# Chapter 3. Transportation Analysis

## What is the purpose of the transportation analysis?

Transportation analysis completed during this phase of the SR 302 Corridor Study focused on the following key objectives:

- Identify existing and future operational issues and congested locations along the SR 302 corridor;
- Understand travel patterns for SR 302 users;
- Identify safety issues and high accident locations on SR 302; and
- Describe existing and future traffic conditions to support public outreach efforts.

The overall goal of the analysis was to gain an understanding of existing and future traffic conditions and the travel behavior of users along the SR 302 corridor. This information will be used in subsequent phases of the Study to evaluate how various alignment alternatives may affect travel patterns in the study area.

## How was the transportation analysis conducted?

To understand existing and expected future transportation conditions for the SR 302 corridor, analysis included the following elements:

- Evaluation of existing traffic circulation patterns for travelers on SR 302; and
- Review of historical accident records to identify safety issues and high accident locations.
- Review of existing traffic volume data and prepared forecasts of future traffic volumes in the year 2030;
- Analysis of key intersections on SR 302 and the SR 302/SR 16 interchange;

The Synchro software program was used to conduct operational analysis of key intersections on SR 302. Level of service (LOS) describes how well these intersections operate as compared to existing standards.

The VISSIM microsimulation model was also used to simulate operational conditions along the east end of the SR 302 corridor and its connection to SR 16. In addition to showing where traffic congestion occurs, the traffic

### Level of Service (LOS)

Level of service (LOS) is a measurement of the quality of traffic operations on a given transportation facility. LOS grading ranges from A through F, similar to grading scales used in the education system. LOS A represents a condition in which drivers would experience minimal delays. LOS F indicates stop-and-go conditions with frequent and lengthy delays for drivers. At LOS C or D, traffic typically flows reasonably well with some delays.

simulations also served as a valuable communication tool for public outreach activities. The visual simulations help describe operational issues to the traveling public and provide a means for the WSDOT team to obtain meaningful input from members of the community. The traffic simulation model will be useful in subsequent Study phases to visually show the traffic flow and congestion reduction benefits of corridor improvement alternatives.

Existing travel patterns were evaluated to identify trip origins and destinations for travelers on SR 302 by reviewing daily traffic volumes and existing AM and PM peak hour turning movement count data at multiple locations along SR 302 and other connecting roadways.

Finally, collision data for the SR 302 corridor for the five year period from 2002 to 2006 was reviewed and summarized.

The findings of the traffic analysis are described in further detail in the Transportation Technical Report that was prepared for this initial phase of the Study.

