in hours and annual growth in service) by alternative. Each alternative would expand transit service (measured in daily service hours, represented by morning and midday service periods):

- Total morning and midday bus service would increase from 135,000 hours in 2006 to 174,000 hours in Alternative 2 and 300,000 hours in the full Preferred Alternative.
- Morning and midday rail service would increase from 327 hours in 2006 (this does not include Sound Transit's

Phase 2 Light Rail program, which began service in July 2009) to between 5,500 hours in the Baseline Alternative and 14,000 hours in the full Preferred Alternative.

The Preferred Alternative contains the most significant expansion of high-capacity transit, both bus and rail.

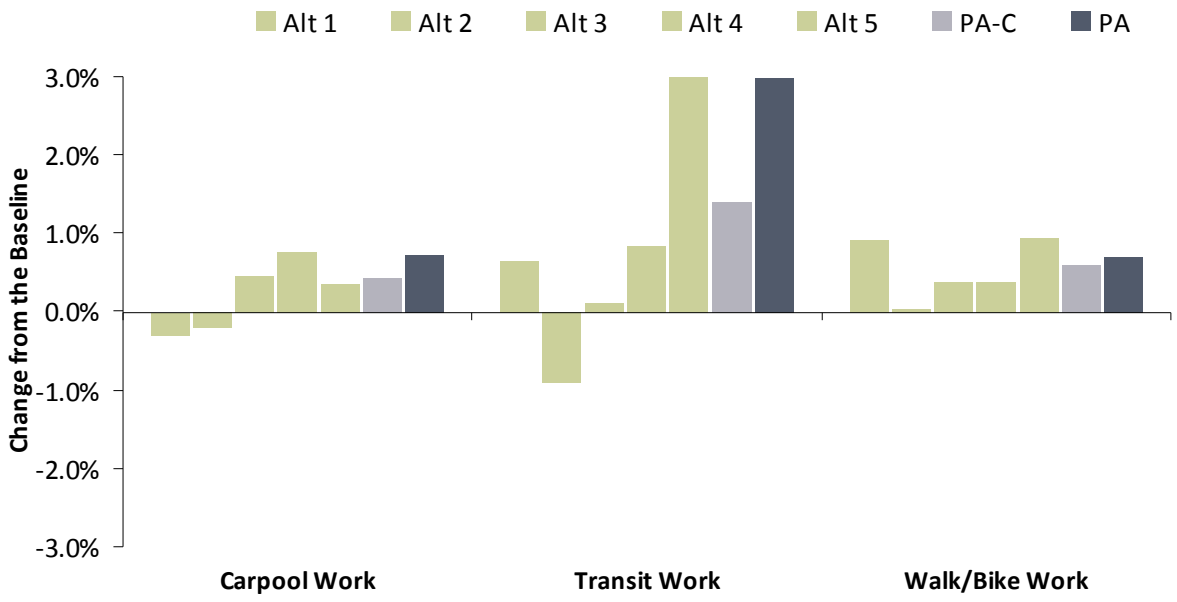
**Exhibit 4-27**[8]

**Travel Mode Share (Average Daily Person Trips by Mode)**

| | 2006 | Baseline | Alt. 1 | Alt. 2 | Alt. 3 | Alt. 4 | Alt. 5 | Preferred Alt. (Constrained) | Preferred Alt. |
|---|---|---|---|---|---|---|---|---|---|
| **Work Trips by Mode** | | | | | | | | | |
| SOV | 1,634,000 | 2,197,000 | 2,174,000 | 2,254,000 | 2 ,180,000 | 2,144,000 | 2 ,063,000 | 2,116,000 | 2,045,000 |
| Carpool | 193,000 | 273,000 | 265,000 | 269,000 | 289,000 | 298,000 | 284,000 | 286,000 | 294,000 |
| Transit | 225,000 | 507,000 | 532,000 | 483,000 | 514,000 | 536,000 | 603,000 | 550,000 | 597,000 |
| Walk/Bike | 119,000 | 186,000 | 216,000 | 189,000 | 198,000 | 199,000 | 216,000 | 204,000 | 206,000 |
| **Non-work Trips by Mode** | | | | | | | | | |
| SOV | 4,199,000 | 6,094,000 | 6,065,000 | 6,148,000 | 6 ,056,000 | 6,007,000 | 5 ,904,000 | 5,965,000 | 5,885,000 |
| Carpool | 5,629,000 | 7,316,000 | 7,345,000 | 7,359,000 | 7,363,000 | 7,360,000 | 7,208,000 | 7,340,000 | 7,319,000 |
| Transit | 161,000 | 286,000 | 374,000 | 312,000 | 320,000 | 327,000 | 380,000 | 375,000 | 397,000 |
| Walk/Bike | 1,286,000 | 2,095,000 | 2,010,000 | 1,981,000 | 2,053,000 | 2,102,000 | 2,299,000 | 2,065,000 | 2,118,000 |
| **% Change from 2006 in Work Trips** | | | | | | | | | |
| SOV | | 34% | 33% | 38% | 33% | 31% | 26% | 29% | 25% |
| Carpool | | 41% | 37% | 39% | 50% | 54% | 47% | 48% | 52% |
| Transit | | 125% | 136% | 115% | 128% | 138% | 168% | 144% | 165% |
| Walk/Bike | | 56% | 82% | 59% | 66% | 67% | 82% | 71% | 73% |
| **% Change from 2006 in Non-work Trips** | | | | | | | | | |
| SOV | | 45% | 44% | 46% | 44% | 43% | 41% | 42% | 40% |
| Carpool | | 30% | 30% | 31% | 31% | 31% | 28% | 30% | 30% |
| Transit | | 78% | 132% | 94% | 99% | 103% | 136% | 133% | 147% |
| Walk/Bike | | 63% | 56% | 54% | 60% | 63% | 79% | 61% | 65% |

[8] This exhibit has changed since the DEIS.

**Exhibit 4-27 (continued)**



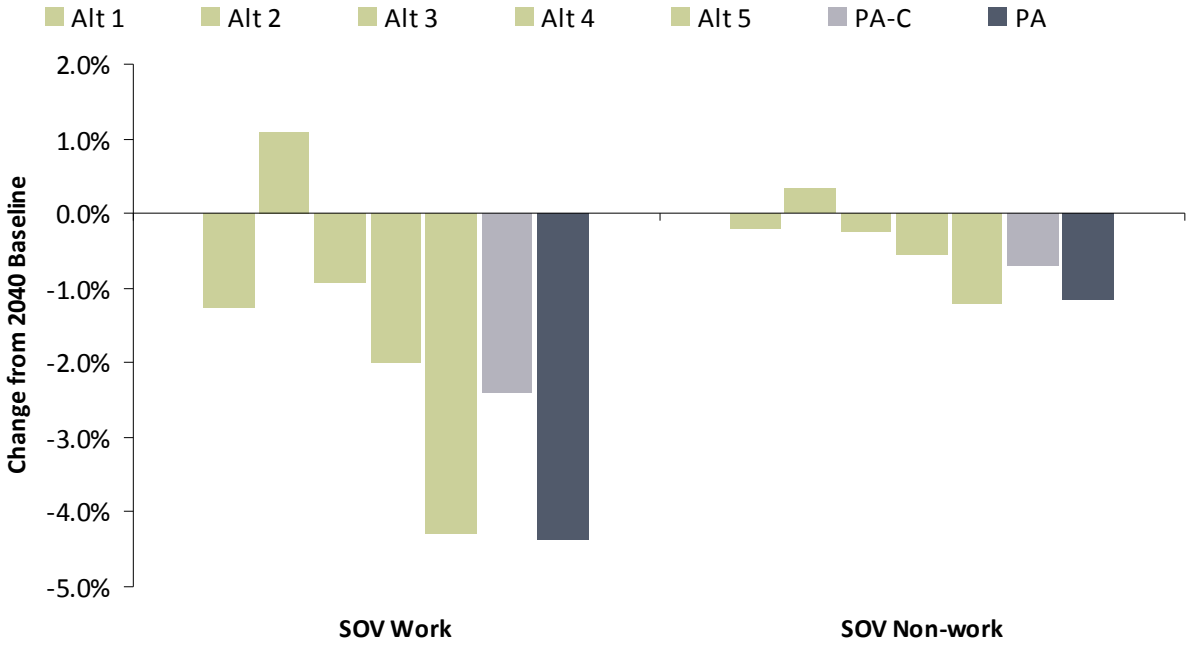



**Exhibit 4-28**[9]

## Peak and Off-Peak Transit Service Hours

| | 2006 | Baseline | Alt. 1 | Alt. 2 | Alt. 3 | Alt. 4 | Alt. 5 | Preferred Alt. (Constrained) | Preferred Alt. |
|---|---|---|---|---|---|---|---|---|---|
| **Bus Service** | | | | | | | | | |
| Peak core** bus service | 760 | 960 | 1040 | 980 | 1060 | 1140 | 1180 | 1670 | 1980 |
| Peak connector bus service | 250 | 310 | 350 | 310 | 320 | 330 | 350 | 360 | 400 |
| Peak specialized bus service | 350 | 580 | 670 | 560 | 650 | 610 | 690 | 700 | 790 |
| **Total peak hour bus service hours** | **1360** | **1850** | **2060** | **1850** | **2030** | **2080** | **2220** | **2730** | **3170** |
| Off-peak core** bus service | 660 | 800 | 840 | 800 | 860 | 920 | 960 | 1340 | 1540 |
| Off-peak connector bus service | 210 | 240 | 240 | 240 | 230 | 250 | 250 | 250 | 280 |
| Off-peak specialized bus service | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| **Total off-peak hour bus service hours** | **890** | **1060** | **1100** | **1060** | **1110** | **1190** | **1230** | **1610** | **1840** |
| **Rail Service** | | | | | | | | | |
| Peak light rail service | 2 | 48 | 62 | 80 | 62 | 80 | 110 | 80 | 117 |
| Peak commuter rail service | 2 | 7 | 7 | 7 | 7 | 7 | 13 | 7 | 13 |
| **Total peak hour rail service hours** | **4** | **55** | **69** | **87** | **69** | **87** | **123** | **87** | **130** |
| Off-peak light rail service | 2 | 37 | 50 | 63 | 50 | 63 | 93 | 63 | 97 |
| Off-peak commuter rail service | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 0 | 7 |
| **Total off-peak rail service hours** | **2** | **37** | **50** | **63** | **50** | **63** | **100** | **63** | **104** |

