

SECTION 4 BASELINE CONDITIONS

This section is comprised of two different sets of conditions—baseline conditions and existing conditions. The primary conditions, or baseline conditions, represent how the project area will look in 2014 after the Renton Nickel Improvement Project I-5 to SR 169 (Renton Nickel Improvement Project) is constructed. The Renton Nickel Improvement Project has already been environmentally cleared. Existing conditions consist of the current freeway system in 2005 as described below.

EXISTING CONDITIONS

How do existing conditions help us understand baseline conditions?

The existing conditions represent the current 2005 conditions in the study area. By including information about existing conditions, readers can compare current conditions to future conditions and better understand what traffic will be like at the starting point of this project.

What information did we use for existing conditions?

The I-405 Team used the year 2005 to represent existing conditions in the corridor. We assembled freeway and ramp traffic volumes from available WSDOT data. We collected local street traffic volumes from traffic impact studies, the cities of Tukwila and Renton, and we conducted traffic counts for the remaining locations.

How many vehicles use I-405 and SR 167 today?

Daily Traffic

The I-405 Team compiled the existing 2005 average weekday traffic volumes from available WSDOT information. The following volumes represent two-directional totals with northbound and southbound traffic added together. Between I-5 and SR 167, I-405 carries 148,000 vehicles per day. Between SR 167 and SR 169, I-405 carries 144,000 vehicles per day. The section of SR 167 between the SW 43rd Street interchange and



Peak hours represent the most congested conditions.

I-405 carries 127,000 vehicles per day. Truck traffic makes up approximately nine percent of the average weekday traffic volumes in the study area.

Peak-Hour Traffic

The peak period is the time of day when the maximum amount of travel occurs. It may be specified as the morning (a.m.) or afternoon (p.m.) peak. The peak hour within the peak period is the hour when the maximum demand occurs.

Freeway bottlenecks constrain peak-period freeway volumes in the study area. The I-405/SR 167 interchange acts as a bottleneck limiting the number of vehicles passing through the center of the study area. Bottlenecks outside the study area also restrict the freeway volumes. These bottlenecks include: I-5 to the west, I-405 to the north, and in the afternoon peak period, southbound SR 167 south of SW 41st Street.

Both northbound and southbound I-405 in the study area are considered peak travel directions because both directions carry high volumes during the morning and afternoon peak travel periods. The highest traffic volumes in the study are on the section of I-405 between SR 167 and SR 169. In the morning peak hour, southbound I-405 from SR 169 to SR 167 carries the highest volumes—some 4,020 vehicles and 4,400 persons in the general-purpose lanes, and 700 vehicles and 1,600 persons in the HOV lanes. In the afternoon peak hour, northbound I-405 from SR 167 to SR 169 carries the highest volumes—some 3,910 vehicles and 4,150 persons in the general-purpose lanes, and 910 vehicles and 2,000 persons in the HOV lanes.

In the study area, only SR 167 has an off-peak travel direction. Southbound SR 167 is the off-peak travel direction in the morning peak period, and northbound SR 167 is the off-peak travel direction in the afternoon peak period.

Exhibits 4-1 and 4-2 show the existing 2005 morning and afternoon peak-hour vehicles trips, person trips, and average travel speeds. Truck traffic makes up a smaller percentage of the total traffic volumes during the peak hours compared to the daily volumes. Truck traffic comprises approximately 8 percent of the morning peak-hour volumes and 5 percent of the afternoon peak-hour volumes.

Exhibit 4-1: 2005 Existing Conditions Morning Peak-Hour Vehicle and Person Trips, and Average Travel Speed