# What are the traffic conditions in the SR 302 corridor today?

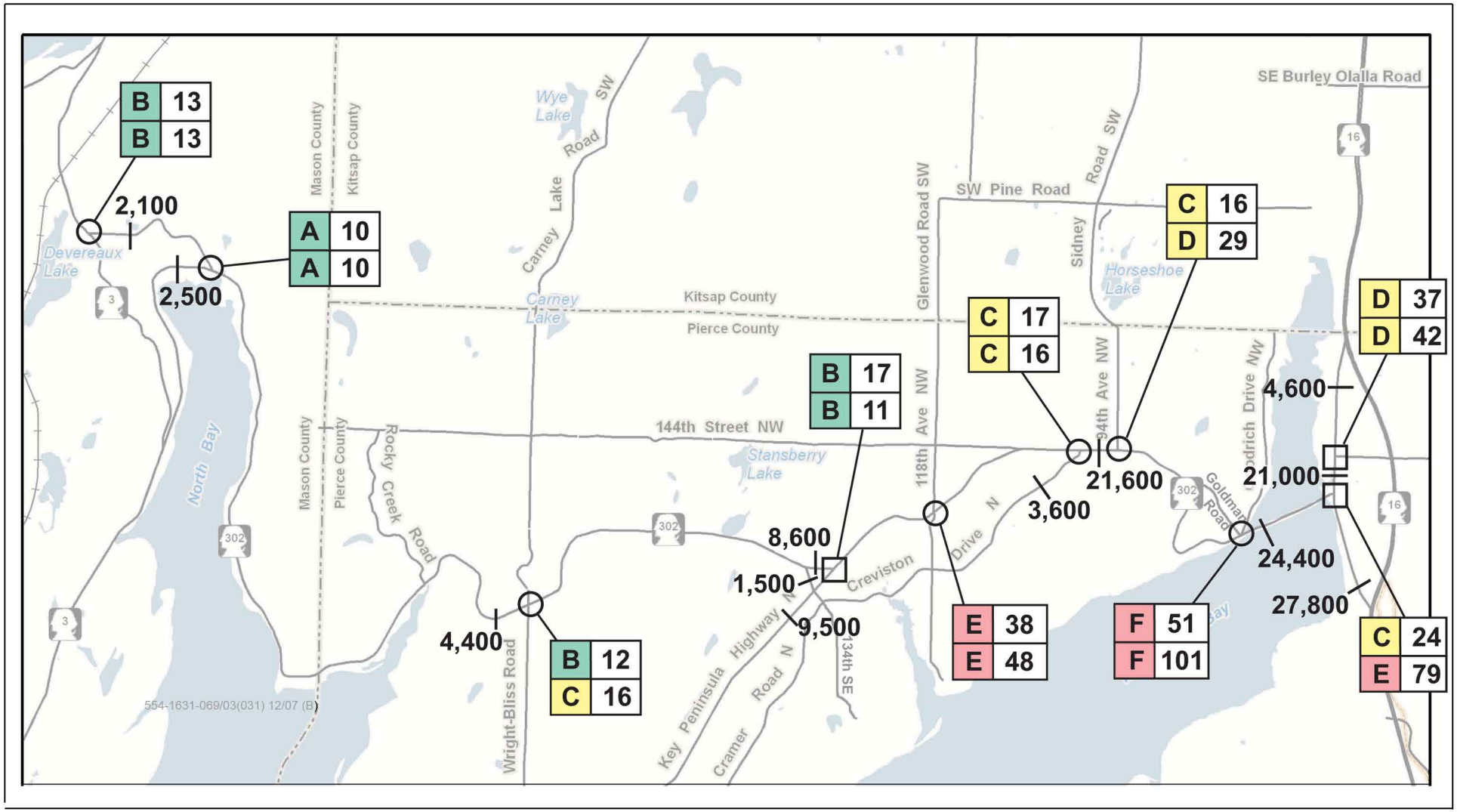
## Traffic Volumes and LOS

Traffic volumes vary considerably along SR 302, with volumes ranging from 2,100 vehicles per day (vpd) just east of SR 3 to 24,400 vpd at the Purdy Bridge. Average weekday daily traffic volumes for locations along the SR 302 corridor are shown in Figure 3-1.

For the SR 302 corridor, WSDOT and the Puget Sound Regional Council (PSRC), the regional planning authority, have identified an LOS standard of C as the peak hour threshold for acceptable operations (PSRC 2003). Analysis of existing operating conditions, indicates several locations that are operating poorly at LOS E or F during the AM and/or PM peak commute periods, including the intersections of SR 302 / SR 302 Spur, SR 302 / Goldman Drive, and SR 302 / 118th Avenue NW. In addition, intersections including SR 302 Spur / 144th Street NW and SR 302 / 94th Avenue NW are operating at LOS D. All locations evaluated west of the SR 302 / Key Peninsula Highway intersection currently operate at LOS C or better during the AM and PM peak commute periods. LOS conditions for locations along the SR 302 corridor are also shown in Figure 3-1.

### LOS Standard

LOS standards are used to evaluate the transportation impacts of long-term growth and concurrency. In order to monitor concurrency, local jurisdictions adopt standards by which the minimum acceptable roadway operating conditions are determined and deficiencies may be identified.

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N

0 0.5 1

Miles

Weekday Daily Traffic Volume X,XXX

Signalized Intersection

Unsignalized Intersection

LOS Delay (Sec)

AM

PM

*The LOS for unsignalized intersections is defined by worst movement.