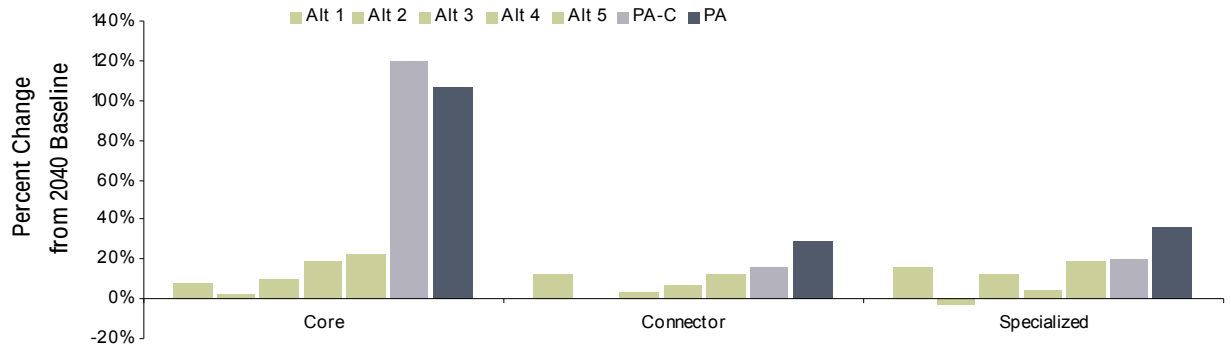
* Total regionwide transit vehicle service hours shown for one representative hour of the AM or midday periods (AM = 6am to 9am, MD = 9am to 3pm)
Bus hours rounded to nearest 10 hours; rail hours rounded to nearest hour

** Core bus service includes BRT service

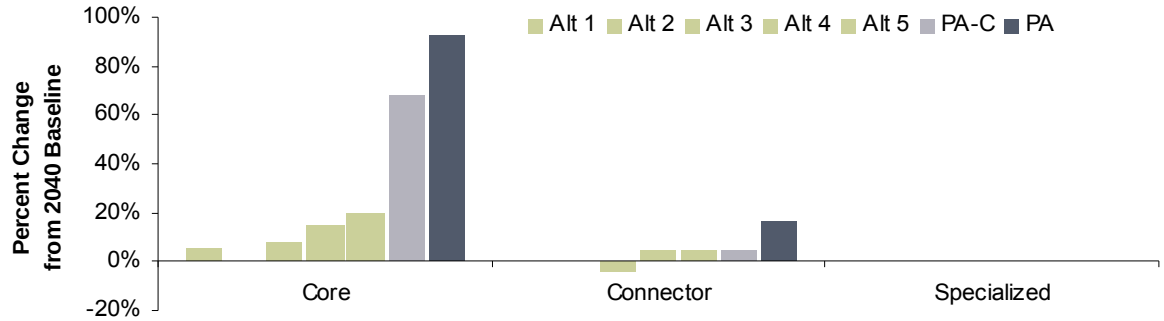
[9] This exhibit has changed since the DEIS.

**Exhibit 4-28 (continued)**

**Peak Hour Annual Bus Transit Service Increases by Type of Service**




**Off-Peak Hour Annual Bus Transit Service Increases by Type of Service**




Alternative 2 would have the lowest annual service growth in core service, at between 0.65 and 0.75 percent growth per year above 2006 service levels. Alternative 1 would have annual core service growth of about 0.8 percent, while Alternatives 4 and 5 would increase morning core transit service the most, at 1.2 and 1.3 percent per year, respectively. Annual increases in connector bus service would vary from about 0.6 percent with Alternative 2 to 1 percent with Alternatives 1 and 5, with the other alternatives falling between. Specialized bus service, responding to federal mandates, would grow the most, at between 1.3 percent and 2.0 percent per year.

Model results show daily transit ridership (measured in daily boardings) would grow with each alternative, as shown in Exhibit 4-29:

- In the year 2040, daily boardings on the ferry system (including walk-on passengers for both auto and passenger ferries) would range from a low of 38,000 boardings for the Baseline Alternative to a high of 53,000 boardings for Alternative 5.
- Daily ridership on rail transit (combined light rail and commuter rail) is forecast to range from a low of 136,000 boardings for Alternative 3 to a high of 208,000 boardings for Alternative 5.
- Alternative 2 would have the fewest total daily boardings on the region's bus transit systems (593,000 boardings per day), while the full Preferred Alternative would have the most (756,000 daily boardings).
- Combined daily ridership for all transit components ranges from a low of 789,000 daily boardings for the Baseline Alternative and Alternative 2 to a high of just under 1,000,000 daily boardings for the Preferred Alternative (Constrained) and the full Preferred Alternative.

Comparing the daily transit boardings expected in 2040 with 2006 levels, all the alternatives show substantial growth:

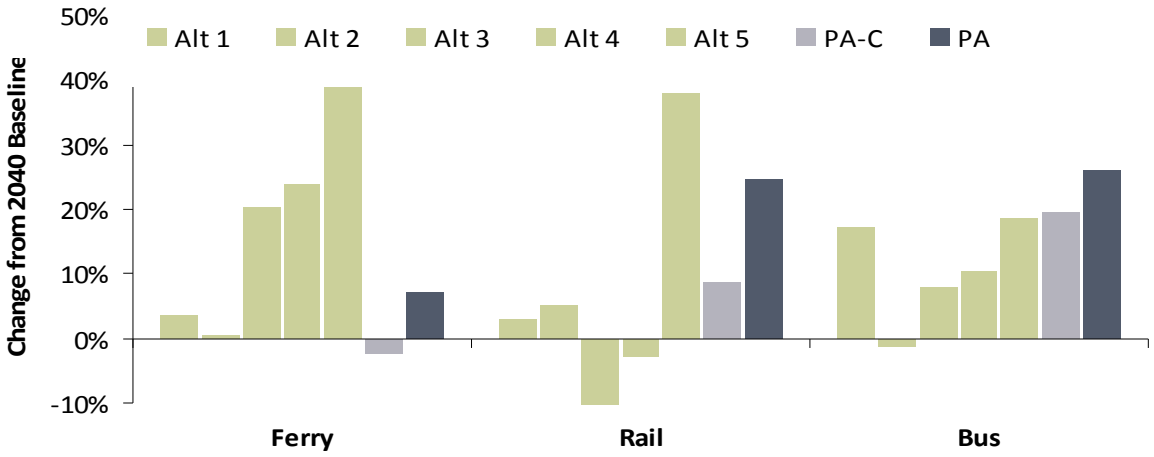
- Ferry boardings are forecast to grow between 219 percent (Baseline Alternative) and 351 percent (Alternative 5). Although some of this growth would be due to increased use of the Washington State Ferries auto ferry system, much of the ridership growth would occur as a result of new passenger ferry service.
- For the rail system (both commuter and light rail), boardings forecasts show very significant growth, reflecting the opening of Sound Transit's initial Link light rail service in 2009 (this service was not included in the 2006 base year), and additional services in later phases of the plan horizon.

- Bus service boardings are forecast to grow from 368,000 daily boardings in the 2006 base year to between 593,000 daily boardings (Alternative 2) and 756,000 daily boardings (full Preferred Alternative).

**Exhibit 4-29**[10]
**Transit Travel (Average Daily Boardings by Mode)**

| Transit Type | 2006 | Baseline | Alt. 1 | Alt. 2 | Alt. 3 | Alt. 4 | Alt. 5 | Preferred Alt. (Constrained) | Preferred Alt. |
|---|---|---|---|---|---|---|---|---|---|
| **Transit Boardings** | | | | | | | | | |
| Ferry | 11,800 | 37,600 | 38,900 | 37,700 | 45,100 | 46,500 | 53,200 | 36,700 | 40,200 |
| Rail | 5,800 | 151,300 | 155,500 | 159,200 | 135,800 | 147,200 | 208,500 | 164,400 | 188,800 |
| Bus | 367,500 | 599,900 | 703,600 | 592,500 | 646,900 | 662,900 | 712,400 | 717,100 | 756,400 |
| **Total** | **385,100** | **788,800** | **898,100** | **789,400** | **827,800** | **856,600** | **974,100** | **918,300** | **985,400** |
| **Percent Change from 2006 in Transit Boardings** | | | | | | | | | |
| Ferry | | 219% | 230% | 219% | 282% | 294% | 351% | 211% | 241% |
| Rail | | 2509% | 2581% | 2645% | 2241% | 2438% | 3495% | 2734% | 3155% |
| Bus | | 63% | 91% | 61% | 76% | 80% | 94% | 95% | 106% |
| **Total** | | **105%** | **133%** | **105%** | **115%** | **122%** | **153%** | **138%** | **156%** |

** Ferry boardings include only walk-ons. For total ferry activity, refer to Exhibit 4-30 – Ferry Travel.*




When compared with the Baseline Alternative, the six action alternatives show high transit boardings in nearly every category. The exceptions are a very slight reduction in bus ridership for Alternative 2, and lower rail ridership in Alternatives 3 and 4, due to improved express bus services in

[10] This exhibit has changed since the DEIS.

competitive rail corridors. Otherwise, all action alternatives would produce higher total transit ridership than the Baseline Alternative.

The full Preferred Alternative results in higher transit ridership than the Baseline Alternative: ferry ridership is 7 percent higher, rail ridership is 25 percent higher, and bus ridership is 26 percent higher.

The investments in transit capital facilities and transit service included in the alternatives would support increased use of transit for both work and non-work trips, as shown in Exhibits 4-26 and 4-27. Forecasts show that the number of transit trips would grow faster than total trips, leading to a shift in mode share over time. Mode shifts would be greater for work trips. Transit's share of total work trips would be 16 percent in the Baseline Alternative, dropping to 15.4 percent in Alternative 2, and increasing to 19 percent in the full Preferred Alternative and Alternative 5. Alternatives 1, 3, and 4 would result in transit's share of work trips being between 16.2 and 16.9 percent, while the Preferred Alternative (Constrained) would increase work trip transit mode share to 17.4 percent.

## 23 What effects on the ferry system are specific to individual alternatives?

All alternatives assume the continuance of the existing Washington State Ferries auto ferry route structure, which includes seven current cross-sound routes. All alternatives would also continue the four existing passenger ferry routes operating from Bremerton to Annapolis, Bremerton to Port Orchard, Vashon to downtown Seattle, and West Seattle to downtown Seattle (also known as the King County Water Taxi). The major differences among the alternatives relate to the inclusion of new passenger ferry service on both Puget Sound and Lake Washington:

- The Baseline Alternative would add no new routes.
- Alternative 2 would add a new auto ferry route between Southworth and downtown Seattle.

- On Puget Sound, Alternative 2 would offer the fewest new passenger ferry routes (four); Alternative 3 would add six routes; and Alternatives 1, 4, and 5 would each add eight routes. The Preferred Alternative (Constrained) would add only three new routes, and the full Preferred Alternative would ultimately add nine new cross-sound routes.
- Alternatives 1 and 5, the Preferred Alternative (Constrained), and the full Preferred Alternative would each add three new passenger ferry routes across Lake Washington, and Alternative 4 would add one. Alternatives 2 and 3 would add no new passenger ferry routes across Lake Washington.

Exhibit 4-30 summarizes the number of ferry routes by alternative.

