Mobility

The Highway Demand/Capacity Imbalance

Washington State's population has increased 45% from 1980 to 2003 and is projected to increase another 36% by 2030 to an estimated 8.5 million, more than twice the number of people in 1980. This change in population has translated in to a significant increase in the number of licensed drivers.

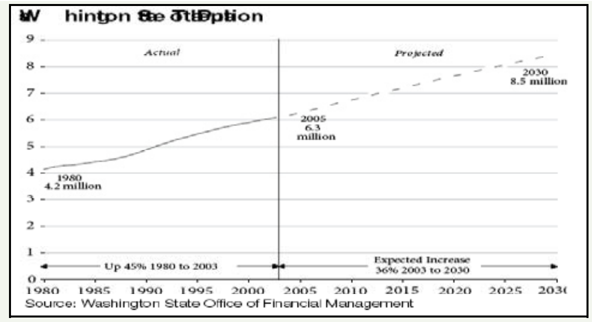
The number of licensed drivers in Washington increased from 2.7 million in 1980 to 4.4 million in 2003, an overall increase of 66 percent, or an annual average increase of 2.9 percent. In 2003, 72.1 percent of the population held a valid driver's license, an increase from 65.9 percent in 1980. This upward trend is expected to continue, increasing the number of licensed drivers to nearly 6 million by 2030.

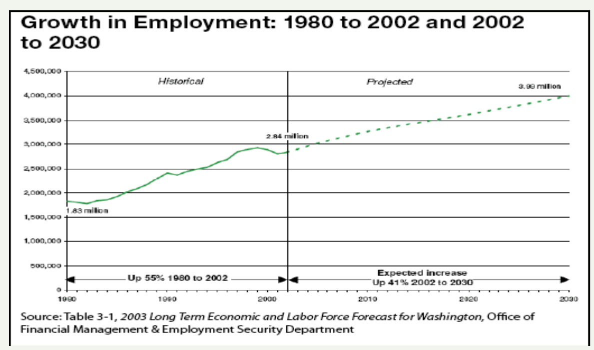
From 1980 to 2002, the number of jobs in Washington State grew from 1.83 million to 2.84 million, an average annual growth rate of 2 percent. Between 2002 and 2030, 1.15 million jobs are expected to be added to the state's economy. Employment in the state is expected to increase at an average annual rate of 1.2 percent, from 2.84 million in 2002 to 3.99 million by 2030.

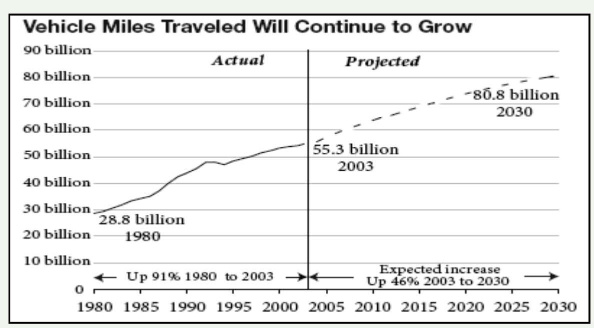
The combined growth in population, licensed drivers, and jobs will translate into substantial increases in travel and demand for transportation systems and services. From 1980 to 2003 the number of miles traveled (Vehicle Miles traveled or VMT) has increased by 91%. VMT is expected to increase another 46% above 2003 levels to a staggering 80.8 billion miles traveled per year on Washington's highways.

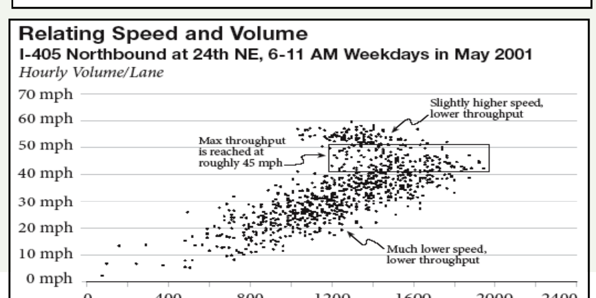
The growth in travel demand has outpaced expansion of transportation system capacity. This imbalance of demand and capacity occurs in virtually every mode of transportation: at our airports, on our rail lines, and especially on our roadways.

Congestion not only causes delay, it also causes lost productivity for the roadway system. That is, under









congested conditions, even though the road is "full" of cars, they are moving so slowly that fewer vehicles actually pass any given point on the road. Typically, the maximum throughput of vehicles on a freeway, about 2,000 vehicles per lane per hour, occurs at speeds of 42-51 mph, or about 70%-85% of the posted speed.

As demand increases, congestion causes a drop in speeds. For a typical freeway, when speed drops to below 45 mph, or about 85% of 60 mph, the productivity of the freeway starts to decline. When congestion causes drivers to lower vehicle speeds to 30 mph, the throughput (volume of flow) on a freeway may fall from 2,000 vehicles per lane per hour to as low as 700. When cars are stuck in congestion, the difference between the intended capacity of the roadway and the actual number of cars that the road is serving is called "lost productivity," "lost throughput," or "lost capacity." Whatever the term, congested freeways deliver far fewer benefits to citizens than if the roads could be kept flowing smoothly.

By 2030, without substantial new capacity or significant changes that affect how and when we travel, users of Washington State's transportation system will experience less reliable movement of freight and goods, longer travel times, increased delay and higher consumer costs to name a few.

Moving away from the historical practice of taxing to build our way out of congestion or to satisfy the demands of growth, this 20-year plan warns that as we grow, we must grow smarter and be more innovative. There is not enough state or local money and land to build our way out of congestion. Therefore, WSDOT has set a goal to get the highest possible performance from our existing transportation investments – from basic maintenance and operations activities to the application of sophisticated technologies – means people and goods move more reliably and predictably on the system.

Achieving a better balance between demand for the system and capacity of the system will require methods to:

- Maintain flow of traffic
- Maximize throughput
- Improve productivity

Alternatives to single occupant vehicle transportation are key to managing the demands placed upon the transportation system. Public transit, the Commute Trip Reduction program, and walking and biking facili-

How Does WSDOT Measure Congestion?

