3. Background

Study area

The I-405 Corridor encompass about 230 square miles and extends on both sides of I-405 from its southern connection to I-5 at Tukwila, to its northern intersection with I-5 in Snohomish County, north of Lynnwood(Figure 3-1). The study area includes the cities of Tukwila, Renton, Newcastle, Bellevue, Beaux Arts, Clyde Hill, Medina, Hunts Point, Yarrow Point, Redmond, Kirkland, Woodinville, and Bothell, as well as portions of the cities of Issaquah, Kenmore, Kent, Lynnwood, and Mercer Island and unincorporated areas of King and Snohomish counties.

The unique geographic features such as lakes, steep hills and rivers, that define western Washington also present bottlenecks and barriers to an effective transportation system. The roadway network of I-405 reflects the local geography and development patterns that have occurred over the years. The sparse roadway network in the I-405 corridor has created the situation where state highways frequently serve as the principal means of transportation, even for short trips. Major local arterials have also become heavily congested as the area's population and employment has grown.

Growth in the corridor

I-405 has changed dramatically, from a Seattle bypass in the 1960s, to the roadway of choice for most north-south trips east of Lake Washington. More than two-thirds of the total trips on I-405 begin and end within the corridor itself. The remaining trips often lead to communities to the south along SR-167 and developing areas to the east in the Cascade foothills.

Study Area Population, Employment, and Households

The Puget Sound Region has experienced steady population and employment growth over the past four decades. Employment in the I-405 communities have more than tripled, while population almost doubled.

As shown in Figure 3-2, population and employment will continued to grow. Forecasts show that by 2020 an additional 144,000 people are expected to be employed within the study area, while the population is expected to reach approximately 765,000. Redmond, Bellevue, Tukwila/South Center, and Kent are expected to receive the highest employment and household growth in the corridor.