**Exhibit 4-30**[11]
**Auto and Passenger Ferry Routes – 2040**

| | 2006 | Baseline | Alt. 1 | Alt. 2 | Alt. 3 | Alt. 4 | Alt. 5 | Preferred Alt. (Constrained) | Preferred Alt. |
|---|---|---|---|---|---|---|---|---|---|
| Auto Ferry Routes | 7 | 7 | 7 | 8 | 7 | 7 | 7 | 7 | 7 |
| Puget Sound Passenger Routes | 4 | 4 | 12 | 8 | 10 | 12 | 12 | 7 | 13 |
| Lake Washington Passenger Routes | 0 | 0 | 3 | 0 | 0 | 1 | 3 | 3 | 3 |
| **Total Routes** | **11** | **11** | **22** | **16** | **17** | **20** | **22** | **17** | **23** |

The level of passengers and autos using the ferry system for each of the alternatives would have implications for other transportation modes, mainly the roadway and transit systems, but also for the walking and bicycling system. Auto ferry impacts would take the form of increased vehicular traffic on the roadways serving ferry terminals. Passenger ferry activity would increase the need for connecting transit service at passenger ferry terminals, as well as investment in walking and bicycling facilities to serve passengers connecting at ferry terminals.

- Total daily boardings on the ferry system would increase from 35,700 boardings in 2006 to 67,700 boardings with

[11] This exhibit has changed since the DEIS.

the Baseline Alternative to 88,000 boardings in Alternative 5, a 30 percent increase over the Baseline Alternative and 146 percent higher than 2006.

- Walk-on trips are projected to increase in response to new passenger ferry service, increasing between 219 percent with the Baseline Alternative and Alternative 2 to over 350 percent in Alternative 5.
- Drive-on SOV traffic would increase the most (39 percent) with Alternative 5 and the least (12 percent) with Alternative 1. Ferry carpool trips would grow most in Alternatives 1 and 5, while ferry truck trips would grow most with Alternative 2.

Compared with the Baseline Alternative, Alternatives 1 and 5 show significantly higher carpool trips, and all alternatives except Alternative 3 would result in fewer truck trips.

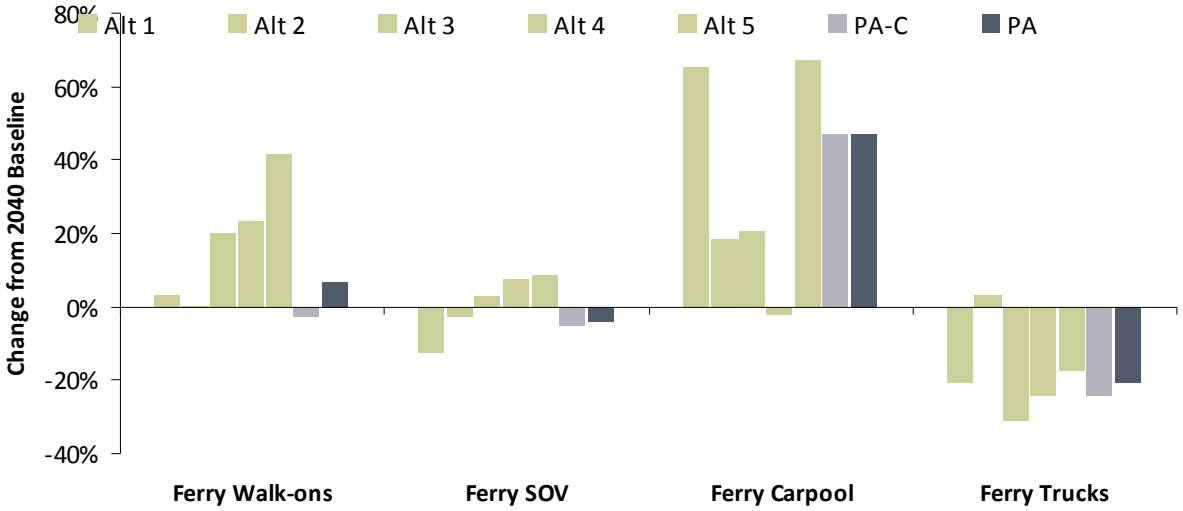
Exhibit 4-31 shows average daily boardings for auto and passenger ferries by boarding mode for each alternative.

**Exhibit 4-31**[12]
**Ferry Travel (Average Daily Person Trips by Boarding Mode)**

| | 2006 | Baseline | Alt. 1 | Alt. 2 | Alt. 3 | Alt. 4 | Alt. 5 | Preferred Alt. (Constrained) | Preferred Alt. |
|---|---|---|---|---|---|---|---|---|---|
| **Auto and Transit Ferry Person Trips** | | | | | | | | | |
| Ferry Walk-ons | 11,800 | 37,600 | 38,900 | 37,700 | 45,100 | 46,500 | 53,200 | 36,700 | 40,200 |
| Ferry SOV | 17,400 | 22,300 | 19,500 | 21,700 | 22,900 | 24,000 | 24,200 | 21,200 | 21,400 |
| Ferry Carpool | 4,600 | 4,900 | 8,100 | 5,800 | 5,900 | 4,800 | 8,200 | 7,200 | 7,200 |
| Ferry Trucks | 1,900 | 2,900 | 2,300 | 3,000 | 2,000 | 2,200 | 2,400 | 2,200 | 2,300 |
| **Total** | **35,700** | **67,700** | **68,800** | **68,200** | **75,900** | **77,500** | **88,000** | **67,300** | **71,100** |
| **Percent Change from 2006 in Ferry Boardings** | | | | | | | | | |
| Ferry Walk-ons | | 219% | 230% | 219% | 282% | 294% | 351% | 211% | 241% |
| Ferry Drive-ons | | 53% | 21% | 58% | 5% | 16% | 26% | 28% | 29% |
| **Total** | | **90%** | **93%** | **91%** | **113%** | **117%** | **146%** | **89%** | **99%** |

[12] This exhibit has changed since the DEIS.

**Exhibit 4-31 (continued)**




## 24 What effects on the nonmotorized system are specific to individual alternatives?

The provision of walking and bicycling (nonmotorized) facilities, as well as supporting transit service, would generate differences in the amount of walking and bicycling trips among the alternatives. Although land use and development patterns could also affect walking and bicycling activity, the land use policies that drive these patterns do not vary among the alternatives; all are based upon the implementation of VISION 2040.

Walking and bicycling facilities exist along many of the region's roadways, and for the Transportation 2040 alternatives, many future roadway improvements would include bicycle lanes and sidewalks. Because these facilities are typically a part of roadway design, at this regional plan level it is uncertain how many new nonmotorized facilities would be constructed as part of future roadway projects. However, the alternatives do include off-road pedestrian and bicycling investments, and the alternatives vary substantially in the number of new walking and bicycling facilities provided:

- The Baseline Alternative would add 30 miles of new facilities to the 570 miles of off-road facilities existing in the base year 2006, an increase of 5 percent.

- Alternatives 1 through 4 would each increase the system by just over 30 percent.
- The Preferred Alternative (Constrained) would expand the off-road walking and biking system by 61 percent (348 miles).
- Alternative 5 would add a significantly larger amount of new facilities (488 miles), nearly doubling (an 86 percent increase) the off-road facilities between 2006 and 2040.
- The full Preferred Alternative would expand the walking and biking system the most, adding 553 miles of new trails (an increase of 97 percent over the 2006 base year).

Exhibit 4-32 summarizes the miles of off-road pedestrian and bicycling facilities for each alternative.

**Exhibit 4-32[13]**
**Investment in Off-road Walking and Bicycling Facilities (miles of facilities)**

| | 2006 | Baseline | Alt. 1 | Alt. 2 | Alt. 3 | Alt. 4 | Alt. 5 | Preferred Alt. (Constrained) | Preferred Alt. |
|---|---|---|---|---|---|---|---|---|---|
| New miles of facilities | | 30 | 177 | 175 | 170 | 175 | 488 | 348 | 553 |
| Total miles of facilities (2040) | 570 | 600 | 747 | 745 | 740 | 745 | 1,058 | 918 | 1,123 |

*Source: PSRC project database for the plan alternatives*

Forecasts of future walking and bicycling trips are affected by the provision of walking and bicycling facilities, the existence of other transportation investments that may either compete with or facilitate walking and bicycling, and other factors.

- Walking and bicycling to work make up a fairly small share of total walking and bicycling trips (16 percent in 2006), but this share is predicted to increase somewhat by 2040, with work trips reaching 19 percent of the total in the full Preferred Alternative and Alternative 5.
- Compared to the Baseline Alternative, Alternatives 1, 4, 5, and the full Preferred Alternative have more nonmotorized

[13] This exhibit has changed since the DEIS.

trips and Alternatives 2, 3, and the Preferred Alternative (Constrained) have fewer.

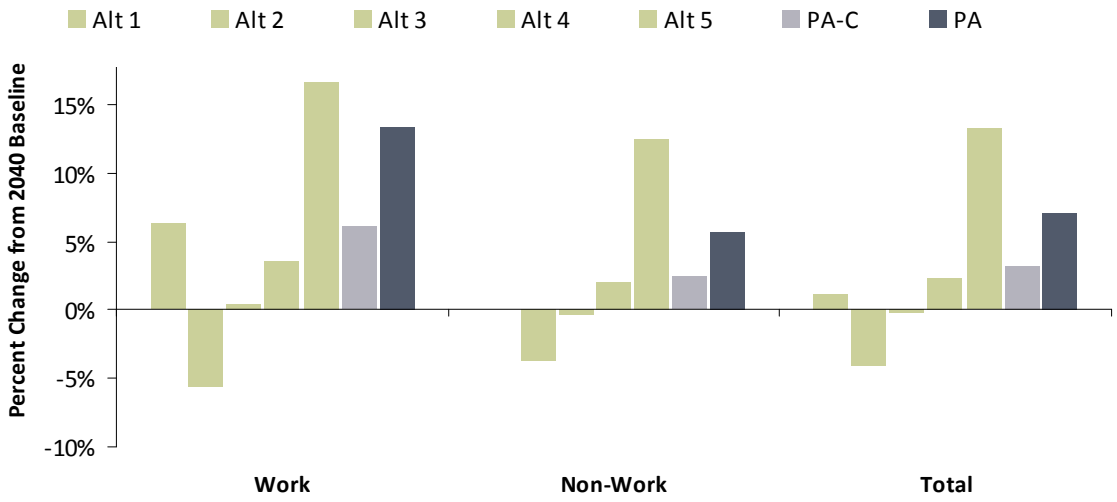
- Daily work trips via walking, bicycling, and walk to transit in the year 2040 would range from 508,000 for Alternative 2 (92 percent more than 2006) to 627,000 for Alternative 5 (137 percent more than 2006). Walking, bicycling, and walk to transit trips to work are projected to increase from 104 percent to 116 percent in the other five alternatives.
- Most daily walking and bicycling trips are non-work related (about 85 percent of all trips). In 2006, non-work walking and bicycling trips totaled 1,447,000. The alternatives would all result in increased non-work walking and bicycling trips, ranging from a 58 percent increase in Alternative 2 to an 85 percent increase in Alternative 5.
- Total daily walking and bicycling trips would increase from 1.7 million in 2006 to between 2.8 million for Alternative 2 and 3.3 million for Alternative 5 in 2040.
- Alternative 5 would have the most new walking and bicycling trips (1.6 million), a 93 percent gain.
- Compared with the Baseline Alternative, Alternative 5 shows the largest gains in both work trips and non-work trips, while Alternative 2 shows lower growth in all three categories of walking and bicycling trips (work, non-work, and total trips).