WSDOT's mission is to move the largest number of people and largest amount of freight as efficiently as possible using current capacity. This is partly served by maximizing the number of vehicles that the highway can move through the system. Currently, maximum traffic throughput is achieved on a typical freeway segment in the Central Puget Sound region at about 51 mph (roughly 85% of the posted speed limits). When speeds fall below 70% of posted speed, or about 40 mph, the highway has lost efficiency to the level of significant congestion. Below 35 mph, the road operates in a severely congested manner.

WSDOT's Congestion Measurement Thresholds

Condition	Highway Speed Range	Description
Posted Speeds	52 mph or above (Posted Speed)	Highway is at less than maximum productivity because drivers are at greater than optimal spacing
Maximum Throughput	51 mph-41 mph (about 85%-70% of Posted Speed)	Highway is working at maximum productivity
Congestion	40 mph (below 70% of Posted Speed)	Highway is at less than maximum productivity because drivers are jammed at less than optimal spacing
Severe Congestion	35 mph or below (about 60% of posted speeds)	Highway is well below maximum productivity

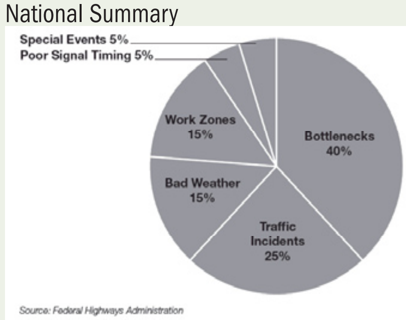
Note: Maximum throughput figures are based on current technology and roadway geometrics. Improved vehicle and roadway technology could shift these thresholds upwards.

WSDOT's Congestion Measurement Principles (since 2002):

- Use real-time measurements (rather than modeling) whenever possible.
- Measure congestion due to incidents as distinct from congestion due to inadequate capacity.
- Show whether reducing congestion from incidents will improve travel time reliability.
- Use plain English to describe congestion measures.
- Demonstrate both long-term and short-to-intermediate term results.
- Communicate about possible congestion fixes using an "apples to apples" comparison with the current situation (for example, if the trip takes 20 minutes today, how many minutes shorter will it be if we improve the interchanges?)

The Sources of Congestion

National Summary



According to the Federal Highway Administration's 2004 report Traffic Congestion and Reliability: Linking Solutions to Problems, the majority of congestion is caused by bottlenecks. Traffic incidents are the next highest contributor followed by inclement weather.

ties provide alternative modes of travel. They relieve demand on highway systems, and reduce congestion, as well as increase sustainability of the transportation system. Creating more usable capacity on our transportation system will include:

- Improving flow on the system with ramp metering, incident response, and high occupancy vehicle lanes
- Providing alternatives to traveling on congested highways with commute trip reduction programs, better local networks, and transit oriented development
- Keeping the system moving through basic maintenance and operations
- Increasing access management programs, which can increase roadway capacity by 23 percent to 45 percent

Major Factors Contributing to Congestion

The growth in travel demand, especially during peak hours has caused many of the highways in Washington State to operate less efficiently. This decreased efficiency further consumes the capacity of the highway leading to more congestion (recurring congestion). Non-recurring congestion resulting from weather, roadway construction, collisions and vehicle breakdown, further reduces the operating efficiency of the highway system. On a fundamental level, failure to price the use of roadway capacity contributes to unconstrained demand and causes congestion. The major factors that contribute to congestion based on a national summary from the Federal Highway Administration are as follows:

- Bottlenecks
- Traffic Incidents
- Bad Weather
- Work Zones
- Poor Signal Timing
- Special Events
- Fluctuations in Normal Traffic

Bottlenecks are places where the physical attributes of a roadway change in a manner that impacts the flow of traffic. Typical bottlenecks are locations where; the number of lanes decrease, the roadway physically narrows either in shoulder width or lane width or narrow bridges. WSDOT has separated bottlenecks into two categories, bottlenecks and chokepoints. WSDOT defines chokepoints as, places where congestion occurs because of traffic interference and/or the roadway configuration (examples: freeway interchanges; lack of left turn lanes at intersections; seasonal road closures). Bottlenecks and chokepoints greatly influence the flow of traffic, whether it be long backups of vehicles trying to exit the roadway, vehicles having to dramatically reduce their travel speeds when leaving one freeway to enter another (freeway to freeway connections) or vehicles slowing down as they cross a narrow bridge.

Traffic Incidents typically include; collisions, disabled vehicles, debris on the roadway, spills, and roadside distractions that alter driver behavior (e.g., roadside construction, electronic signs, a fire beside the freeway) and other events that impede the normal flow of traffic. For every minute a lane remains blocked, four to 10 minutes of congestion may result.

Bad Weather, such as the recent events in November 2006 where heavy rainfall caused flooding, sink holes and landslides, resulted in the temporary closure of more than a dozen highways in Western Washington for several days. Snowfall, avalanche control, ice and heavy fog can cause delay.

A Work Zone is an area of a highway with construction, maintenance, or utility work activities. A work zone is typically marked by signs, traffic control devices, barriers, pavement markings, and/or work vehicles. It extends from the first warning sign or rotating/strobe lights on a vehicle to the END ROAD WORK SIGN or the last temporary traffic control device.

Poor Signal Timing causes additional delay to drivers. In fact, minor side street traffic may experience excessive delay, particularly during off-peak hours. Because of this, drivers may actually avoid the signalized intersection and switch to alternate routes or, to residential streets not designed to handle through traffic.

Special Events like sporting events, political rallies and parades can cause temporary, but major impacts to normal travel conditions expected by motorists.