I-405 Corridor

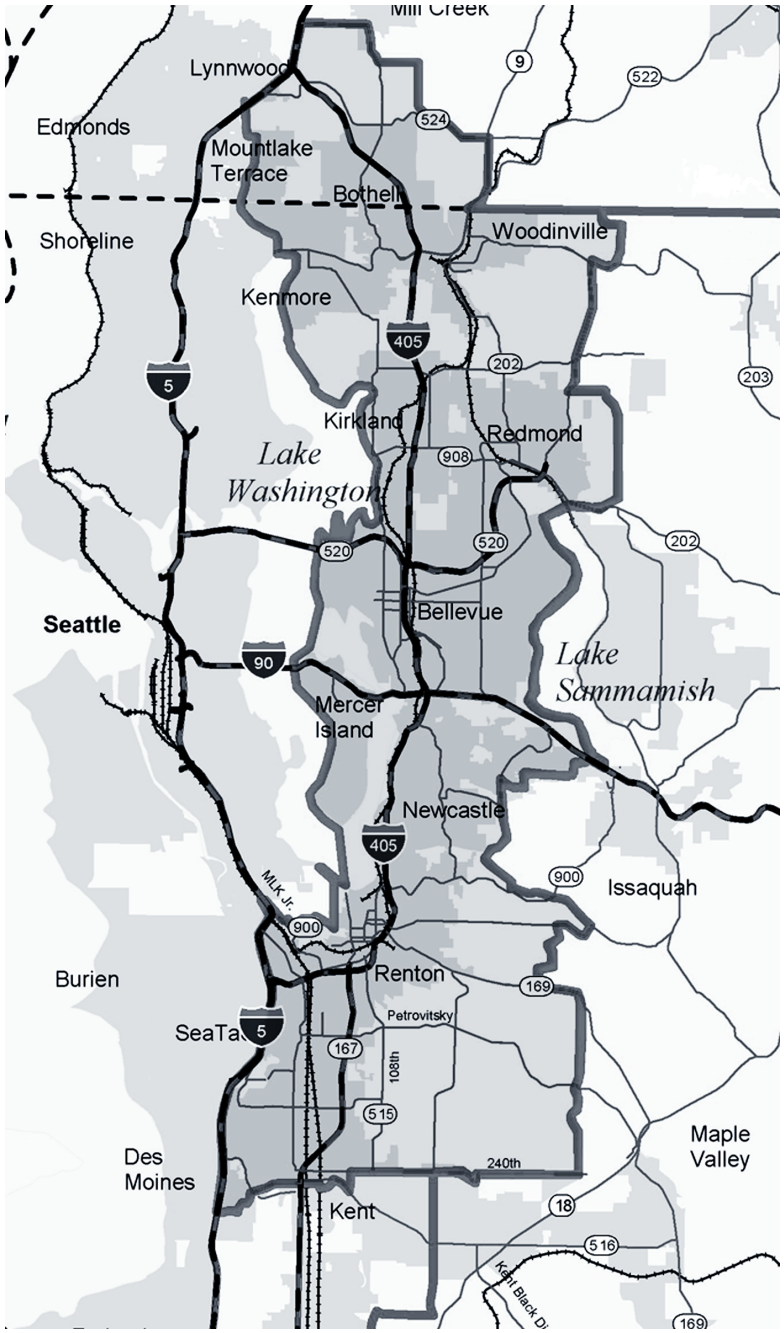

Figure 3-1

Growth Management

In 1990, the Washington State Legislature passed the Growth Management Act (RCW 36.70A) to manage growth and influence development patterns within the state. The Growth Management Act (GMA) requires coordination and consistency in local planning efforts, as well as compatibility of local, regional, and state planning. The GMA defines urban and rural growth areas (UGAs), designates urban centers, establishes density targets, and establishes minimum levels of services on key state highways. I-405 is located within the Seattle-area growth boundary.

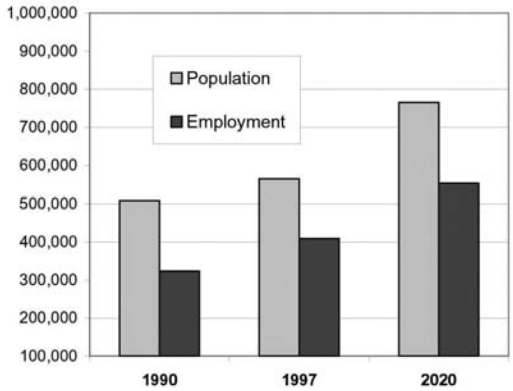

Figure 3-2: I-405 Population and Employment Growth

The GMA requires local jurisdictions to adopt and enforce ordinances that ensure the maintenance of transportation service standards before approving new development projects. This provision establishes growth boundaries, allowing new developments only when roads and other infrastructure or services are available to handle the demands they create.

Most cities and counties located in the I-405 Corridor have adopted a comprehensive transportation plan and a concurrency ordinance. However, public policy and private investments are often disconnected. The area's earlier urban growth practices predate growth management planning and continue to dominate even as new development strategies are employed. The pre-GMA practices favor automobile access over new alternative travel options. As a result, Eastside cities are facing serious congestion and mobility issues.

Improvements to local and state highways are essential to maintain the appropriate growth management balance. Without transportation improvements, there will be pressure for growth in rural areas or at the urban fringe. This pattern of growth will increase demand on the transportation infrastructure, demand on public services, adverse impacts on the environment, vehicular congestion and long-term increases in the cost of providing public services.

Transportation System

The transportation system to the east of Lake Washington consists of a network of regional highways linking major activity centers, supported by local circulation systems. I-405, the major north/south facility is located in the western portion of the corridor. Increasing travel demands are straining the capacity of the existing facilities in the corridor.

I-405 Freeway

Interstate 405 begins at I-5 in Tukwila and ends in the north at I-5 outside of Lynnwood. I-405 varies from six to ten lanes along the 30-mile corridor. The section of I-405 from I-5

in Tukwila to I-90 includes two general-purpose lanes and an HOV lane in each direction. The next section from I-90 to SR-522 in Bothell has three general-purpose lanes and an HOV lane in each direction except for the northbound direction between SR-520 and NE 70th, where it has an additional climbing lane. On the section north of SR-522, I-405 has two general-purpose lanes and an HOV lane in each direction. There are a total of 27 interchanges along I-405, including the connections with Interstate 5.

Supporting Roadway Network

Much of I-405s adjacent arterial system is discontinuous because of topography and development patterns. The pattern of land development is predominantly suburban, resulting in a different type of road system compared to more traditional street patterns found in older cities. Instead of a regular grid system, arterials are curvilinear, generally spaced at long and irregular intervals. These arterials are fed by smaller streets serving residential and business developments that frequently "dead end" in a developments, rather than linking to alternate arterial routes. On the Eastside there are very few east/west through-streets that continue for any great distance. This means more traffic on fewer streets, resulting in more congestion on the key roadways.

The I-405 corridor has about 13 percent of the roadways in the Puget Sound Region, but nearly 18 percent of the population. This is typical of a growing urban area. Overall, the roadway network in the study area is relatively sparse. Major arterials, maintained by local jurisdictions, include the Woodinville-Duvall Road, Bellevue-Redmond Road, Petrovitsky Road, Richards Road, 148th Ave. NE, and the Coal Creek Parkway.