Exhibit 4-33 summarizes the average number of daily walking and bicycling trips for each alternative.

**Exhibit 4-33**[14]

**Nonmotorized Trips (Average Daily Walking and Bicycling Trips)**

| | 2006 | Baseline | Alt. 1 | Alt. 2 | Alt. 3 | Alt. 4 | Alt. 5 | Preferred Alt. (Constrained) | Preferred Alt. |
|---|---|---|---|---|---|---|---|---|---|
| **Walk, Bicycle, and "Walk to Transit" Trips** | | | | | | | | | |
| Work | 265,100 | 538,200 | 572,000 | 508,200 | 540,700 | 557,200 | 627,200 | 571,100 | 609,700 |
| Non-work | 1,447,000 | 2,381,400 | 2,383,500 | 2,293,100 | 2 ,373,200 | 2,428,900 | 2 ,679,000 | 2,440,300 | 2,515,500 |
| **Total** | **1,712,200** | **2,919,600** | **2,955,500** | **2,801,300** | **2 ,913,800** | **2,986,100** | **3 ,306,200** | **3,011,400** | **3,125,100** |
| **Percent Change from 2006** | | | | | | | | | |
| Work | | 103% | 116% | 92% | 104% | 110% | 137% | 115% | 130% |
| Non-work | | 65% | 65% | 58% | 64% | 68% | 85% | 69% | 74% |
| **Total** | | **71%** | **73%** | **64%** | **70%** | **74%** | **93%** | **76%** | **83%** |




Walking and bicycling to work make up a fairly small share of total walking and bicycling trips (15 percent in 2006), but this share is predicted to increase somewhat by 2040, with Alternative 5 work trips reaching 19 percent of total trips.

### Nonmotorized Travel Health Benefits

As growth patterns provide more housing near employment and vice versa, and as more pedestrian and bicycle facilities are provided, there are more opportunities for travelers to choose walking and bicycling as a preferred mode of travel. This would improve the health and well-being of travelers who

[14] This exhibit has changed since the DEIS.

choose to walk and bicycle more often. All else being equal, alternatives providing greater opportunities for walking and bicycling would produce more health benefits. By this measure, Alternative 2 would produce the lowest health benefits and Alternative 5 would produce the most. Refer to Chapter 18: Human Health for additional information.

## 25 What effects on the freight system are specific to individual alternatives?

Freight mobility is considered an important element in all major projects. Investments specific to truck freight include the projects that are a part of the FAST Corridor Partnership—a combination of strategically selected roadway-rail grade separations, capacity expansion, and ITS projects to benefit freight. These investments appear across all the action alternatives. Other investments in the regional transportation system (both added capacity and TSM programs) will also benefit freight users, as shown in Exhibit 4-34. Investments in Sounder commuter rail will also benefit freight rail in these locations as well.

Alternatives 2 and 3 would provide significant added capacity along heavy freight corridors (SR 509 and SR 167), providing freight mobility benefits. Alternatives 3, 4, and 5 would toll portions of the highway system and reduce average freeway delay, providing benefits to freight users.

Other freight benefits are reflected throughout aggregate performance of the road network through the measurement of user benefits. Truck freight-related user benefits increase as a share of total user travel benefits with Alternatives 3, 4, and 5.

Exhibit 4-34 displays the annual benefits (in millions of 2008 dollars) that would accrue to freight users in three categories (light commercial, medium trucks, and heavy trucks) from the action alternatives (in terms of change from the Baseline Alternative). All categories of system users would receive benefits under each of the alternatives. Passenger vehicles would reap the majority of benefits from the investments in each alternative. Still, the analysis predicts benefits for all categories of truck users.

**Freight Benefits**

Decision makers are interested in the way benefits of transportation projects are distributed across classes of vehicles. Some transportation improvements have broad benefits to users of the transportation system, while others may distribute benefits more narrowly to specific users, such as freight vehicles. This distributional issue relates to who pays and who benefits from improvements. The different vehicle classes are passenger cars, light commercial vehicles, medium trucks, and heavy trucks.

**What are user benefits?**

Benefits to users include travel time savings, travel reliability benefits, changes to vehicle ownership, and operating costs and other changes to consumer surplus that result from tolling and pricing policies.

For more information about the methodology used to calculate user benefits, refer to Appendix D: Policy Analysis and Criteria Evaluation Report.

These benefits increase with truck weight. While the freight-related benefits vary among the alternatives, the analysis shows that medium and heavy trucks would receive the majority of user benefits. Freight benefits would account for less than 50 percent of total benefits with Alternatives 1 and 2 and the Preferred Alternative (Constrained) and full Preferred Alternative. Freight's share of total benefits would increase to 52 percent in Alternative 3, 64 percent for Alternative 4, and 68 percent in Alternative 5. The full Preferred Alternative would have the greatest overall user benefit, and Alternatives 4 and 5 would have the greatest benefit to freight users.

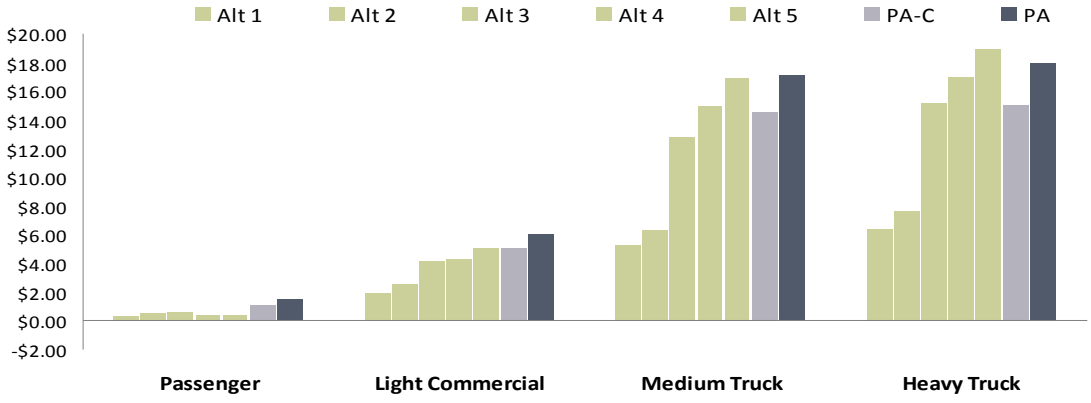
**Exhibit 4-34**[15]

**Annual Benefits to Commercial and Passenger Users**

**Total Annual Benefits by User Type (Change from 2040 Baseline)**

| | Alt. 1 | Alt. 2 | Alt. 3 | Alt. 4 | Alt. 5 | Preferred Alt. (Constrained) | Preferred Alt. |
|---|---|---|---|---|---|---|---|
| **User Benefits** | | | | **(millions of 2008 dollars)** | | | |
| Passenger | $1,130 | $1,673 | $2,100 | $1,459 | $1,388 | $3,747 | $4,886 |
| Light Commercial | $122 | $160 | $263 | $270 | $314 | $318 | $375 |
| Medium Truck | $358 | $430 | $867 | $1,012 | $1,138 | $987 | $1,154 |
| Heavy Truck | $499 | $602 | $1,182 | $1,322 | $1,478 | $1,177 | $1,399 |
| Total Commercial | $978 | $1,193 | $2,312 | $2,604 | $2,930 | $2,482 | $2,928 |
| Share of Commercial | 46% | 42% | 52% | 64% | 68% | 40% | 37% |
| **Total** | **$2,109** | **$2,866** | **$4,412** | **$4,063** | **$4,318** | **$6,229** | **$7,814** |

**Per Trip Benefits by User Type (Change from the 2040 Baseline):**
Reduced Travel Time , Unreliability, Vehicle Operating Costs and Other User Costs




[15] This exhibit has changed since the DEIS.

## 26 What effects on passenger rail are specific to individual alternatives?

Amtrak does not have any current plans for additional passenger routes in the region; therefore, none of the plan alternatives include specific investments in new intercity passenger rail. However, Amtrak and WSDOT have ongoing plans for track and crossing improvements along the rail corridor in the PSRC region. These improvements will improve safety, speed, and travel reliability on the intercity passenger rail system. No significant negative impacts are anticipated to result from these improvements. All of the alternatives include investments in Sounder commuter rail service, including tracks, crossings, and other facilities. These improvements would have positive impacts on Amtrak service through the central Puget Sound region. The Obama administration has announced plans for new investments in intercity high-speed passenger rail service, including the Pacific Northwest corridor between Eugene, Oregon, and Vancouver, B.C. These specific project improvements are currently unknown and are not included in this FEIS.

Although not a major travel choice for commuters, Amtrak is used by some people for travel within the region, including commuting. Given current limited schedules and train frequencies, however, Amtrak would not have the potential for meeting a significant portion of the region's travel needs.

## 27 What effects on the regional airport system are specific to individual alternatives?

The alternatives considered in this FEIS do not include provisions for improvements to the region's airport system. The last update of the *Regional Airport System Plan* in 2001 included long-range forecasts of aviation activity and laid out a regional plan for meeting these needs. Of critical concern was meeting the region's long-range commercial passenger needs. In 1996 PSRC adopted a resolution (A-96-02) in support of planning for a third runway at Sea-Tac Airport as the region's long-range plan for accommodating commercial passenger growth. PSRC also recognized that Sea-Tac Airport, even with

the third runway and other capacity improvements, would not meet the region's needs indefinitely. Therefore, in Executive Board Resolution EB-04-01, PSRC encouraged the state to complete a study of long-range airport capacity needs. In 2005 the Legislature adopted Engrossed Substitute Senate Bill ESSB-5121, directing WSDOT's Aviation Division to assess aviation capacity and implement a plan to address future needs. In July 2009, the *Long-Term Air Transportation Study Summary Report* was completed. The report identified three major issues (capacity, stewardship, and land use) and strategies to address them.

The following strategies address airport system capacity issues:

- Invest in advanced aviation technology.
- Use demand management techniques.
- Redistribute demand from congested airports to nearby airports.
- Expand airports with capacity constraints.
- Construct new airports.
- Prevent airport closures.
- Maintain service at small commercial airports.

The following strategies address airport stewardship issues:

- Prioritize system investments.
- Improve instrument approach capability.
- Enhance safety.
- Install weather reporting equipment.
- Improve management of airport pavements.
- Install landing aids and other improvements at small airports.
- Develop new funding programs.

The following strategies address land use issues:

- Initiate state-coordinated planning with local and regional agencies.
- Develop funding eligibility criteria and grant assurances.
- Strengthen legislation to protect public investments in airports.
- Require state airport land use certification.

The following discussion outlines the potential impacts that could be expected to result from the strategies being considered within the Long-Term Air Transportation Study process. Further planning and environmental analysis would likely be required before these strategies are implemented. This would be especially true of the capacity actions.

### Impacts of Capacity Strategies

Investments in airport system demand management strategies and new technology would improve system efficiency, enhance safety, and make better use of the existing airport system. New technologies (navigation systems, approach and runway lighting, etc.) would also increase the system's accessibility to more users during poor weather and reduced visibility conditions, with potential economic benefits. This could result in added traffic at these airports, causing more aircraft noise.