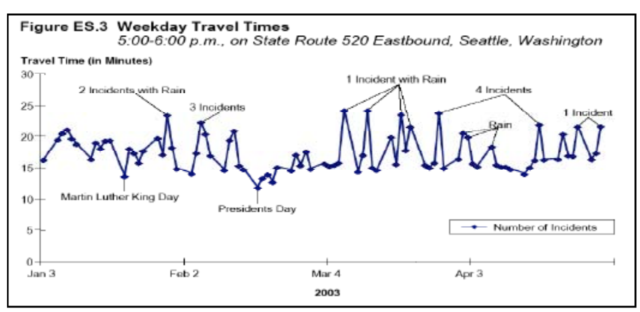


Figure ES.3 Weekday Travel Times
5:00-6:00 p.m., on State Route 520 Eastbound, Seattle, Washington

Fluctuation in Normal Traffic is the variability of day to day demand. Some days, traffic volumes are abnormally high leading to significantly longer travel times, other days traffic volumes are below normal and traffic flows freely without delay.

Any one of the above factors can cause traffic to slow below an acceptable level. When two or more of these factors are combined, traveling on the freeway becomes a nightmare. This interaction between multiple factors creates a dynamic and unpredictable series of conditions that is rarely the same from one day to the next, or even from one highway to another. For example, the travel time that one motorist experiences leaving home at 6:30 a.m. may be completely acceptable, but another motorist who leaves home 30 minutes later experiences a travel time that is more than twice as long. These motorists' experiences can change dramatically if the next day there is a lane blocking collision, or if it is raining. The graph to the right clearly shows the combination of these factors at work.

To make matters even more complex some of these situations can cause other events to occur. Consider the following:

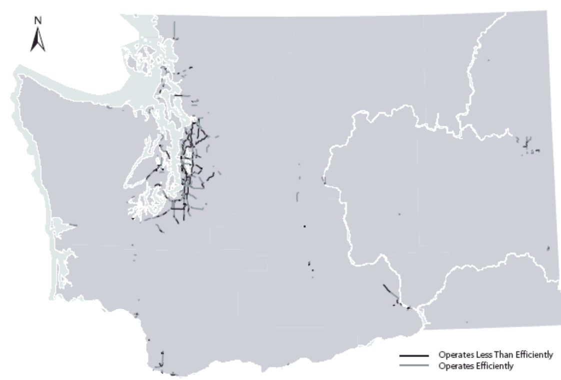
- When traffic volumes are above normal on one highway, many commuters may decide to take an alternate route causing volumes to spike and slowing traffic to a crawl.
- Even moderate congestion can cause an increase in collisions as the following distance between vehicles is reduced and drivers become distracted.
- Poor signal timing on a local road may cause vehicles on freeway off ramps to backup onto the mainline, reducing the through capacity of the roadway.
- Bad weather can cause poor visibility leading to slow downs and potentially more collisions.
- Drivers distracted by a collision may cause additional collisions as their attention leaves the roadway ahead of them.

Needs and How to Identify Congestion

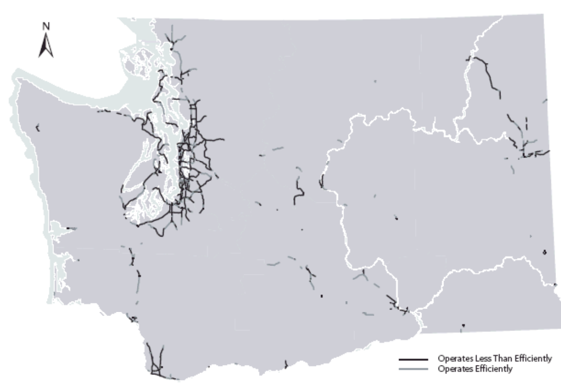
(How Was Congestion Identified for this HSP Update?)

Recurring congestion was determined by locations that operate below 70% of the posted speed during the peak-hour, as shown in figure xx along with areas that operate efficiently during the peak-hour, 70 to 85% of the posted speed. These conditions do not reflect the impact of congestion associated with local roads, additional impacts associated with ramps, interchanges, weather, special events, construction, collisions or incidents. This is the criteria used to determine both Interstate and non-Interstate congested corridors.

Computer analysis was used to forecast the 24-hour operating conditions for the year 2030 to identify locations where the peak-hour travel speeds fell below 70% of the posted speed. Of those locations, the ones with the most significant delay were chosen as study corridors. These projected future conditions reflect the completion of the mobility projects included in both the 2003 "Nickel" funding package and the fully funded projects included in the 2005 TPA. These projections do not reflect the impact of congestion associated with local roads, additional impacts associated with ramps, interchanges, weather, special events, construction, collisions or incidents.