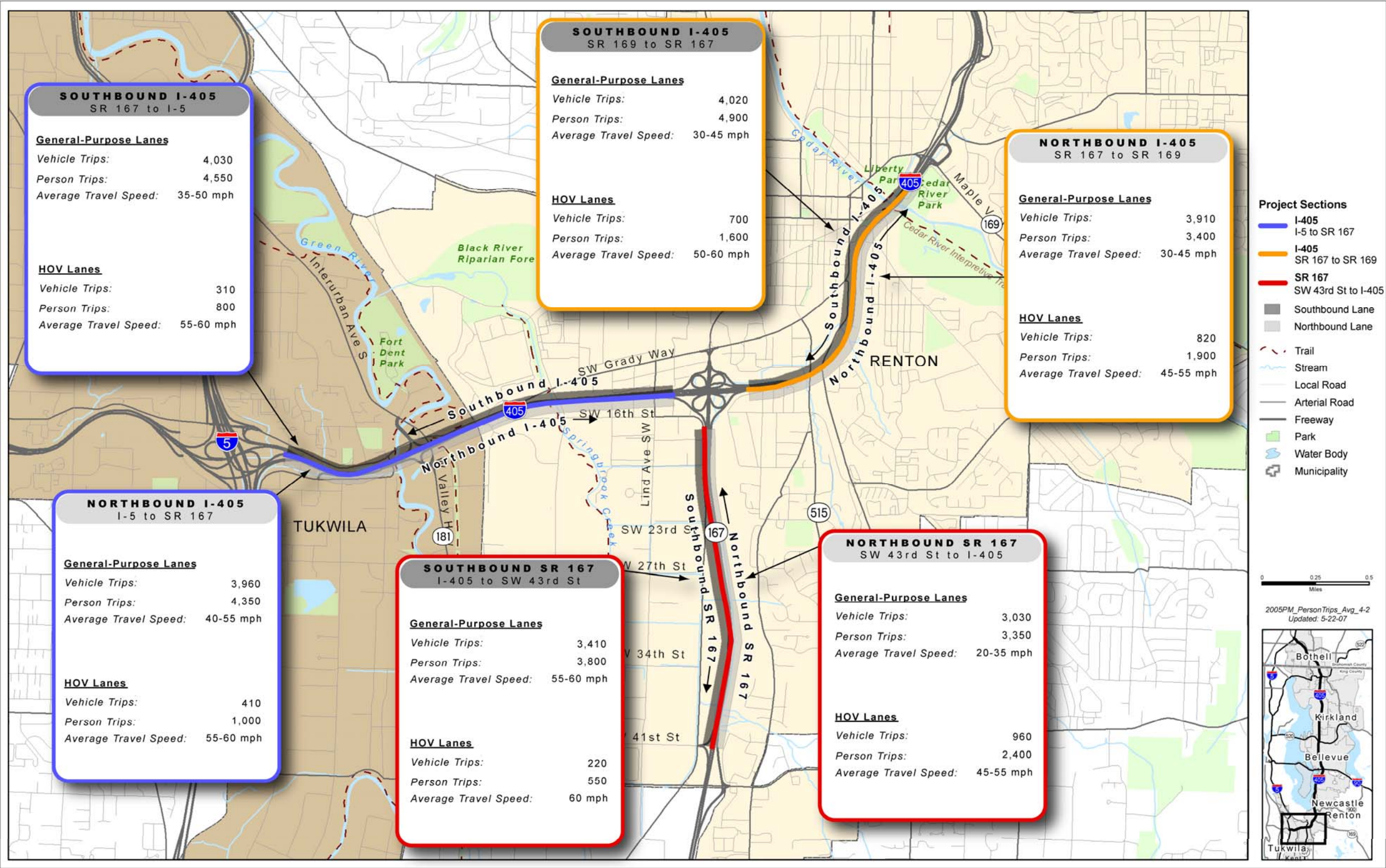