Redistributing demand from congested airports (such as Sea-Tac Airport) to nearby airports could potentially reduce delay (and associated delay costs) for airlines and users at congested airports. Moving air traffic from one airport to another would also potentially move airport impacts, such as airport noise and highway traffic, to communities that are not currently exposed to high levels of airport traffic and noise. These impacts would vary based on the specific conditions at the affected airports. On the other hand, if commercial air traffic were redistributed to other airports within the region (or neighboring regions), then existing impacts at congested airports might be reduced or future impacts might be avoided or reduced. The same would likely be true if airports with capacity constraints were expanded, or if new airport(s) were built.

Construction of new airports would likely cause significant environmental impacts on and near the new airport site(s). These impacts, which would heavily depend on the selected site, would likely include construction impacts from the airport and related access facilities, as well as ongoing impacts related to airport operation, such as airport traffic, aircraft noise, water

runoff and water quality impacts, air quality impacts, and a range of impacts to natural systems.

Prevention of airport closures, a capacity strategy, would help to preserve the system's ability to meet demand. By preserving existing airports, the region could reduce the need for construction of new airport infrastructure and related impacts (both from new construction and ongoing operations). Airport closures could result in the concentration of airport activity at remaining airports, increasing airport traffic, aircraft noise, and related traffic on roadways serving the airports where activity has relocated.

### Impacts of Stewardship Strategies

Stewardship strategies are aimed at preserving the existing airport system infrastructure, making wise investments, and operating the system to enhance safety and efficiency. These strategies are not capital intensive and would not, by themselves, result in any foreseeable significant environmental impacts.

### Impacts of Land Use Strategies

These strategies are aimed at improving the relationship between airports and neighboring communities, with the objectives of reducing impacts, enhancing safety, preserving airport assets, and enhancing the economic benefits of airports. No significant environmental impacts are anticipated to result from the implementation of these strategies. However, if these strategies were successfully implemented, numerous potential long-range future impacts, such as airport noise, might be avoided or reduced. These strategies are general in nature and do not allow for detailed airport-specific analysis of impacts. Such analysis would likely be done in the future in connection with decisions on airport system capacity.

## 28 How was special needs transportation evaluated for the Transportation 2040 alternatives?

The plan alternatives were evaluated through the process outlined in Chapter 3: Plan Alternatives. This process included VISION 2040 policy screening, which specifically includes

**Environmental Justice**

For more information on environmental justice, please refer to Chapter 17: Environmental Justice.

special needs transportation, and an assessment based on technical criteria, which also included factors related to special needs transportation. Furthermore, the environmental justice work discussed in Chapter 17: Environmental Justice, while not explicitly covering special needs transportation, provides additional information on the alternatives analysis, in particular on tolling.

At varying levels, all plan alternatives include continued expansion of public transportation, as well as projects that provide improvements for nonmotorized travel that could provide accessible connections to the public transportation system. While these increases in service and facilities could provide expanded and better transportation options for those who cannot drive a car, increased transit service and barrier-free access benefit all users of the public transportation system. Three areas of special needs transportation are discussed in this FEIS: public transportation, accessible facilities, and providers and types of service.

**Special Needs Transportation**

For more information about special needs transportation, please refer to the response to Question 14 in this chapter.

### Public Transportation

The bulk of transit service provided in the alternatives is fixed-route service; the fleets would be equipped with accessibility features, and transit agencies would meet requirements for accessible transit access. For these reasons, all the alternatives would benefit those who must rely on public transportation.

Furthermore, the ADA requires public transit agencies that provide fixed-route service to also provide complementary paratransit services to people with disabilities who cannot use the fixed-route bus or rail service because of a disability (this is one type of demand-response service). Agencies are required to provide this paratransit service for trips with origins and destinations within three-quarters of a mile of a route or station, but paratransit-eligible customers who are outside the service area could still use the service if they are able to get themselves into the service area. The expansion of fixed-route service also includes commensurate increases to ADA paratransit service.

The differences in these benefits among the alternatives are largely due to varying investments in levels of transit service. Modeled outcomes (refer to Exhibit 4-28) for the alternatives show that Alternatives 4 and 5 have the most transit service increases in the morning. Alternative 5 also has the most significant expansion of high-capacity transit—bus and rail. The Baseline Alternative and Alternative 2 have the lowest annual service increases, at 0.9 percent above 2006 service levels. Alternatives 1 and 3 would increase morning service at 1.2 percent growth per year over 2006 levels. Morning service may serve both work and non-work trips, but usually provides most options for commuting.

Midday transit service increases (annual growth rates) result in a narrower range than the morning period, from 0.5 percent for the Baseline Alternative and Alternative 2 to 0.6 percent and 0.7 percent respectively for Alternatives 1 and 3, increasing to 0.9 percent for Alternative 4 and 1.0 percent for Alternative 5. Midday, or off-peak service, could be considered as serving many non-work trips, which is an important level of service for those who cannot drive a car.

Students using public transportation services use existing fixed-route service. Transportation services provided by school districts are outside of the scope of the FEIS, but are discussed in the *Coordinated Transit-Human Services Transportation Plan* (refer to response to Question 14). Increases in fixed-route service would benefit those with special transportation needs; however, there are some who would always need door-to-door or paratransit service. A proportion of the overall service increases across the alternatives should be paratransit service.

### Accessible Facilities

Providing barrier-free pathways through the expansion of nonmotorized facilities is critical to increasing accessibility for those with mobility needs.

The full Preferred Alternative has the largest expansion of the nonmotorized network, which greatly contributes to barrier-free accessibility for accessing fixed-route service.

Alternative 1 focuses on improving facilities in metropolitan and core cities and the safety of existing pedestrian facilities, but it has a limited expansion in access to transit facilities. Alternatives 2 and 4 would complete a continuous network of pedestrian facilities to within a one-half-mile radius of high-capacity transit stations and centers, ferry terminals, and park-and-ride lots and for cycling, within 3 miles. Alternative 3 would complete the arterial sidewalk network, and thereby increase access to arterial transit service, although the majority of the transit service increases in this alternative are to the tolled highway facilities. The Baseline Alternative would add the least in terms of nonmotorized facilities.

While there would always be a need for door-to-door paratransit service, developing a comprehensive accessible nonmotorized network would benefit those with special transportation needs who can access fixed-route services for their daily activities.

### Providers and Types of Special Needs Service

The provision of service—by transit operator or community-based organization, and whether fixed-route or on demand—is also a key area of special needs transportation service.

Because special needs transportation services are provided by entities in addition to public transportation providers, regional coordination is essential. Minimizing gaps, eliminating redundant services, increasing efficiencies, raising awareness of existing services, and improving mobility are objectives of the region's special needs transportation plan, PSRC's *Coordinated Transit-Human Services Transportation Plan* (the Coordinated Special Needs Transportation Plan), which is the implementing plan for Transportation 2040.

## 29 How will special needs transportation be evaluated in the Transportation 2040 Plan?

The Transportation 2040 FEIS is a plan-level review; therefore, the potential effects to special needs populations are broadly evaluated with the expectation that more detailed reviews will follow for projects identified in the Transportation 2040 Plan. It

is expected that existing federal, state, and local laws governing accessibility will be followed in project development and review. The regional goals identified in PSRC's Coordinated Special Needs Transportation Plan will also serve to support plans and projects for special needs transportation.

## 30 What is the outreach for special needs populations in the regional plan update?

Special needs populations are being brought into Transportation 2040 through the Special Needs Transportation Committee, which is convened by PSRC and meets bimonthly. The committee has received regular updates and requests for input to the plan and is currently working on the update to the Coordinated Special Needs Transportation Plan. The areas where the environmental justice work overlaps across the respective populations will be coordinated.

## 31 What benefits to transportation are specific to individual alternatives?

### Mobility

Mobility benefit measures are designed to capture the primary benefits to transportation system users of each alternative. Both the benefits and costs are measured as a monetary value so they can be combined to produce a benefit-cost result. Four mobility metrics are used in this analysis: (a) travel time savings, (b) improved reliability, (c) operating cost savings, and (d) other user cost savings. For more information on the details of this analysis, refer to Appendix D: Policy Analysis and Criteria Evaluation Report.

Exhibit 4-35 displays annual transportation mobility benefits in dollars for the six action alternatives as compared to the Baseline Alternative. In terms of user time savings, the full Preferred Alternative provides the highest benefits ($6.39 billion). The Preferred Alternative (Constrained) has slightly lower time savings benefits, at $5 billion. The other plan alternatives produce lower benefits (between $2.5 billion

and 3.5 billion), with Alternative 1 producing the lowest benefits of the six action alternatives: $1.8 billion.

**Exhibit 4-35**[16]
**Annual Transportation Mobility Benefits (millions)**

| | Alt. 1 | Alt. 2 | Alt. 3 | Alt. 4 | Alt. 5 | Preferred Alt. (Constrained | Preferred Alt. |
|---|---|---|---|---|---|---|---|
| User Time Savings | $1,845 | $2,511 | $3,440 | $2,889 | $3,559 | $5,016 | $6,390 |
| User Travel Unreliability Savings | $293 | $408 | $1,001 | $1,136 | $1,290 | $1,065 | $1,178 |
| User Vehicle Operating Costs Savings | -$93 | -$189 | -$73 | $202 | $13 | $73 | $213 |
| Other User Costs Savings | $17 | $38 | $77 | -$15 | -$457 | $89 | $34 |
| **Total User Costs/Benefits** | **$2,061** | **$2,769** | **$4,392** | **$4,210** | **$4,405** | **$6,242** | **$7,815** |

Travel reliability benefits vary considerably among the alternatives, with Alternative 1 having the lowest benefit ($293 million) and Alternative 5 the highest ($1.3 billion), over four times the reliability benefit of Alternative 1. Reliability is assessed for freeways only, so improvements in freeway performance in Alternatives 3, 4, and 5 and both the Preferred Alternative (Constrained) and full Preferred Alternative contribute to significant user benefits for improved reliability. User vehicle operating cost savings would be the greatest with the full Preferred Alternative and the least with Alternative 2. For this measure, Alternatives 4, 5, and the Preferred Alternative (Constrained) have greater benefits than the Baseline Alternative.

Other user cost savings (which take into account the effects of tolls on consumer surplus benefits) show the Preferred Alternative (Constrained) with the highest annual benefits ($89 million greater than the Baseline Alternative), while Alternative 5 has the lowest benefit (a reduction in consumer surplus—user benefits—of $457 million per year).

When all user mobility benefits are combined, the differences among the alternatives (when compared with the Baseline Alternative) are substantial. Alternative 1 would generate the lowest annual user benefit ($2 billion), while the full Preferred Alternative would generate the greatest user benefit: $7.8 billion.

[16] This exhibit has changed since the DEIS.