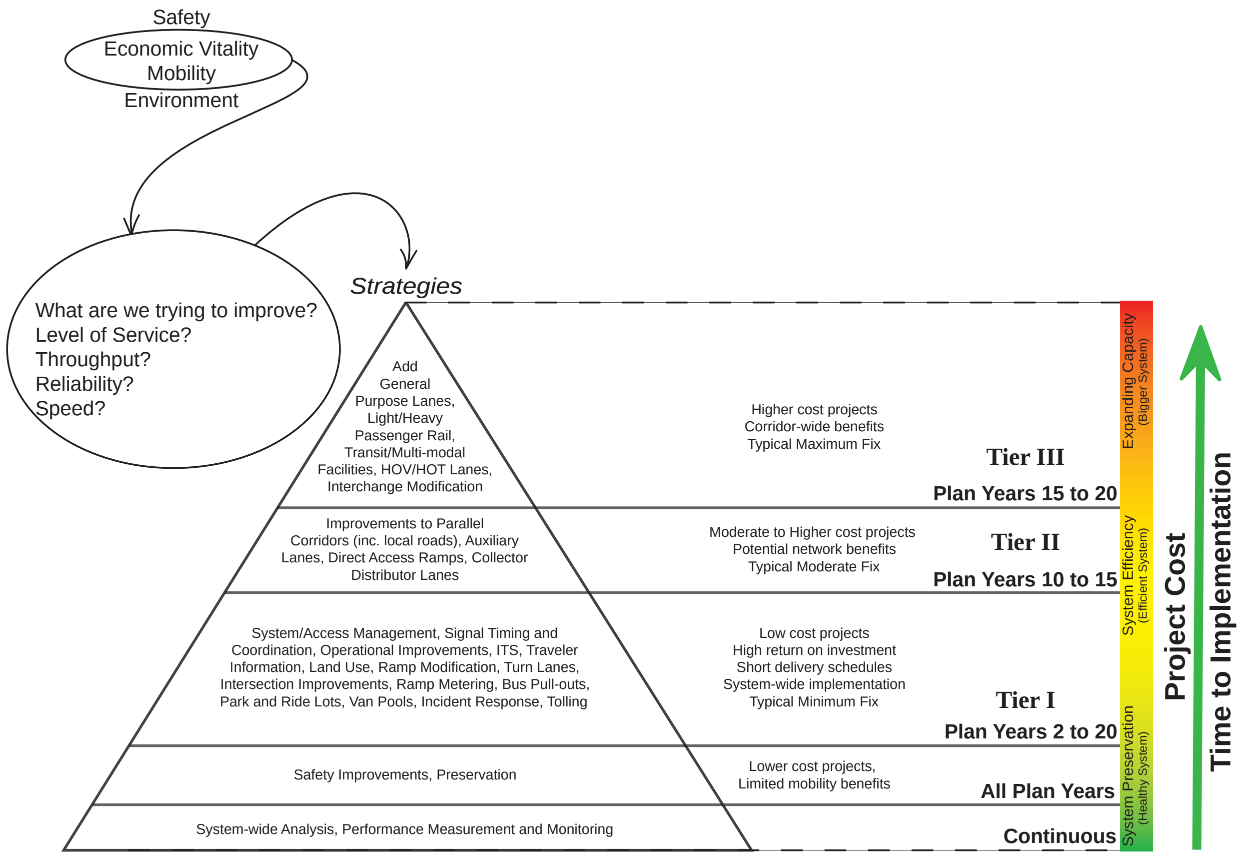


The above map shows the worst operating conditions experienced during 2005 on State Highways.



The above map shows the projected worst operating conditions for 2030 on State Highways.

Draft 2007-2026 Washington State Highway System Plan: Implementation Plan



Strategies to Address Needs (How will this HSP address Mobility Needs?)

A new approach to improve congested conditions on state corridors has been developed for inclusion in this update of the 2007-2026 HSP. There are three tiers of investment strategies that could be implemented incrementally over the life of the 20-year plan to maximize every dollar invested.

- System Operation (Healthy System)
- System Efficiency (Efficient System)
- System Expansion (Bigger System)

System Operation (Healthy System)

System operations promote a "healthy system" through continual performance measurement and monitoring to ensure capital investment decisions are made at the right time in the right locations. A healthy system also must be preserved to protect current and future assets. Another critical component of a healthy system is continual improvement in providing safer highways.

System Efficiency (Efficient System)

The second tier, system efficiency, promotes the optimum operation of the system. System efficiency begins with delivering low cost projects with shorter construction schedules to a wide range of high benefit locations. These projects could include operational improvements such as ramp metering, turn lanes or signal timing adjustments, and intelligent transportation systems. System efficiency also includes some moderately priced projects to expand upon the previously completed lower cost projects that maintain the operational efficiency of a corridor. Typical projects may include adding auxiliary lanes or improving a parallel corridor.

System Expansion (Bigger System)

System expansion is the third investment tier and includes the most costly solutions. These solutions would only be considered after all other (lower cost) alternatives have been exhausted. These solutions would also build upon previously implemented solutions so that no work would be wasted (see Figure 13). These solutions may include adding general purpose or HOV lanes, passenger rail, transit, multimodal facilities and major interchange modifications.

Strategies to Address Congestion

- Complete project commitments made to the Legislature
- Incident Response
- Operational Improvements
- Chokepoints & Bottlenecks (not included in Congested Corridors)
- Congested Corridors (Tier I, Tier II, Tier III)

These strategies were considered for every congested corridor segment on the Interstate, as well as some of the congested corridor segments on non-Interstate. Future HSP updates will address additional corridor segments.

Complete project commitments made to the Legislature

The 2003 “Nickel” funding package and the 2005 funding package approved by the Washington State Legislature will generate over $11 billion towards mobility projects over the next 16 years. This additional revenue will complete many projects and will begin or continue work on the projects listed (see Figure 12). By doing this, the Legislature sets the priority for future projects and direction for transportation investments. Therefore the completion of these projects is seen as a high priority for WSDOT’s future program.

Incident Management

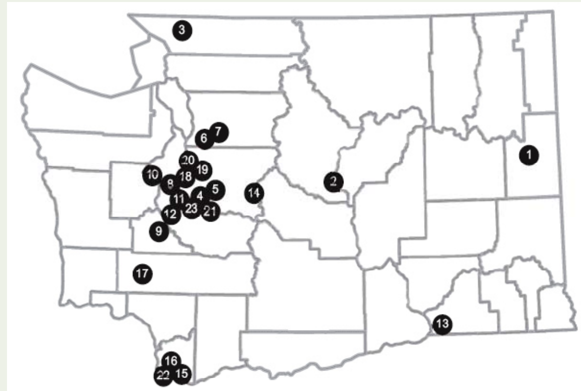
Incident Management is a reactive approach to addressing collisions, but WSDOT also takes a proactive approach to addressing collisions. The current efforts of WSDOT’s Incident Response are discussed in the following paragraphs along with the locations around the state where these efforts are focused. For more information about Incident Response please visit the Incident Response web page at: http://www.wsdot.wa.gov/incidentresponse/.

Operational Improvements/Intelligent Transportation Systems (ITS)

WSDOT’s approach to reducing congestion is multi-faceted, focusing on reducing the causes of congestion, providing capacity improvements, and making the most efficient use of the existing transportation system.

As roadway congestion increases, Intelligent Transportation Systems are used to maintain vehicle throughput. We now use these types of technology including ramp metering, traveler information, incident response, border crossing technology, weather operations based on prediction tools, commercial vehicle information systems networks (CVISN), and coordinated signal technology.