**Figure 3-1**
**Preliminary Traffic Analysis**
***Existing Traffic Volumes and Levels of Service***
SR 302 Corridor Study

## Traffic Queues

The WSDOT team conducted field studies and developed traffic models to simulate conditions similar to the actual conditions described above. These simulations showed that during the AM peak commute period, eastbound traffic queues at the SR 302 / SR 302 Spur intersection typically extend back past the Purdy Bridge and the Purdy Lagoon. These long queues often correspond with peak traffic flows from communities along SR 302 to Peninsula High School. During the PM peak commute, long queues also occur in the eastbound direction at the SR 302 / SR 302 Spur intersection, in addition to southbound queues and northbound queues extending past the SR 302 northbound on-ramp back to SR 16.

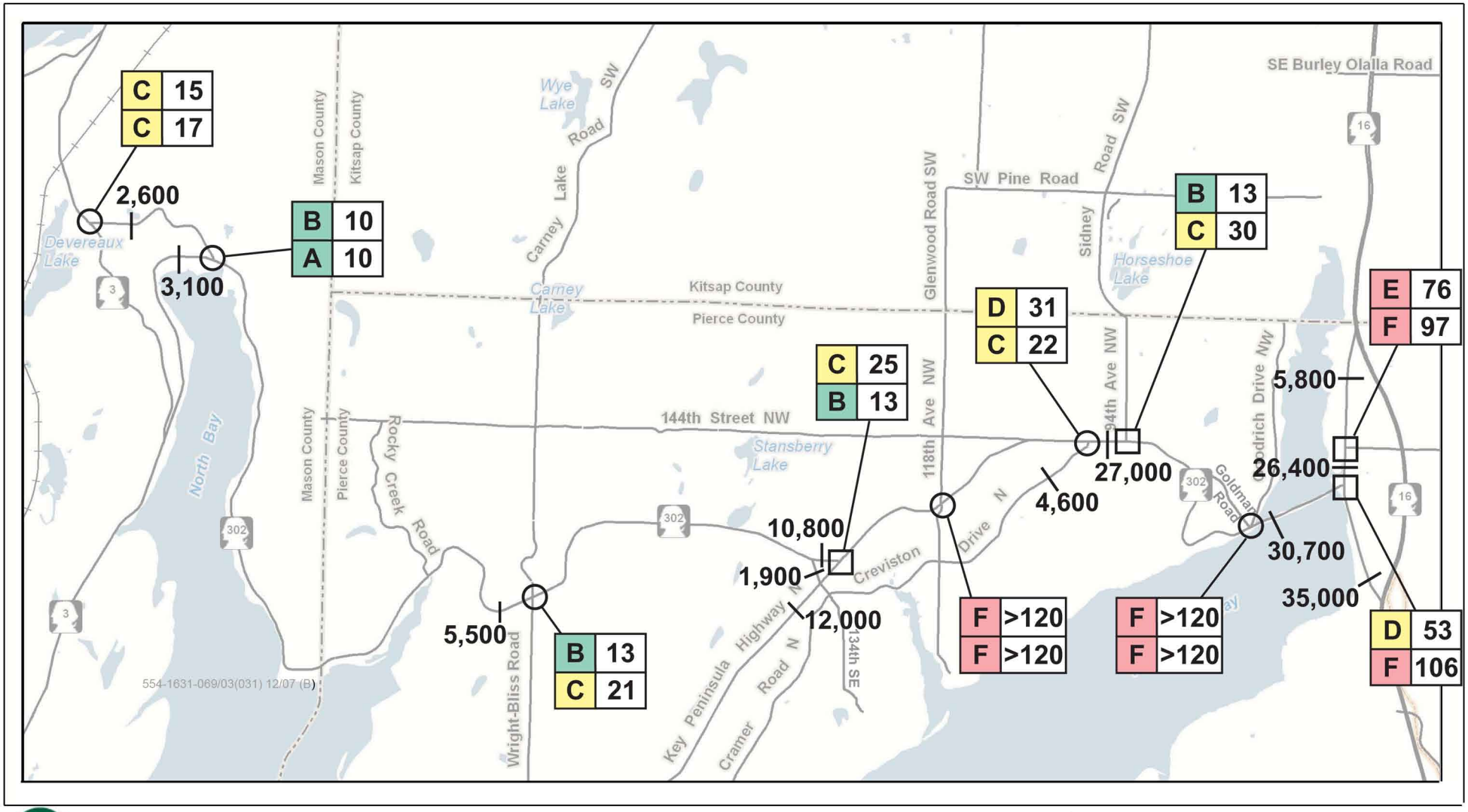
# What traffic conditions are expected by the year 2030?