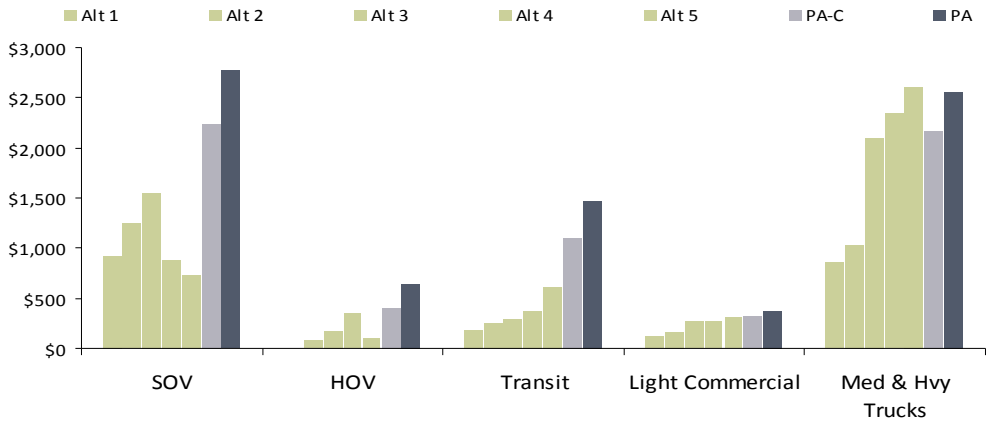
As shown in Exhibit 4-36, mobility benefits would be spread across four major user groups: SOV, HOV, transit, and commercial. A large majority of travel time savings benefits (between 68 and 89 percent) would accrue to SOV and commercial users for all alternatives. Time savings benefits for SOV users would be greatest with the full Preferred Alternatives ($2.2 billion) and least with Alternative 4 ($364 million). HOV user benefits would be greatest with the full Preferred Alternative ($530 million), and least with Alternative 1 ($28 million). Transit's time savings benefits would be greatest ($1.5 billion) with the full Preferred Alternative, and least ($181 million) with Alternative 1, when compared to the Baseline Alternative. Commercial user time savings benefits would be greatest with Alternative 5 ($2.25 billion) and least in Alternative 1 ($799 million). For HOV and commercial users, travel reliability benefits would be greatest with Alternative 5.

**Exhibit 4-36**[17]

## Mobility Benefits for SOV, HOV, Transit, and Commercial Users

| | Alt. 1 | Alt. 2 | Alt. 3 | Alt. 4 | Alt. 5 | Preferred Alt. (Constrained) | Preferred Alt. |
|---|---|---|---|---|---|---|---|
| **Time Savings** | | | | **(millions of 2008 dollars)** | | | |
| SOV | $836 | $1,152 | $1,123 | $364 | $581 | $1,682 | $2,203 |
| HOV | $28 | $115 | $183 | $224 | $108 | $309 | $530 |
| Transit | $181 | $261 | $297 | $370 | $618 | $1,096 | $1,469 |
| Commercial | $799 | $983 | $1,837 | $1,931 | $2,252 | $1,928 | $2,187 |
| **Total** | **$1,844** | **$2,511** | **$3,440** | **$2,889** | **$3,559** | **$5,015** | **$6,389** |
| **Travel Reliability Benefits** | | | | | | | |
| SOV | $126 | $175 | $387 | $422 | $461 | $425 | $474 |
| HOV | -$36 | -$21 | $45 | $79 | $80 | $52 | $66 |
| Transit | NA | NA | NA | NA | NA | NA | NA |
| Commercial | $202 | $254 | $569 | $635 | $748 | $588 | $638 |
| **Total** | **$292** | **$408** | **$1,001** | **$1,136** | **$1,289** | **$1,065** | **$1,178** |
| **Vehicle Operating and Ownership Costs Savings** | | | | | | | |
| SOV | -$52 | -$111 | $3 | $165 | $103 | $105 | $120 |
| HOV | -$11 | -$23 | -$55 | $38 | $19 | $29 | $33 |
| Transit | NA | NA | NA | NA | NA | $6 | $10 |
| Commercial | -$29 | -$55 | -$73 | -$3 | -$109 | -$68 | $50 |
| **Total** | **($92)** | **($189)** | **($125)** | **$200** | **$13** | **$66** | **$203** |
| **Other User Costs Savings** | | | | | | | |
| SOV | $11 | $28 | $35 | -$63 | -$402 | $31 | -$31 |
| HOV | $2 | $4 | $5 | $3 | -$95 | $15 | $13 |
| Transit | NA | NA | NA | NA | NA | NA | NA |
| Commercial | $3 | $7 | $37 | $45 | $39 | $44 | $53 |
| **Total** | **$16** | **$39** | **$77** | **($15)** | **($458)** | **$90** | **$35** |
| **Total User Benefits** | **$2,060** | **$2,769** | **$4,393** | **$4,210** | **$4,403** | **$6,236** | **$7,805** |

**Annual Mobility Benefits Relative to the 2040 Baseline**
(millions of 2008 dollars)




[17] This exhibit has changed since the DEIS.

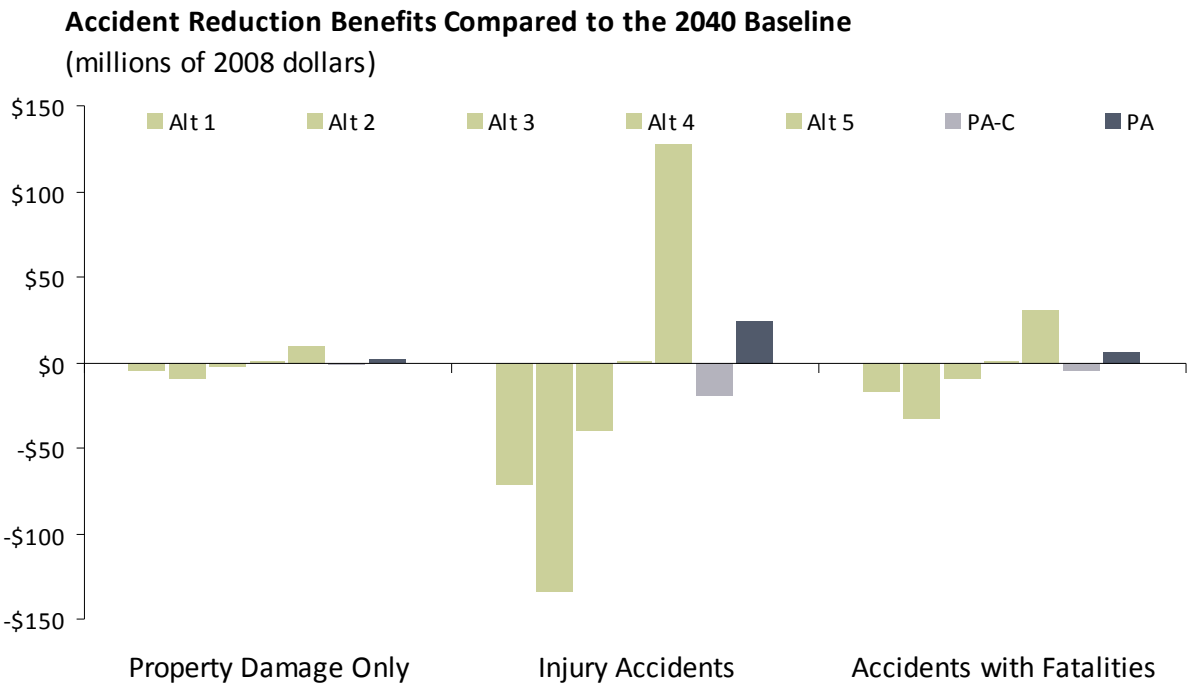
Accident cost savings (safety benefits) are measured by the dollar value of changes in accident risk (based on benefit-cost analysis—refer to Appendix D: Policy Analysis and Criteria Evaluation Report). The costs of accident risk are determined by the probability of an accident, severity of accidents, and the costs that are incurred as a result of accidents. All of these factors are influenced by loadings and speeds on transportation facilities. A large body of research and supporting literature, including guidance from the Federal Highway Administration, provides adequate guidelines on how to value mortality, morbidity, and property loss consequences of accidents. All else being equal, those alternatives where accident cost risk is lowest would be favored.

The alternatives provide different levels of accident cost savings in three categories: property damage only, injury accidents, and accidents with fatalities. Exhibit 4-37 displays how the action alternatives compare in accident cost savings relative to the Baseline Alternative. Alternatives 1 through 3 and the Preferred Alternative (Constrained) show lower accident savings (higher accident costs) than the Baseline Alternative. Alternative 4 shows no measurable difference in accident cost (or savings) compared to the Baseline Alternative, while the full Preferred Alternative shows modest accident reduction savings benefits. Alternative 5 is the only one showing significant accident cost savings above the Baseline Alternative, with $9 million in property damage savings, $127 million in injury accident savings, and $31 million in fatal accident savings, for a total benefit of $168 million. The bar chart in Exhibit 4-37 graphically shows these differences among the alternatives.

**Exhibit 4-37**[18]

**Annual Accident Reduction Benefits Compared to the 2040 Baseline Costs (millions of 2008 dollars)**

| | Alt. 1 | Alt. 2 | Alt. 3 | Alt. 4 | Alt. 5 | Preferred Alt. (Constrained) | Preferred Alt. |
|---|---|---|---|---|---|---|---|
| Property Damage Only | -$5 | -$10 | -$3 | $1 | $9 | -$1 | $2 |
| Injury Accidents | -$71 | -$134 | -$39 | $0 | $127 | -$20 | $24 |
| Accidents with Fatalities | -$17 | -$33 | -$10 | $0 | $31 | -$5 | $6 |
| **Total** | **-$94** | **-$177** | **-$52** | **$1** | **$168** | **-$26** | **$32** |




[18] This exhibit has changed since the DEIS.

## 32 How would the alternatives' benefits be distributed across the region?

Equity is an important criterion in evaluating transportation system investments. This analysis has identified four key aspects of the equity criterion: (a) the distribution of impacts by geography, (b) the distribution of impacts by income of transportation system users, (c) distribution of benefits to freight and passenger vehicles, and (d) benefits of investments to low-income and minority (environmental justice) populations.

### Distribution of Benefits by Regional Sub-area

Planning within the PSRC region is done at numerous levels, including sub-areas (refer to Exhibit 4-38). User benefits were calculated for each sub-area of the region. The results are shown in Exhibit 4-39, which displays benefits for the six action alternatives compared with the Baseline Alternative. All action alternatives would have higher benefits than the Baseline Alternative. The full Preferred Alternative would produce the highest total benefits regionwide, as well as the highest user benefits within every area of the PSRC region (refer to Exhibit 4-39).

King County would have higher user benefits than the other three counties, largely because the majority of the region's population and jobs are located in King County. Within King County, benefits are fairly evenly distributed among the three sub-areas for Alternative 1. For Alternative 2, benefits would be nearly double in south King County. In Alternatives 3 and 4, user benefits would be highest in Seattle-Shoreline, East King County, and South King County. The Preferred Alternative (Constrained) and the full Preferred Alternative both produce significant benefits across King County, but each would generate more benefits in Seattle-Shoreline and South King County than in East King County.

The full Preferred Alternative would produce the highest user benefits regionwide, followed by the Preferred Alternative (Constrained), then Alternatives 3, 4, and 5. Regionwide,

Alternatives 1 and 2 would see roughly half the benefits of Alternatives 3 through 5.