Location of Projects



Key	Project Title
1	US 395 North Spokane Corridor
2	SR 28 East Wenatchee Corridor
3	SR 539 Lynden to the USA/Canada Border
4	SR 509 Complete SR 509 from I-5 to Des Moines Memorial Drive
5	SR 18 Issaquah Hobart Road to I-90
6	SR 522 Paradise Lake Road to Monroe
7	US 2 Monroe Bypass
8	Completion of Puget Sound HOV System
9	SR 510/SR 507 Yelm Bypass
10	SR 3 Belfair Bypass
11	SR 167 from SR 509 at the Port of Tacoma to SR 167/SR 512 at Puyallup
12	SR 704 Crossbase Highway
13	US 12 US 730 to McDonald Road
14	I-90 Snoqualmie Pass East
15	SR 14 Camas / Washougal
16	I-205 SR 14 to NE 134th Street
17	I-5 13th Street to Mellen Street
18	SR 518/SR 509 Interchange
19	I-405 Lynnwood to Tukwila - Corridor Improvements
20	SR 520 Bridge Replacement and HOV
21	SR 410 Bonney Lake Vicinity - Corridor Widening
22	I-5 Columbia River Crossing
23	I-5/SR 161/SR 18 “Triangle” Interchange

Ramp Metering

Ramp metering has been in place in the Seattle area for years and has proven highly effective in maintaining and even increasing throughput. Ramp meters are stop-and-go signals located on entrance ramps to the freeway. They control the frequency with which vehicles enter the flow of traffic on the freeway.

Ramp meters are a proven and cost-effective method of relieving traffic congestion. By increasing the efficiency of freeway use, ramp meters save taxpayers costs associated with building new lanes. Past ramp meter activations have reduced rear-end and side-swipe collisions by over 30%.

Driver and Traveler Information Systems consists of roadway condition and congestion information, construction, maintenance and ferry delay information, and emergency and road closure information. Providing motorists with this information allows them to make route or timing decisions before or during their trip.

Truck Operations

Trucks are required to be weighed, inspected, and registered for travel in Washington. Stopping at truck scales and ports of entry can delay truck shipments. Advanced technology such as commercial vehicle information systems and weigh-in-motion technologies can improve efficiency and reduce the time spent at the scales in most cases.

Bottlenecks and Chokepoints

An extensive list of bottlenecks and chokepoint locations and solutions has been developed for this update of the HSP. Over the next several years additional locations will be identified through future analysis for inclusion in later updates to the HSP. To identify a bottleneck or chokepoint location for this update, WSDOT regions followed the guidelines established as follows.

First, the location under consideration had to fit the definition of being either a chokepoint or bottleneck:

Bottlenecks are places where the physical attributes of a roadway change in a manner that impacts the flow of traffic. Typical bottlenecks are locations where; the number of lanes decrease, the roadway physically narrows either in shoulder width, lane width or narrow bridges.

Chokepoints are places where congestion occurs because of traffic interference and/or the roadway configuration (examples: freeway interchanges; lack of left turn lanes at intersections; seasonal road closures).

Second, the observed congestion must be supported with traffic data and analysis models. If congestion is a problem today or anticipated within the next 20 years, it must also satisfy at least one of the following applicable criteria:

- The congestion problem impacts the flow of mainline through traffic.
- The impact on mainline traffic flow is measured as through vehicle peak hour speeds that are determined (measured or modeled) to be equal to or less than 70 percent of the posted speed.
- Traffic flow criteria for ramps will also be considered to determine if the congestion is caused by on/off ramp traffic.

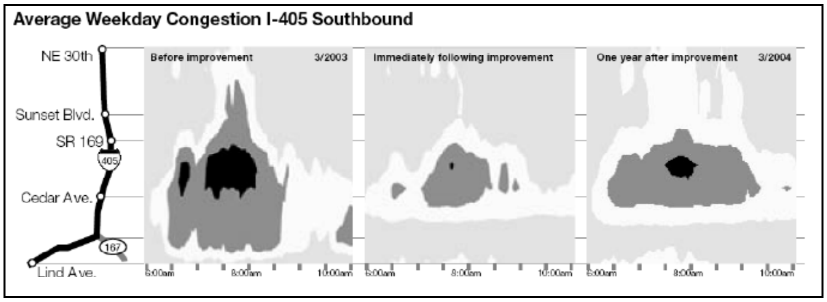
The Washington Transportation Plan identified funding targets for a statewide list of chokepoint and bottleneck locations. This list will be used to create strategies to address congestion in these specific locations.

Fixing Bottlenecks and Chokepoints

Targeted traffic flow improvements can also make a significant difference in system performance. The recently completed I-405/SR 167 Flyover ramp is a good example of one such targeted investment. Prior to the opening of the new ramp, stop-and-go conditions occurred weekday mornings between 6:45 and 8:00 a.m. Immediately after the opening the new ramp, the stop-and go condition was almost entirely eliminated. In the past year we've seen continued growth in the I-405 mainline volumes as well as the I-405 southbound to SR 167 southbound ramp. While serving higher volumes, the congestion at the interchange area is still considerably lower than the conditions prior to the project. On weekends, both the stop-and-go traffic and heavy congestion conditions have been essentially eliminated.

Congested Corridors (Tier I, Tier II, Tier III)

Improving the operating conditions of congested corridors will be accomplished through an incremen-



Average Weekday Congestion I-405 Southbound tal approach, where every improvement builds upon previous work so that no work is wasted.

Tier I Strategies

Tier one strategies are low cost projects that deliver a high return on capital investments and have the shortest delivery schedules. These strategies bridge the gap between system operation and system efficiency therefore; some of these strategies have been described earlier.

Access Management

Managing access to state highways by limiting driveways and cross traffic preserves highway capacity where growth is expected and maximizes existing highway capacity and safety where development has occurred.

Ramp Modification

Ramp modifications can vary widely in that ramps can be extended, widened or realigned to reduce the sharpness of a curve. Ramp modifications can also include reconstruction to create a flyover ramp which can greatly improve efficiency (see Fixing Bottlenecks and Chokepoints, page xx).