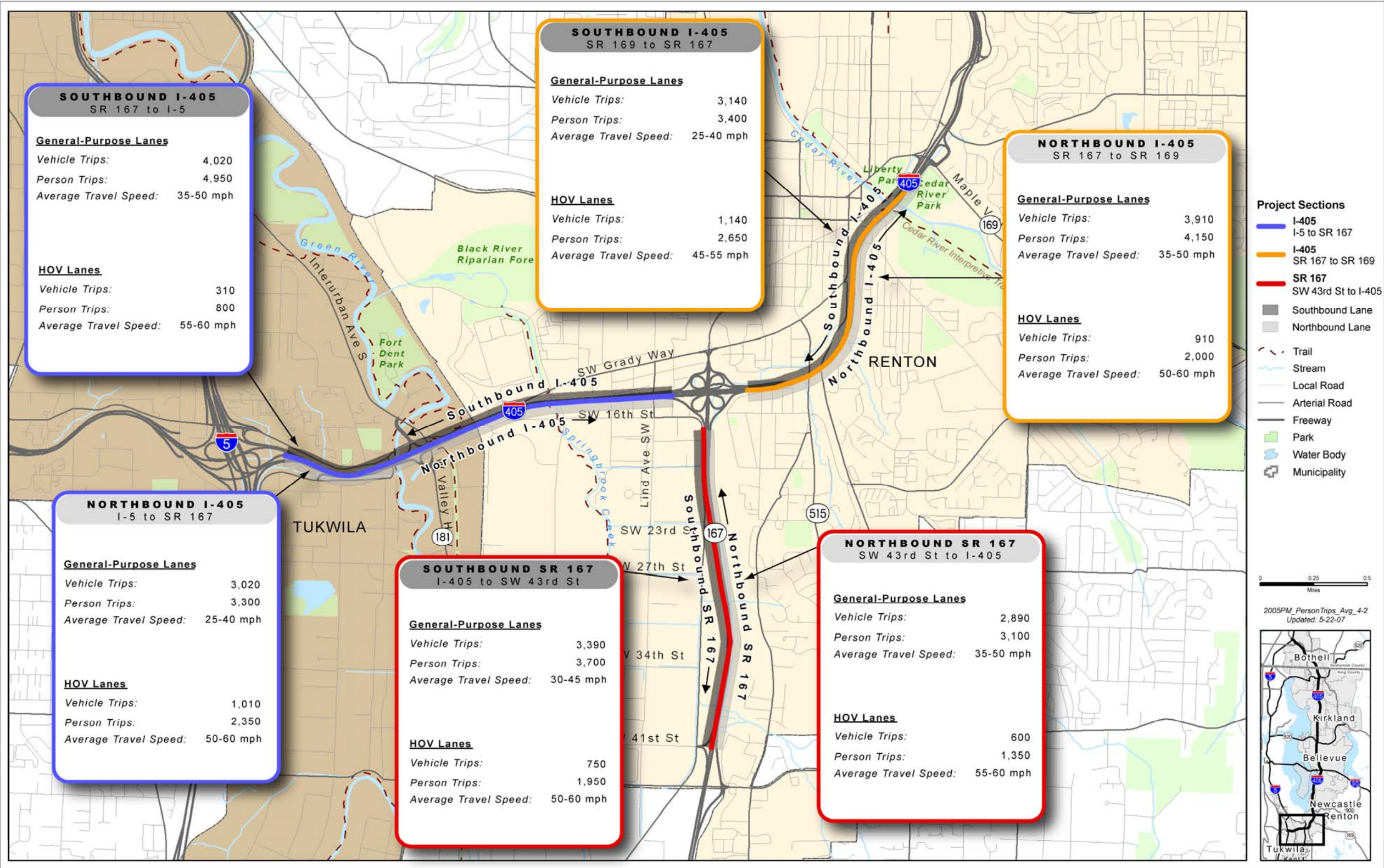