In Kitsap County, the full Preferred Alternative would produce the most user benefits, while Alternatives 1 and 4 would produce the lowest benefits. In Pierce County, all alternatives would produce significant user benefits, with the full Preferred Alternative producing the highest ($1.4 billion) and Alternative 1 the least ($441 million). Snohomish County would also realize the greatest annual benefits from the full Preferred Alternative, followed closely by the Preferred Alternative (Constrained), while Alternative 1 would produce the least benefit.

Compared to the Baseline Alternative, the action alternatives would produce much greater per trip user benefits in all regional sub-areas. Across the region, the Preferred Alternative (Constrained) and the full Preferred Alternative produce significantly greater total benefits as well as per trip benefits than the other alternatives. The full Preferred Alternative produces higher benefits than the Preferred Alternative (Constrained) in each sub-area. The Preferred Alternative (Constrained) and the full Preferred Alternative are predicted to generate per trip benefits to users of between $1.50 and $2.50, compared with the other alternatives, which generate per trip benefits generally between $0.50 and $1.50. Alternatives 1 and 2 would generate somewhat lower user benefits per trip, at between $0.50 and $0.80 per trip, while Alternatives 3 through 5 would generally produce greater per trip benefits of between $1.00 and $1.50 per trip. Alternative 3 produces strong per trip user benefits across the region, and those benefits are most evenly distributed. Alternative 4 produces solid per trip benefits in King, Pierce, and Snohomish counties (generally greater than $1.00) but produces lower per trip benefits ($0.50) in Kitsap County. The highest per trip benefits in any sub-area would occur in Seattle-Shoreline with Alternative 5 (about $0.80).

**Exhibit 4-38. Puget Sound Regional Sub Areas**

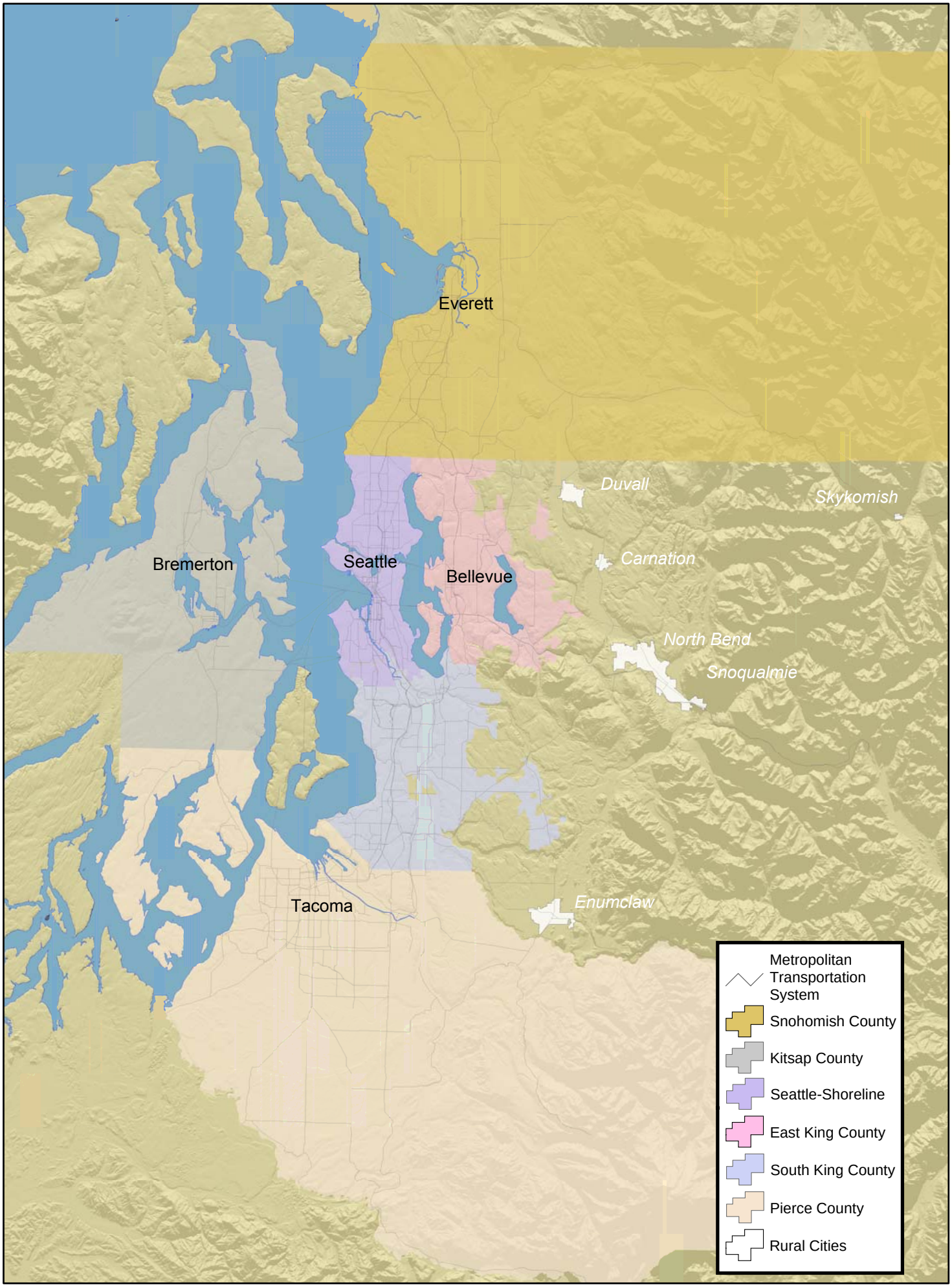
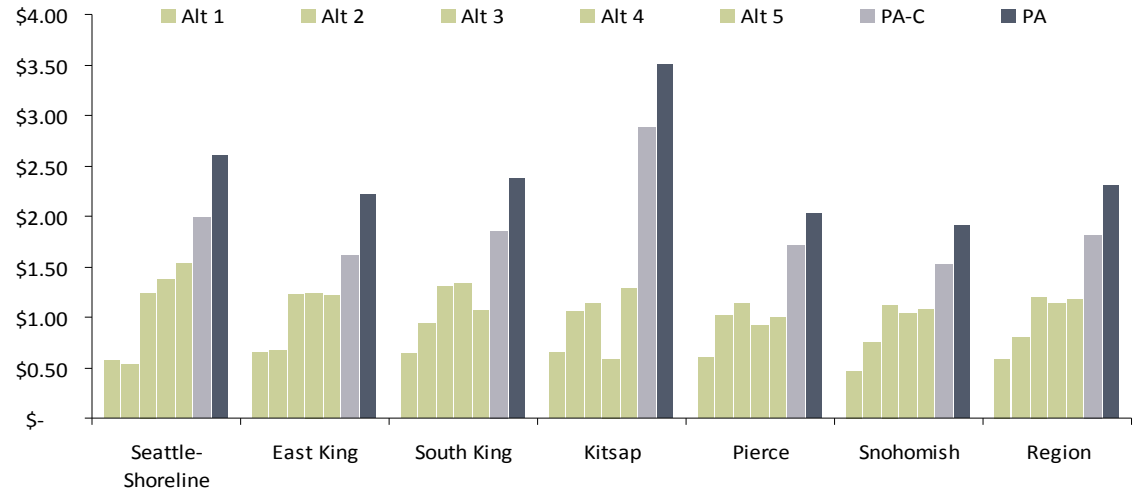


**Exhibit 4-39**[19]

## Annual User Benefits by Regional Sub-area

| Sub-Area | Alt. 1 | Alt. 2 | Alt. 3 | Alt. 4 | Alt. 5 | Preferred Alt. (Constrained) | Preferred Alt. |
|---|---|---|---|---|---|---|---|
| | | | | (millions of 2008 dollars) | | | |
| King County | $1,209 | $1,435 | $2,467 | $2,560 | $2,385 | $3,511 | $4,538 |
| Seattle-Shoreline | $380 | $365 | $843 | $918 | $988 | $1,315 | $1,686 |
| East King County | $374 | $388 | $684 | $698 | $662 | $900 | $1,198 |
| South King County | $456 | $682 | $940 | $944 | $735 | $1,297 | $1,653 |
| Kitsap County | $146 | $237 | $251 | $127 | $273 | $630 | $755 |
| Pierce County | $441 | $734 | $821 | $656 | $700 | $1,216 | $1,428 |
| Snohomish County | $317 | $510 | $753 | $694 | $696 | $1,012 | $1,251 |

**Per Trip User Benefits (Change from 2040 Baseline)**




[19] This exhibit has changed since the DEIS.

### Distribution of Benefits by Income

Annual user benefits were calculated for four categories of household income, as defined in the travel demand model:

| | |
|---|---|
| Low income: | less than $30,000 |
| Low-mid income: | $30,000 to $55,000 |
| High-mid income: | $55,000 to $90,000 |
| High income: | more than $90,000 |

This definition of low-income is not the same as that used by the U.S. Department of Health and Human Services to identify environmental justice populations (refer to Chapter 17: Environmental Justice).

As shown in Exhibit 4-40, user benefits for the action alternatives, compared with the Baseline Alternative, would be greatest for high-income households, while low-income households would receive the lowest benefit. The Preferred Alternative (Constrained) and the full Preferred Alternative produce the greatest benefits to all income groups. Alternatives 1, 2, and 3 would have greater benefits to low-income households than the Baseline Alternative, while Alternatives 4 and 5 would produce lower benefits for low-income households than the Baseline Alternative. Compared to the Baseline Alternative, Alternative 4 would produce significantly lower benefits to low-income users than all other alternatives.

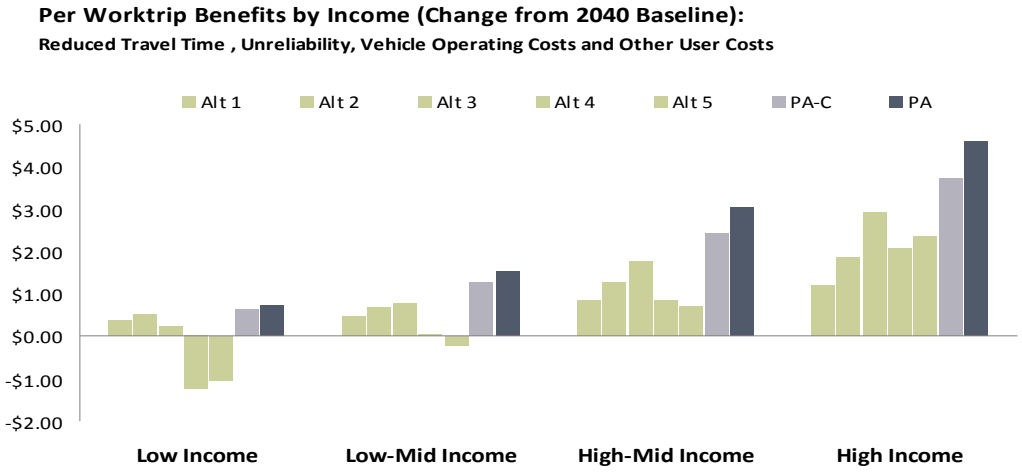
**Why are mobility benefits lower for low-income households?**

As described in Appendix D, the mobility benefits to the transportation system users are a function of travel time benefits and the users' values of time. Users with higher values of time will value travel time benefits greater than those with lower values of time. The calculation of mobility benefits relies upon the user classes and values of time that are embedded in the region's travel demand model. By definition, these values of time are average values across all members of the user class and abstract from reality where values of time are non-homogenous across individuals and even across time and trip purpose for each individual. The measures of benefits rely upon the law of averages, where variations from the mean are expected to be offsetting.