Turn Lanes

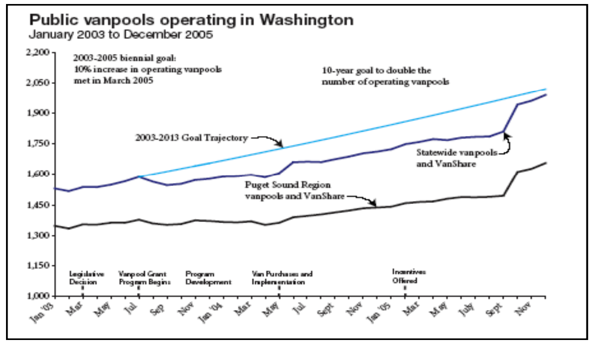
Turn lanes can be added to intersections, ramps and driveways to allow travelers a place to slowdown before making a turn without causing mainline traffic to slowdown or stop.

Intersection Improvements

Intersection improvements improve the efficiency of traffic movements and can reduce the risk of collisions.

Signal Timing and Coordination

Traffic signals are a vital tool used by the Washington State Department of Transportation to safely and efficiently manage vehicle, bicycle and pedestrian traffic on state highways. To achieve optimum efficiency, traffic signals must be monitored and adjusted to serve changing traffic patterns. Traffic engineers collect detailed information about traffic patterns, volumes and speeds. Once this data is analyzed, new timing plans are developed and field adjustments are implemented as required. To maximize traffic flow on arterials and along corridors, closely spaced signals are inter-connected, creating coordinated signal systems. Using traffic signals in coordinated systems may benefit



society by reducing time delay, and providing improved safety, efficient use of fossil fuels, and reduced air pollution.

Transportation Demand Management (TDM)

Also known as trip reduction, TDM is an umbrella term for strategies that reduce or shift use of the roadway. TDM strategies include:

CTR Programs

The CTR Program uses partnerships between employers and government to encourage change in commuting habits. By encouraging people to ride the bus, vanpool, carpool, walk, bike, work from home, or compress their workweek, the CTR program removes 19,950 vehicles from the state's roadways every morning. This saves space on the roads and reduces air pollution by about 5,000 tons and gasoline consumption by about six million gallons each year. Nearly 1,100 worksites in Washington State participate in the program.

Vanpools

The Puget Sound region leads the nation in vanpooling. There are currently 1,353 vanpools in Puget Sound; they remove approximately 9,400 vehicles from area roads each morning.

Park & Ride Lots which make car and van pooling and riding the bus more convenient. Park and ride lots enhance the convenience of transit, vanpools, and carpools. WSDOT owns 62 lots in Puget Sound, with 12,000 parking spaces. King County lots have an average occupancy of 91 percent. WSDOT plans to increase the capacity of its park and ride lots.

Planning for Land Use

Research has shown a link between land use patterns and travel patterns – denser, mixed-use types of development with good pedestrian and transit access have shown higher walking, transit, and carpooling behavior than lower density areas.

Tolling/ Pricing

Information from other cities and states clearly shows the huge potential of roadway pricing to maintain flow and capacity and prevent congestion. This is done by charging users a fee for using the roadway during congested times. The fee limits the vehicles using the lanes, keeping volumes at a level that allows smooth flow and maximum throughput. California and Texas have had success in charging a fee to use underused HOV lanes. These High Occupancy/Toll (HOT) lanes improve the use of the HOV lane, while maintaining smooth flow and a travel time advantage for transit and carpools. Pricing represents the next frontier and a real potential to maximize use of the system.

Tier II Strategies

Tier two strategies are moderate to higher cost projects that deliver potential network benefits to both highways and local roads. These strategies will be considered only after all applicable tier one strategies have been implemented. These strategies support an efficient highway system.

Improvements to Parallel Corridors (including local roads)

There are times when widening a congested roadway is not feasible. One approach to add capacity is to widen a parallel roadway which can provide travelers an alternate route to the same destination.

Adding Auxiliary Lanes

Auxiliary lanes can connect two interchanges, add passing opportunities on two-lane highways or provide slow moving vehicles a lane when going up hills or mountains.

Adding Collector Distributor Lanes

Adding a collector distributor lane that begins before an off ramp and extends beyond the on ramp of closely spaced interchanges improves the efficiency of the interchanges and reduces the impact of vehicles entering and exiting the freeway, thus improving vehicle throughput on general purpose lane travelers.

Direct Access Ramps

WSDOT is building many HOV lane direct access ramps throughout the Puget Sound area for Sound Transit. Direct access ramps allow buses, carpools and vanpools to directly access the high occupancy vehicle (HOV) lanes from park and ride lots and local streets. Carpools, vanpools and buses no longer have to weave across the general-purpose lanes when they can connect directly with HOV lanes. Direct access ramps improve safety, reduce congestion, save time, and increase reliability for both HOVs and general-purpose traffic.

Tier III Strategies

Tier three strategies are the highest cost projects that can deliver corridor-wide benefits. These strategies will be considered only after all applicable tier one and tier two strategies have been implemented. These strategies support system expansion.

Transit

Sound Transit is making it easier to get around Central Puget Sound. Our congestion-fighting alternatives include fast ST Express buses, Tacoma Link light rail and Sounder commuter trains. ST Express buses connect more than 34,000 people every day on fast, direct routes between major population centers in the region.

Commuter Rail

Commuter rail trains provide passenger service between central cities and their suburbs. Commuter rail trains typically operate only on workdays and during commute hours. These trains typically run on the same railroad tracks as freight trains and often share some stations with Amtrak intercity trains.

Other Multi-Modal Strategies Inter-modal Connections

In Island and Kitsap counties and on Vashon Island, transit service is timed and linked with ferry schedules. In downtown Seattle, there is frequent transit service, but not specifically linked to ferry schedules. New inter-modal connections issues will emerge with the construction of new inter-modal ferry terminals in Mukilteo and Edmonds, which may have connections to commuter rail services.