## Traffic Volumes and LOS

Based upon historical traffic volume trends on SR 302, traffic volumes along SR 302 and in surrounding areas are expected to increase by approximately 1% annually over the next 20 years. This translates to an estimated overall increase of approximately 26% between 2007 and the future planning year 2030. These projections indicate that travelers will experience increasingly longer delays due to traffic congestion, especially during peak commute hours.

Year 2030 average weekday traffic volumes and projected LOS conditions for the AM and PM peak commute hours are shown in Figure 3-2. The results of the traffic analysis indicate that the current highway capacity is inadequate to accommodate existing and projected future traffic volumes at key locations along the highway.

Figure 3-2 shows that in 2030 the SR 302 / SR 302 Spur, SR 302 Spur / 144th Street NW, SR 302 / Goldman Drive, and SR 302 / 118th Avenue NW intersections would all operate poorly during AM and PM peak commute periods. The SR 302 / Creviston Drive N intersection would also operate at LOS D during the AM peak hour, which is slightly worse than acceptable. All locations evaluated west of the SR 302 / Key Peninsula Highway intersection would continue to operate at LOS C or better. The intersection at SR 302 and 94th Avenue NW is expected to be signal-controlled in the future; thus, even with projected traffic growth, it could operate better in the year 2030 than it does today unless eastbound vehicle queues from the SR 302 / SR 302 Spur intersection extend back to this location.




Washington State Department of Transportation

Date: December 17, 2007

Note: Traffic Volumes projected based on 1% annual growth.

N

0 0.5 1

Miles

Weekday Daily Traffic Volume X,XXX

Signalized Intersection

Unsignalized Intersection

LOS Delay (Sec)

AM

PM

*The LOS for unsignalized intersections is defined by worst movement.

**Figure 3-2**
**Preliminary Traffic Analysis**
***2030 Baseline Traffic Volumes and Levels of Service***
SR 302 Corridor Study

## Traffic Queues

Year 2030 traffic simulations showed that during the AM peak commute period, eastbound traffic queues at the SR 302 / SR 302 Spur intersection could extend as far back as Danforth Drive on a typical weekday. During the PM peak commute, even longer queues would be experienced in the eastbound direction at the SR 302 / SR 302 Spur intersection. In addition, southbound and northbound queues could extend past the SR 302 northbound on-ramp, back to SR 16 and the Burnham Drive interchange. The northbound queues extending from SR 302 during the PM peak hour could result in breakdowns in SR 16 mainline traffic operations on a typical weekday. During both the AM and PM commute periods, vehicles stopped on driveways and side streets along SR 302 are often unable to make turns onto SR 302 in either direction.