**Exhibit 4-40**[20]

**Annual Benefits by Income**

| | Alt. 1 | Alt. 2 | Alt. 3 | Alt. 4 | Alt. 5 | Preferred Alt. (Constrained) | Preferred Alt. |
|---|---|---|---|---|---|---|---|
| **User Benefits** | | | | **(millions of 2008 dollars)** | | | |
| Low Income | $29 | $41 | $17 | -$92 | -$78 | $44 | $47 |
| Low-Mid Income | $53 | $82 | $88 | $5 | -$24 | $138 | $160 |
| High-Mid Income | $159 | $250 | $342 | $160 | $130 | $453 | $556 |
| High Income | $317 | $500 | $772 | $535 | $597 | $958 | $1,159 |




## Distribution of Benefits by User Type

Benefits of transportation investments accrue differently for different categories of users, as shown in Exhibit 4-41. This analysis calculated annual user benefits for four categories of roadway system users. Compared to the Baseline Alternative, the action alternatives would produce greater user benefits for all four user classes, with passenger vehicles receiving the greatest total benefit. On a per trip basis, medium and heavy trucks would receive the greatest benefits. While the full Preferred Alternative generates the greatest total benefit to all four user categories, Alternative 5 would produce the greatest per trip benefit for heavy trucks. Alternatives 2 through 5 produce increasing levels of benefit for light commercial, medium trucks, and heavy trucks. Among commercial users, benefits would be proportionately greater with heavier trucks.

[20] This exhibit has changed since the DEIS.

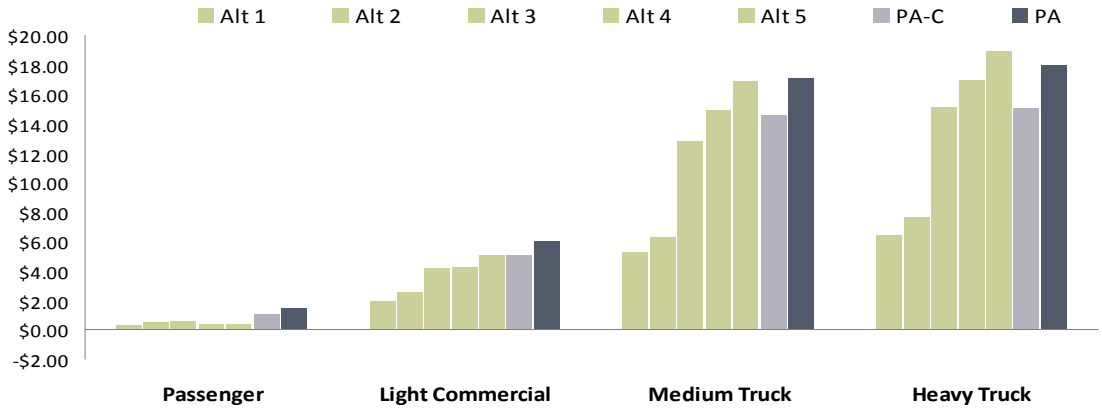
Benefits per trip are forecast to be positive for all the alternatives across all user categories, with passenger users having the lowest per trip benefit (between $0.00 and $2.00). Alternatives 1 and 2 would produce relatively similar per trip benefits for light commercial vehicles (about $2.00), and greater benefits for medium and heavy trucks (between $5.00 and $8.00 per trip). Alternatives 3, 4, and 5 each produce benefits of about $4.00 per trip for light commercial vehicles, and much higher benefits for medium and heavy trucks, ranging from $16.00 to $19.00 per trip.

**Exhibit 4-41**[21]

**Annual Benefits by User Type**

| Alternative | Alt. 1 | Alt. 2 | Alt. 3 | Alt. 4 | Alt. 5 | Preferred Alt. (Constrained) | Preferred Alt. |
|---|---|---|---|---|---|---|---|
| **User Benefits** | | | | **(millions of 2008 dollars)** | | | |
| Passenger | $1,130 | $1,673 | $2,100 | $1,459 | $1,388 | $3,747 | $4,886 |
| Light Commercial | $122 | $160 | $263 | $270 | $314 | $318 | $375 |
| Medium Truck | $358 | $430 | $867 | $1,012 | $1,138 | $987 | $1,154 |
| Heavy Truck | $499 | $602 | $1,182 | $1,322 | $1,478 | $1,177 | $1,399 |

**Per Trip Benefits by User Type (Change from the 2040 Baseline):**
Reduced Travel Time , Unreliability, Vehicle Operating Costs and Other User Costs




[21] This exhibit has changed since the DEIS.

## 33 What cumulative effects on transportation could occur if the Transportation 2040 actions coincide with other planned actions?

As the central Puget Sound region's population and employment grow, the region's human footprint will also grow. The region's built environment continues to grow with time, and with this growth, cumulative impacts from the additional residents and jobs could occur.

Once adopted, Transportation 2040 would set the region's direction for transportation investments for the next 30 years. Any of the alternatives would include hundreds of individual projects and programs to be implemented over time as project decisions are made and funding becomes available. Over time, individual project decisions could result in cumulative impacts on the region.

Many of the specific major transportation investments proposed over the next 30 years are described in the Baseline Alternative, and cumulative impacts from the implementation of these projects would occur regardless of which Transportation 2040 alternative might ultimately be selected. These planned transportation investments are incorporated into the transportation analysis.

Future cumulative effects from implementing the transportation projects could be influenced by other regional plans and actions. Local jurisdictions throughout the region may revise their existing land use plans to complement the Transportation 2040 Preferred Alternative, and the development resulting from these plans could have both positive and negative effects on the environment.

PSRC has performed an analysis of the development that could result from these revised plans (refer to Chapter 5: Land Use, Population, Employment, and Housing) and has concluded that none of the action alternatives would induce future land use and development pattern changes that are substantively different than the Baseline Alternative. In addition, all plan alternatives are consistent with the adopted VISION 2040 Regional Growth Strategy. Therefore, none of the alternatives

are expected to result in additional cumulative transportation effects.

## 34 How can the effects to transportation be mitigated?

All plan alternatives are intended to support and be consistent with VISION 2040, with the following objectives: to serve regional growth, improve mobility, preserve the existing system, and mitigate potential impacts associated with urban growth. Nevertheless, implementation of any of the alternatives would likely cause a range of impacts. There are numerous actions that the region's public agencies (and future project sponsors) could take to reduce these impacts.

General mitigating measures for all alternatives include investments to reduce congestion, improve mobility, and address environmental issues, including climate change, greenhouse gases and other air pollutants, and water quality. In addition, the region could expand programs to encourage the choice of alternative travel modes during morning and evening commute times and throughout the day.

Additional transit-oriented development near transit and rail stations could help to reduce the number and length of trips and can improve accessibility to jobs and services in regional centers. With connections to a continuous regional pedestrian and bicycle network, this combination could benefit human health, reduce travel time, and alleviate congestion for some of the region's population.

With regard to the desire to reduce greenhouse gas emissions, new and yet-to-be-developed fuel technology and vehicle design may further mitigate air pollution, reduce harmful runoff, and improve water quality.

At the local level, design standards could be adopted in development regulations to make the most of best practices with regard to additional impervious surfaces (lane miles, acres of park-and-ride lots), surface water runoff, and the installation of pedestrian and bicycle facilities to improve accessibility to transit and rail stations, ferry terminals, and trip destinations.

At the state level, WSDOT construction practices would be followed to minimize disruption and delay and to reroute traffic as necessary. State-level TDM, TSM, and ITS elements would be employed to reduce congestion and improve travel time during construction. Mitigating measures may also include the following:

- Extend or improve regional facilities, such as the Interurban Trail and the Burke-Gilman Trail.
- Develop viable, non-tolled alternatives to tolled facilities, including transit, other mode choices, and appropriate arterial routes.

Mitigation during project construction would be determined on a project by project basis, but in most cases would include measures such as the following:

- Manage traffic to minimize delay and disruption.
- Reduce noise in compliance with local regulations.
- Coordinate traffic control with local agencies, and when appropriate, across jurisdictional boundaries.
- Use transportation management technology to alert drivers of delays and alternate routes.
- Disseminate information through local avenues to keep drivers informed about construction activities, roadway closures, and alternative modes of travel.
- Coordinate construction activities with Union Pacific, BNSF, Link light rail, and Sounder commuter rail to minimize disruption of service near rail stations.
- Coordinate with police, fire, and emergency services providers, transit agencies, and school districts.

### 35 Are there any significant unavoidable adverse impacts to transportation?

All seven plan alternatives would serve the region's forecast population and employment growth, though in different ways. Each alternative includes significant investments in the transportation system. These investments, whether focused on maintenance and preservation, system operation, or system expansion, would cause varying levels of impacts regionwide.

Implementation of any alternative could have some significant unavoidable adverse impacts resulting from both construction and ongoing operation of the transportation system, although at differing levels.

Although numerous measures could be taken to reduce the impacts of construction projects (as described in the previous section), some impacts could not be avoided. Although some projects and programs included in the alternatives are likely to have lower impacts in some areas, such as congestion, delay, and air emissions, there would nevertheless be impacts from construction and operation of these projects and programs.

The following significant unavoidable adverse impacts could occur as a result of the plan:

- **Construction**. Construction impacts could be both regionwide and location-specific. These impacts would vary depending on the number, size, type, and location of construction projects in each alternative. These adverse construction impacts could include noise, dust, reduced water quality, reduced air quality, energy consumption, traffic disruptions, and short-term land use and economic impacts related to construction activity.
- **Runoff**. New roadways, rail lines, and parking infrastructure could increase the amount of impermeable surfaces and increase stormwater runoff. If properly controlled and treated, however, this runoff would not result in significant erosion or water quality impacts. Also, the amount of VMT could affect tire-related deposits on roadways, which could affect water resources.
- **Emissions**. New transportation infrastructure would accommodate more trips and potentially result in more greenhouse gas emissions. Some of these emissions could be concentrated in regional growth centers where more people would be affected (refer to Chapter 6: Air Quality and Climate Change for more information).
- **Noise**. Accommodating regional trip growth would cause additional noise along many corridors (refer to Chapter 7: Noise).

- **Congestion and delay**. Although the alternatives consider the issues of congestion and mobility, not all would result in reduced congestion regionwide. Some alternatives could result in significant unavoidable adverse congestion and delay in heavily traveled corridors.
- **Visual quality**. Construction of significant transportation infrastructure could have significant impacts on the visual quality, vistas, and views, depending on the location and design of specific facilities.