HOV/HOT Lanes

HOV lanes are designed to move more people in less space, while providing a more reliable trip for buses, carpools and vanpools. HOV lanes also add capacity for general-purpose lanes when carpools move from the regular lane into the HOV lane.

A HOT lane pilot project is being planned for the HOV lanes on SR 167. WSDOT is using the pilot project to assess whether or not HOT lanes are a viable solution to relieve congestion, and could be implemented on other highways in the Puget Sound region. HOT lanes maintain free, priority status to transit and carpools, but also allow solo-drivers that pay a toll to use the lanes. Toll rates will be variable and will depend on the level of congestion.

Interchange Modification

Interchange modifications can range from ramp reconfiguration to full reconstruction with an entirely different design to accommodate projected future traffic patterns.

Add General Purpose Lanes

Adding general purpose lanes increases system capacity through capital investments in highway widening, improving connections and passing/climbing lanes.

Performance Measurements

(Inventory and Definitions of WSDOT's Congestion Measurement Terms Used in This HSP Update)

Vehicle Throughput: A measure of the number of vehicles that can pass through a roadway segment during a given time period, typically measured for one hour.

Lost Throughput Productivity: Percentage of a highway's throughput lost due to traffic congestion.

Delay: WSDOT uses annual total vehicle hours of delay. This is the total amount of time vehicles travel at or below 85% of the posted speed.

Duration of Congestion: This period is defined as the period in which average weekday speed on a highway fell below 70% of posted speeds.

Maximum throughput/Maximum productivity: When the highway is carrying the largest number of vehicles possible. This occurs when vehicles are traveling at 70%-85% of the posted speed limit. For freeways, it is ~50 mph.

Transportation and Land Use

Historically, the type and availability of transportation has had a major influence in defining the physical structure of our communities. Communities have evolved from being oriented around ports, rivers, canals, and railroads, to a pattern now dominated by the roadway. In turn, where we live, work, recreate, and find goods and services all drive transportation demand. Community design, social, political, and economic activity, and transportation are intertwined.

Traffic congestion, travel delays, unreliable travel times, and reduced safety can occur when demand exceeds roadway or transit capacity. Transportation problems can be exacerbated when:

- People perceive that the only available and apparently affordable housing they desire is miles, cities, and even counties away from jobs, schools, shopping, and recreation.
- Businesses relocate to the suburban fringe, creating “edge cities” and stranding their transit-dependent employees because traditional transit systems do not typically provide effective service in the “reverse commute” direction or from suburb to suburb.

Transportation problems cannot be solved solely by building additional roadways, interchanges, transit lines and stations, or intercity and commuter railway capacity.

These actions can address some congestion in the short-term and are very important, but developing a transportation system to improve Washington State’s mobility that is sustainable, environmentally sound, socially equitable, and economically viable requires recognizing that: Transportation problems are symptoms of underlying individual and community decisions.

“Sprawl” development has infrastructure cost implications and travel cost and time implications that can directly affect housing affordability and quality of life. No one actually wants to commute several hours a day in congested traffic or considers the event life-enriching. People do it to gain other real and perceived benefits.

Many metropolitan area issues, including transportation and affordable housing, are regional and sometimes interregional in nature. Addressing these issues requires unprecedented levels of government cooperation and shared vision.

Transportation funds are collected from the public with the expectation that they will be used to meet transportation needs. There are more transportation needs and desires than there are funds to support them.

Any expenditure of transportation funds must have a reasonable link to improving mobility and access for people, goods, services, and information.

However, since transportation and community development are interconnected, the availability and location of housing, especially affordable housing, can have a positive impact on reducing overall transportation demand and increase the use and effectiveness of the transportation system. The appropriate investment of transportation funds in projects and services can foster affordable housing and yield a long-term transportation benefit.

Transportation investments can support the vitality and redevelopment of urban areas and first-ring suburbs.

This includes brownfield and grayfield areas, where infrastructure already exists and affordable housing can be developed. Such redevelopment can serve to increase transit usage and efficiency. It can also promote walking and bicycling.

Local agencies can use their discretionary transportation funds, such as Congestion Mitigation and Air Quality and Transportation Enhancement and Regional Surface Transportation Program funding, to help support transit-oriented development, redevelopment, and affordable housing development. Local agency-provided transportation improvements can offset some of the total cost of transit-oriented development or other development that includes affordable housing. State transportation investments can be prioritized with the intent of targeting areas where local investments in transportation facilities, transit services, and local decisions on development help to increase the long-term return on the state’s transportation investment.

Transportation planning funds can be used to jointly plan transportation services and community development to maximize return on future investments and ensure the transportation system complements community growth and vitality.

Transportation and Land Use—Key Challenges

Washington State citizens often talk about the challenges facing the transportation systems in the next twenty years, including sprawl, quality of life, and the threats to natural ecosystems and salmon.

Confronting these issues is central to creating forward looking programs for transportation investment. There is no question that efficient transportation systems are essential to economic vitality. There is no question that individualized free market choices about housing, work, and lifestyles are influencing transportation and land use with greater force than either independently influences the other. And there is no question that failure of transportation systems to meet the needs of growing communities can trigger social and environmental costs, including poor land use outcomes.

Although since implementation of the GMA the state as a whole has begun to coordinate growth and transportation and address congestion more effectively, there remains much to learn about what mix of incentives and disincentives will improve the mobility of people and goods. It may take more serious efforts at partnership between governments and businesses to address land use and the everyday decisions people make about where to work, live, and recreate.

Growth Management

Transportation systems are costly public investments. Land use decisions made by local jurisdictions are key determinants of how the state's transportation system serves people, communities, and the economy. Transportation, in turn, helps define the physical structure of our communities.

When passed in 1990, the Growth Management Act included 13 far-reaching goals to guide local comprehensive plans and development regulations. (A fourteenth goal for shorelines was added later.)

The basic principle of the Growth Management Act is that new development should be allowed only at a pace that public agencies providing public services such as roads, water, and sewer systems can keep up with. Local jurisdictions planning under the Growth Management Act implemented these statewide goals with flexibility to make their own choices about growth and development.