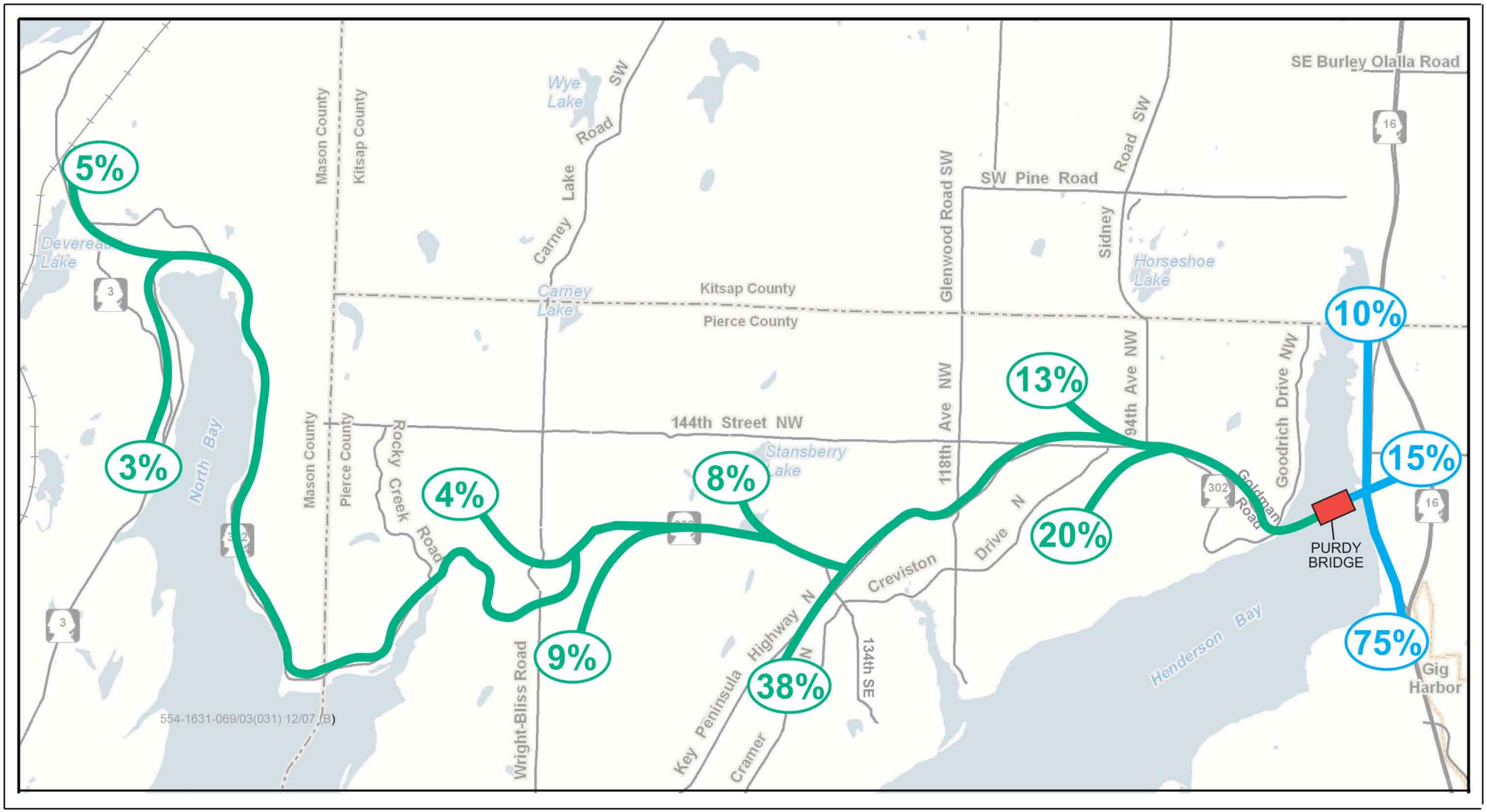
# Where are drivers on eastern SR 302 coming from and going to?

## Origins and Destinations

Traffic volumes are highest between Key Peninsula and Purdy. The peak traffic period occurs during the evening commute. Westbound traffic volumes are higher than eastbound volumes during the evening peak period as commuters return home from jobs in Pierce and Kitsap counties. During the morning commute period, traffic flows are higher in the eastbound direction, with the majority of eastbound SR 302 travelers heading south on SR 16.