The roadway network consists of nine state highways that connect with I-405 . They include SR-167, SR-169, SR-181, SR-900 (Sunset and Park interchanges), I-90, SR-520, SR-908, SR-522 and SR-527. At the northern end of the study area, I-405 becomes SR-525 in Lynnwood, while at the southern end SR-518 extends west towards SeaTac and Burien. Two other state highways (SR-515 and SR-524) cross but do not connect with I-405. Another highway in the primary study area, SR-202, parallels I-405 between SR-520 and SR-522, along the east side of the Sammamish Valley.

Transit System and Supporting Network

Metro (King County), Sound Transit (King, Pierce, Snohomish Counties), and Community Transit (Snohomish County) currently provide transit service for the I-405 corridor. Metro provides local service between and within Eastside communities and express service between major urban centers. Community Transit provides express service between urban centers in Snohomish County and the Eastside. Sound Transit provides express service between selected urban centers. As of early 2002, 17 of 19 routes are in operation. The three major I-405 transit centers are located in Bellevue, Overlake and Kirkland. Planning is underway for new park-and-ride lots, transit centers, and direct access ramps, including large-scale improvements to several I-405 interchanges.

During the area's initial development, there was very little public transit service. In 1972, Metro assumed responsibility for King County public transit, significantly improving service. I-405 bus service now serves multiple Eastside urban centers as well as Seattle, greatly increasing convenience and connectivity. Transit service remains focused on work trips, with more neighborhood service, and better off-peak connections.

Metro, Sound Transit and Community Transit serve 21 permanent park-and-ride lots and 34 leased lots in the corridor. Parking demand for many of the permanent lots exceeds 100 percent. However, many of the leased lots, often church parking lots, with fewer than 50 available parking spaces, are relatively small. More than 160 vanpools travel along I-405 each day. Vanpooling has grown by more than 60 percent since 1995.

Pedestrian and Bicycle Facilities

The bicycle and pedestrian facilities in the corridor include dedicated trails, sidewalks and bike lanes. To accommodate bicyclist demand, all King County buses were equipped in 1994 with bicycle racks that carry two bicycles per bus. Metro buses transport an estimated 465,000 bikes a year throughout the corridor. Metro and Community Transit also offer provide bike racks and lockers at park-and-ride lots and transit centers.

However, long non-motorized commute trips on I-405 can be hindered due to the lack of north-south arterials, topography and roadway infrastructure like highways and cul-de-sacs. Without an adequate trail system paralleling the freeway, I-405 is a major impediment to non-motorized travel, breaking the connectivity of the trail system.

Corridor Travel Conditions

Corridor congestion has drastically increased over the past decade. To measure the condition of travel on I-405, several indicators were used: growth, trip patterns, travel modes and travel times.

Travel Growth

The Puget Sound region has experienced dramatic growth in both the manufacturing (aerospace and aviation) and service-oriented (software, computer technologies and biotechnology) sectors. Both sectors generate high volumes of traffic on the freeway system, including I-405. Between 1970 and 2000, the average daily traffic on several sections of I-405 increased nearly five-fold. I-405 currently carries the heaviest traffic volume in the region and up to 60 to 70 percent of the total daily traffic volumes in the north-south direction. In the east-west direction within the corridor, arterial streets carry 30 to 40 percent.

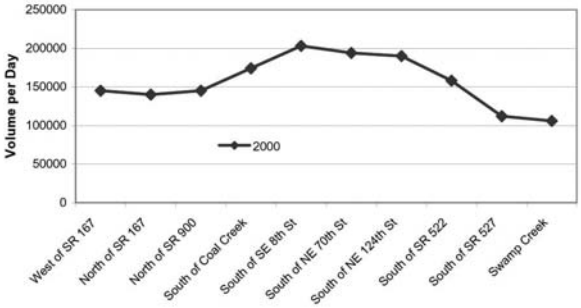

Figure 3-3: I-405 Daily Traffic Volumes

In 2000, the highest volumes on I-405 occurred between I-90 and SR-520 in Bellevue with

nearly 205,000 vehicles per day (Figure 3-3). I-405 traffic volumes are affected by different travel demands as well as available capacity. At several locations, freeway daily traffic counts have not increased much in recent years because the roadway is nearing capacity, with little space for additional vehicles. Person trips are expected to increase more than 50 percent by 2020.

Trip Patterns

About 45 percent of the trips in this corridor begin or end outside the corridor. About 55 percent of the trips are within the corridor. Over 70 percent of all trips are less than 10 miles in length, while over 35 percent of the trips being greater than 30 miles. I-405 will likely continue to be the chosen route for longer trips, as there are no continuous, parallel north-south alternative routes in the corridor.