Transportation investments must be made in support of growth management strategies or growth management cannot succeed. Our state's Growth Management Act (GMA) created a framework rooted in local government for reconciling the pressures from growth on the uses of land with the consequent demands for public infrastructure investment. Since the GMA passed, we have seen improved consistency and public engagement in our local land use decisions as a direct result of the coordinated planning required by the law. Major elements of the GMA are:

- √ Comprehensive Plans
- √ Urban Growth Areas
- √ Concurrency

Comprehensive Plans

Fast-growing counties and the cities within them are required to create comprehensive plans that include several plan elements addressing projected changes in land use and public facilities. Cities and counties have discretion in their comprehensive plans to make many choices about how to plan for and accommodate growth. The local transportation system is part of the infrastructure needed to support the land use element of the comprehensive plan. Regional Transportation Planning Organizations certify the transportation element of local comprehensive plans for consistency with regional goals.

Urban Growth Areas

Jurisdictions preparing comprehensive plans are also required to designate Urban Growth Areas (UGA) where future population growth and infill development

is to be encouraged and outside of which growth should occur only if it is rural in character. The purpose of the UGA is to attract and funnel growth to certain core areas, increasing density there while maintaining the rural character of the land outside the UGA.

Development Encroachment

Washington's Growth Management Act (GMA) also requires local jurisdictions to discourage incompatible development adjacent to public use airports through comprehensive plan policies and development regulations. The airport may no longer be able to function if nearby development creates an unsafe setting for planes taking off and landing. Incompatible development can affect both the short-term and long-term operational capabilities of the airport, impact airport capacity, cause safety implications for people in the air and on the ground, impact noise sensitive uses, affect navigation, and impair the utility of the airport as an economic resource. Airports are recognized under GMA as Essential Public Facilities.

WSDOT encourages ports, special districts, airport sponsors, aviation interests, and local jurisdictions to form partnerships and to work together to discourage incompatible development. The Aviation Division provides research documentation and best management practices and tools that can be used by local jurisdictions and airports to address land use compatibility adjacent to airports.

Similarly, Washington's seaports, highways, rail lines, and distribution centers are vital links to the global economy. The compatibility of these facilities with neighboring communities can affect Washington State's ability to move products for export and serve as a gateway for imported goods.

Concurrency

Transportation and land use decisions continue to shape Washington State's quality of life. In 1990, when the legislature passed the growth management act, transportation planning across regional boundaries and the topic of concurrency were included. Concurrency refers to the timely provision of public facilities and services relative to the demand for them. To maintain concurrency means that adequate public facilities are in place to serve new development as it occurs. The Growth Management Act (GMA) gives special attention to concurrency for transportation. The GMA requires that transportation improvements or strategies to accommodate development impacts need to be made concurrently with land development.

"Concurrency" is defined by the GMA to mean that any needed improvements or strategies are in place at the time of development or that a financial commitment exists to complete the improvements or strategies within six years. Local governments have many choices about how to apply concurrency within their plans, regulations, and permit systems.

If concurrency cannot be demonstrated, then local jurisdictions are required to enforce adopted ordinances, which prohibit development approval unless transportation improvements or strategies to accommodate the impacts of development are made concurrent with the development.

Most local governments have comprehensive plans that include level of service (LOS) standards. If levels of service fall below those described in the transportation chapter of the local comprehensive plan, then corrective action is needed. Concurrency is managed at the local level through ordinances consistent with the standards and policies in the locally adopted comprehensive plans. Sprawl happens in several areas for various reasons. Counties fully planning under the GMA have concurrency requirements as well the cities and their LOS standards are often lower in urban areas.

To reduce inconsistency between neighboring jurisdictions and to consider regional implications of comprehensive plans, local plans are reviewed and certified by metropolitan planning organizations and regional transportation planning organizations. Because state highways serve as primary arterials for many local governments, establishing and maintaining a comprehensive level of service for local governments and the state continues to be an ongoing challenge.

In 1998, the Washington State Legislature passed HB 1487, relating to transportation and growth management planning. House Bill 1487, known as the Level of Service (LOS) Bill, was passed to enhance the identification and coordinated planning for major transportation facilities identified as "transportation facilities and services of statewide significance." LOS for Highways of Statewide Significance (HSS) is set by WSDOT, however, these facilities are not subject to local concurrency requirements under the GMA. Non-HSS facilities have LOS set by WSDOT in consultation with the RTPOs. The GMA does not address whether or not these facilities are subject to local concurrency requirements. Applicability of concurrency to state highways and ferry routes continues to surface as a policy discussion. Two legislative studies underway in 2006 address concurrency. These studies include an examination of whether the concurrency goal should apply to state-owned transportation facilities and how multimodal systems such as transit contribute to concurrency goals. These studies present a timely opportunity to discuss the Growth Management Act's concurrency requirement as it relates to statewide transportation needs. Both projects are in development and will be submitted to the Legislature by December, 2006.

Multimodal Concurrency Study

The multimodal transportation concurrency study requires WSDOT and the Puget Sound Regional Council (PSRC) to coordinate efforts to deliver a study that examines multimodal transportation improvements and strategies to comply with the concurrency requirements of the Growth Management Act (GMA).

The study request calls for analyzing approaches to concurrency that better integrate roadway and transit planning, maintain the ability to attain development objectives of growth centers, and allow for tailoring of Level of Service standards to different growth centers and travel periods. Technical assistance is provided by the Washington State Transportation Research Center (TRAC). For more information, see www.wsdot.wa.gov/planning/concurrency/MultimodalStudy.htm.

State-Owned Transportation Facilities Analysis

The state-owned transportation facilities study directs WSDOT to conduct an analysis of expanding the statewide transportation concurrency requirements. It includes development impacts on LOS standards applicable to state-owned transportation facilities, including state highways and state ferry routes. The analysis will examine gaps in law and practice that strengthen state and local transportation planning. The Legislative objective of the analysis is to ensure that jurisdictional divisions do not defeat growth management concurrency goals.