The project team further evaluated travel patterns along the SR 302 corridor to determine the origins and destinations of travelers crossing the Purdy Bridge. The results of the evaluation are displayed in Figure 3-3. The majority of travelers heading eastbound on the Purdy Bridge have trips originating from areas south of the SR 302 corridor (67%) such as Key Peninsula and have destinations along SR 16 south of the corridor (75%) in areas such as Gig Harbor and Tacoma. In the westbound direction, the trip origins and destinations are reversed, with the majority of trips originating from areas along SR 16 south of SR 302 (75%) and destined to areas such as Key Peninsula (67%).

Approximately 25% of the traffic to and from the west using the Purdy Bridge have origins or destinations in areas just north of SR 302, and approximately 8% have origins or destinations along SR 3 in Mason County. East of the Purdy Bridge, approximately 15% of the trips have origins or destinations in or around Purdy, including the High School and Park and Ride lot, while approximately 10% of the trips have origins or destinations to the north on SR 16.

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Miles

Purdy Bridge

Origins and Destinations West of Purdy Bridge

Origins and Destinations East of Purdy Bridge

**Figure 3-3**
**Preliminary Traffic Analysis**
***Traffic Distribution of Purdy Bridge Users***
SR 302 Corridor Study

## Traffic Diversions

Some traffic that would typically use the Purdy Bridge during uncongested periods diverts to other routes north of the Burley Lagoon, such as Bethel-Burley Road, and east of the SR 302 Spur via roads such as 144th Street NW and Peacock Hill Road, to travel between areas such as Burley and Gig Harbor. These alternate routes are used to avoid the highly congested SR 302 northbound off-ramp from SR-16 and SR-302/SR 302 Spur intersection in Purdy.

As traffic congestion continues to increase along the Purdy Bridge and the rest of the SR 302 corridor, more trips from areas such as Burley are expected to divert to other routes north of SR 302 to access SR 16.

# What safety issues have been identified?

The WSDOT team obtained and reviewed collision data for the SR 302 corridor for the five-year period between 2002 and 2006. During this period, a total of 762 collisions were reported along the SR 302 corridor from milepost (MP) 0.00 to MP 16.87. Three of these collisions resulted in a fatality, 381 collisions resulted in injury, and the remaining 378 collisions resulted in property damage only.

The project team also reviewed high accident locations (HALs) and high accident corridors (HACs) in the study area. Such locations and corridors are identified based on statistical measurements and calculations performed by WSDOT to help prioritize highway safety issues. Figure 3-4 shows the locations of intersection-related accidents that occurred along SR 302 during the 2002-2006 timeframe, and highlights the areas designated as HALs and HACs.

As shown in Figure 3-4, several areas of SR 302 have been given HAL and HAC designations for the 2007-2009 biennium. Specifically, the following two locations along SR 302 between SR 3 and SR 16 have been identified as HALs:

- SR 302 / Wright-Bliss Road (milepost [MP] 7.65).
- SR 302 / Key Peninsula Highway (MP 10.57).