Travel Modes

Single-occupant vehicles (SOVs) generate the majority of the corridor travel demand. Up to 78 percent of work trips on I-405 are made in SOVs. High-occupancy vehicles (HOVs) and transit users comprise around 20 percent of I-405 work trips.

There have been significant changes over the last few decades in the types of trips taken on I-405. Work trips have decreased while non-work trips have increased as lifestyles and workstyles have changed. Almost 40 percent of I-405 trips are for shopping or recreational purposes. Trips that do not start or end at home (e.g., traveling from work to day care or shopping) comprise another 40 percent and reflect the trend in multiple-stop trips. Other trip purposes include school trips (2%) and commercial vehicles (11%).

Congestion

Across the Puget Sound region, the daily vehicle miles of travel (VMT) have doubled in the past twenty years. However, the roadway network has not expanded to accomodate travel demands, resulting in increased congestion on all roads, especially the freeway system (see Figure 3-4). The I-405 Corridor Program defines congestion as travel speeds below 45 mph.

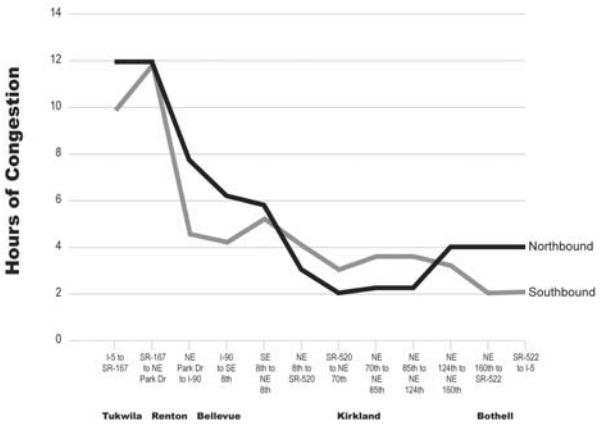

Figure 3-4: Current I-405 Congestion Levels

Traffic congestion along I-405, once limited to morning and afternoon peak periods, now lasts up to 12 hours from I-5 in Tukwila to NE Park Drive in Renton. Traffic congestion on most sections of I-405 last two to seven hours a day. The spillover traffic from vehicles that cannot access I-405 ramps often cause traffic to back up onto local arterials.

Travel Times

The average travel times for evening peak hour trips that originate and end in I-405 are expected

to increase 36 percent by 2020. For the solo commuter time spent in congestion will equal an additional six to eight working days a year for a 10-mile trip. For longer trips, the additional time spent in traffic will equal three to four weeks a year. HOV travel times typically operate 15-20 miles per hour faster than adjacent general-purpose lanes during congested time periods.

Travel Time Reliability

Not only do travel times vary by segment on I-405 they are unpredictable from day to day. A transportation system is effective when travelers experience little or no deviation in travel time for the same trip.

The Washington State Transportation Center (TRAC) conducted research to measure travel time reliability for general traffic along I-405. The following list summarizes the sections of I-405 that were found to have poor reliability in 1999.

- Tukwila to Bellevue during mid-day, evening and morning peak periods
- Bellevue to Tukwila throughout the day (from 6:00 a.m. to 6:30 p.m.)
- Bellevue to SR-522 during the p.m. peak period.
- SR-522 to Bellevue during the a.m. peak period

Traffic incidents along the freeway corridor are the major causes of the reliability problems. Travel in I-405 HOV lanes is considerably more reliable than in the general-purpose lanes. However, HOV reliability suffers when there is a major incident or with stop-and-go conditions, resulting in the decrease of speed and violations by non-HOVs.

Freight Mobility

Puget Sound roadways carry about 1.2 million truck trips each day, with about 70 percent of those trips occurring within King County. I-405 carries a substantial portion of those trips, moving up to 90 percent of the total truck origins and destinations in east King County. Products shipped by truck across I-90 from eastern Washington reach points north and south of Seattle via I-405. I-405 also serves local freight delivery to-and-from cities along the corridor.

The decreasing reliability of the regional transportation system, including I-405, has created a serious problem for regional freight mobility. Currently, truck traffic on the south portion of I-405 comprises up to 8,000 vehicles per day, representing around seven percent of total Renton traffic. By 2020, truck volumes are expected to increase by up to 75 percent, approaching 10 percent of total daily traffic along southern portions of I-405. Substantial delay as a result of congestion costs the region's businesses nearly $700 million a year. The inclusion of light-duty delivery and service trucks, accounting for many of the region's freight trips, would push these figures higher.