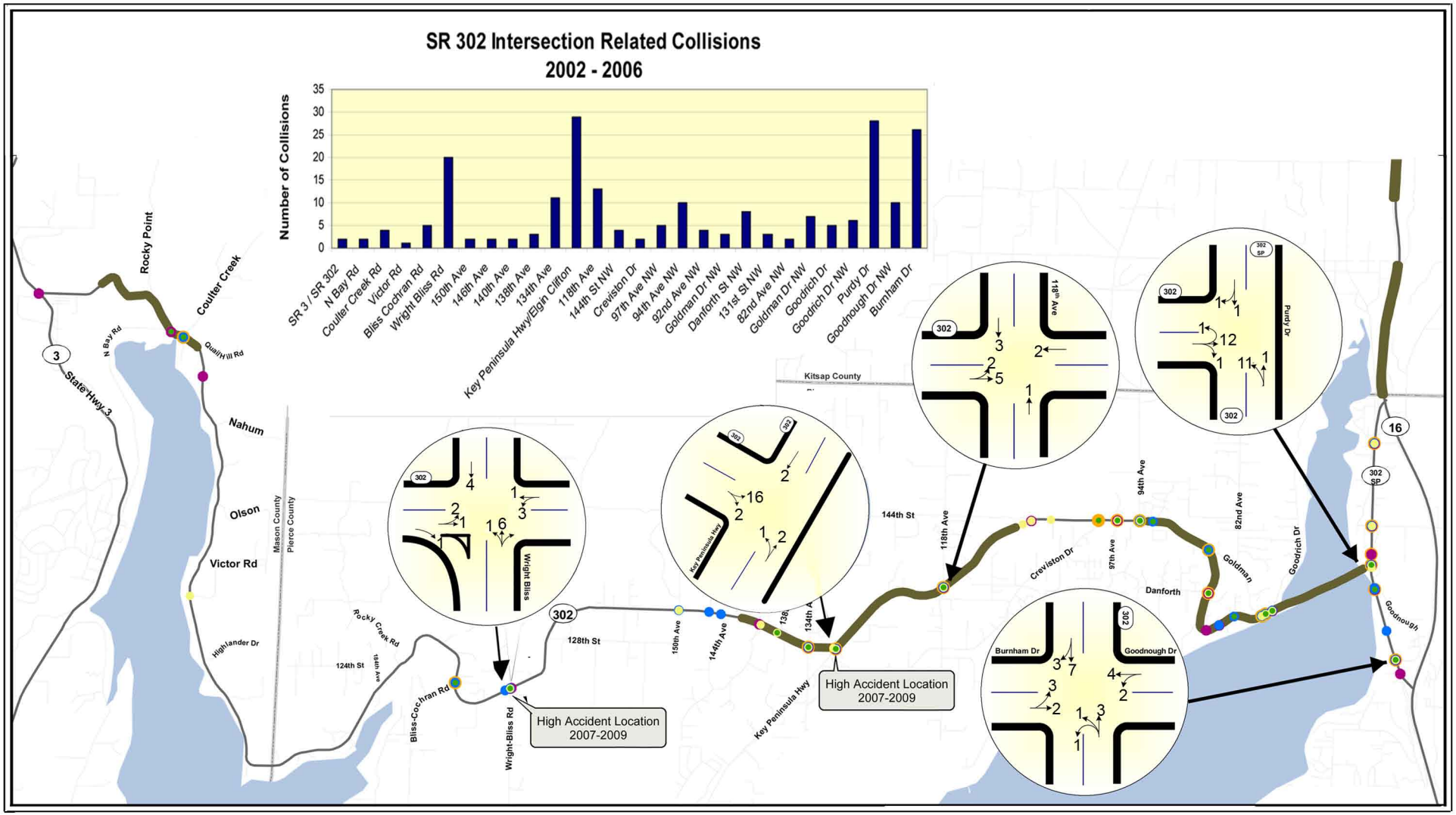
Between 2002 and 2006, nearly 30 collisions were recorded at the SR 302 / Key Peninsula Highway intersection. Nearly all of these collisions occurred before a traffic signal was installed at this intersection. Only one collision was recorded in 2006 after the signal was installed.

### Highway Accident Corridor (HAC)

A highway corridor 1 mile or greater in length where a 5-year analysis of collision history indicates that the section has higher than average collision and severity factors.

### Highway Accident Location (HAL)

A highway section typically less than 0.25 mile in length where a 2-year analysis of collision history indicates that the section has a significantly higher than average collision and severity rate.

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Miles

- 2006 Highway Collisions
- 2005 Highway Collisions
- 2004 Highway Collisions
- 2003 Highway Collisions
- 2002 Highway Collisions
- 2007-09 High Accident Corridors
- Collisions that occurred during turning movements

High Accident Location - A highway section typically less than 0.25 mile in length where a 2-year analysis of collision history indicates that the sectionhas a significantly higher than average collision and severity rate.

High Accident Corridor - A highway corridor 1 mile or greater in length where a 5-year analysis of collision history indicates that the section has higher than average collision and severity factors.

Date: April 2006 Data Source: WSDOT GeoDatabase Geographic Data Technology 2005 TANA, Inc/GDT Inc.



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**Figure 3-4**
**Preliminary Traffic Analysis**
***SR 302 Intersection Related Collisions and High Accident Corridors / Locations***
SR 302 Corridor Study

WSDOT has also identified the following four locations along SR 302 as HACs for the 2007-2009 biennium:

- Kelly Lane (MP 0.5) to Quail Hill Road (MP 1.5).
- East of Doyle Pond (MP 9.7) to Key Peninsula Highway (MP 10.6).
- Key Peninsula Highway (MP 10.6) to 144th Street NW (MP 12.4).
- 94th Avenue NW (MP 13.3) to the SR 302 spur (MP 15.8).

WSDOT also identified an HAC on SR 16 that includes the interchange with SR 302.

The project team has identified several additional locations as having safety concerns:

- SR 16/SR 302 northbound off-ramp: Vehicle queues often extend onto the freeway shoulder adjacent to high speed travel lanes on SR 16.
- Purdy Bridge: The narrow lanes and lack of shoulders present a considerable challenge to many vehicles and pedestrians. Large trucks and buses do not have sufficient width to safely pass without clipping outside rear view mirrors or other parts of the vehicles. The bridge is approaching the end of its design life, is currently load restricted, and will soon need to be reinforced or replaced as the link between the Key Peninsula and SR 16.

Other general safety concerns include the need for improved intersection and freeway ramp operations, better sight distance, and adequate shoulders and clear zones.

As traffic volumes increase and congestion worsens between now and the year 2030, the risk for collisions will likely increase if safety issues are not addressed.

## What have we learned from the transportation analysis?

Following are the key conclusions from the transportation analysis:

- Traffic Volumes: Traffic volumes along SR 302 vary considerably along its length, increasing as one moves east along the highway.
- Intersection LOS: Many intersections located east of the SR 302 / Key Peninsula Highway intersection currently operate at LOS D, E, or F during peak commute periods. West of this location, all intersections currently operate at LOS C or better. In the future, congestion levels are expected to increase on the east end of the corridor.
- Traffic Queues: During the AM peak commute period, long eastbound queues often correspond with peak traffic flows from communities along SR 302 to Peninsula High School. During the PM peak commute, long queues occur in the eastbound

direction at the SR 302 / SR 302 Spur intersection, in addition to southbound queues and northbound queues extending past the SR 302 northbound on-ramp back to SR 16. These queues will continue to worsen in the future.

- Travel Patterns: The majority of travelers on the Purdy Bridge are making trips between areas south of the SR 302 corridor (67%) such as Key Peninsula and areas along SR 16 south of the corridor in areas such as Gig Harbor and Tacoma (75%). As traffic congestion on SR 302 increases, more and more trips from areas such as Burley are expected to divert to other routes north of SR 302 to access SR 16.
- Safety: For the 2007-2009 biennium, WSDOT has identified two locations along SR 302 between SR 3 and SR 16 as HALs. WSDOT has also identified four locations along SR 302 as HACs. WSDOT also identified an HAC on SR 16 that includes the interchange with SR 302.

## How will this information be used in the next steps of the SR 302 Corridor Study?

The traffic analysis conducted during this initial phase of the Study establishes the context and foundation for all subsequent traffic analysis that will be completed for the SR 302 Corridor Study.

Similar traffic analysis methods will be used in future phases of the Study. However, the scope of the analysis will become increasingly detailed as the corridor alternatives are narrowed and the alignment alternatives are defined for the environmental analysis. The Synchro software program will continue to be used to evaluate intersection LOS along the SR 302 corridor and surrounding areas, and the VISSIM microsimulation model will continue to be used to assess the effect of various interchange configurations on SR 302 and SR 16.

In addition to conducting intersection LOS analysis and refining the traffic simulation models, a travel demand modeling effort will be developed to evaluate future traffic growth based on future land use patterns. In combination with the data gathered and traffic analysis conducted to date, this model will be useful in testing the effectiveness of various alignment alternatives in accommodating future travel demand, reducing congestion, and improving safety along SR 302.