Exhibit 4-2: 2005 Existing Conditions Afternoon Peak-Hour Vehicle and Person Trips, and Average Travel Speed



How well does I-405 and SR 167 operate under existing conditions?

The I-405 Team calculated average 2005 travel speeds on I-405 and SR 167 with WSDOT speed detector loops, WSDOT Traffic Congestion Maps and field observations.

I-405 and SR 167 general-purpose lanes currently experience congestion and reduced speeds in the peak travel direction during the morning and afternoon peak periods. The I-405/SR 167 interchange acts as bottleneck, limiting the flow of traffic between I-405 and SR 167. The WSDOT Gray Notebook¹ describes the I-405/SR 167 interchange as one of the most congested and inefficient sections of roadway in the region.

The slowest average travel speeds in the general-purpose lanes are 20 to 35 miles per hour on northbound SR 167 during the morning peak hour. The high volume of northbound SR 167 vehicles trying to merge onto northbound I-405 in the morning causes the slow travel speeds.

The off-peak travel direction of southbound SR 167 in the morning has free-flow conditions. In the afternoon peak hour, northbound SR 167 experiences some congestion near the I-405 interchange, and average travel speeds range from 35 to 50 miles per hour.

The HOV lanes generally operate well during the morning and afternoon peak hours. Speed is reduced in the HOV lanes only when the adjacent general-purpose lanes are heavily congested. HOV drivers tend to slow down as a precaution in case a driver from the adjacent slower lane decides to enter the HOV lane. The slowest HOV lane average speeds are 45 to 55 miles per hour for northbound SR 167 from SW 43rd Street to I-405 in the morning peak hour and southbound I-405 from SR 169 to SR 167 in the afternoon peak hour. The 2005 morning and afternoon peak-hour average travel speeds are shown in Exhibits 4-1 and 4-2, respectively.



I-405 HOV lanes are not typically congested in the study area.

¹ WSDOT, 2006

Are there safety concerns in the study area?

What is a crash rate?

The number of reported crashes for a specified segment of roadway per one million vehicle miles of travel.

What is a non-fatal injury crash rate?

The number of non-fatal injury crashes for a specified segment of roadway per one million vehicle miles of travel.

What is a fatal crash rate?

The number of fatal crashes for a specified segment of roadway per 100 million vehicle miles of travel.

The I-405 Team collected historical crash information for 2003, 2004, and 2005, which were the most recent data available at the time of the analysis. The overall crash rate for the entire length of I-405 is 1.48 crashes per million vehicle miles of travel (MVMT). This is similar to other freeways in King County.

In the study area, however, the crash rate on I-405 between I-5 and SR 169 is 1.98 crashes per MVMT, which is higher than the average for the whole corridor and the northwest region of Washington State. During the three-year reporting period, a total of 1,466 crashes were reported along this section of I-405, including two fatal crashes. Rear-end collisions make up 68 percent of these collisions because of the high traffic volumes, traffic congestion, and variable speeds occurring in this area. The remaining crash breakdown is crashes with fixed objects (14 percent), sideswipe crashes (13 percent), and other types of crashes (5 percent). SR 167 between the SW 43rd Street interchange and I-405 has a crash rate of 1.84 crashes per million vehicle miles of travel. During the three-year reporting period, a total of 533 crashes were reported on this section of SR 167. Exhibit 4-3 compares crash rates for I-405 and SR 167 in the study area, averages for the whole I-405 corridor, and the northwest region of Washington State.

Exhibit 4-3: Crash Rates for the Three-Year Period of 2003, 2004, and 2005

Crash Rates	I-405, between I-5 & SR 169	SR 167, between SW 43rd St & I-405	I-405 Corridor Average	NW Region (Year 2005 only)
Total Crash Rate (MVMT)	1.98	1.84	1.48	1.50
Non-Fatal Injury Crash Rate (MVMT)	0.80	0.72	0.55	0.55
Fatal Crash Rate (100 MVMT)	0.35	0.00	0.20	0.29

Source: WSDOT Transportation Data Office

The non-fatal injury crash rate for I-405 and SR 167 in the study area is higher than the average for the entire I-405 corridor and the northwest region of Washington State.

In addition to the crash rate analysis, WSDOT conducted a High Accident Location (HAL) review in 2006, which identified nine HAL locations in the study area. Exhibit 4-4 lists the HAL locations and the predominant crash pattern for each location.

Exhibit 4-4: HAL Locations and Crash Patterns in the Study Area

HAL Location	Crash Pattern
I-405 NB on-ramp from Tukwila Parkway	Left-Turn
I-405 NB off-ramp to SR 181	Rear-End
I-405 SB off-ramp to SR 181	Rear-End
I-405 NB collector-distributor lane at SR 167	Fixed Object
I-405 SB off-ramp to SB SR 167	Rear-End
I-405 SB off-ramp to NB SR 167	Rear-End, Fixed Object
I-405 NB on-ramp from NB SR 167	Fixed Object
I-405 NB off-ramp to SB SR 169	Rear-End
SR 181 within the I-405 Interchange	Rear-End

Source: WSDOT Transportation Data Office

Additionally, the section of I-405 between I-5 and SR 167 was identified as a High Accident Corridor (HAC) in 2006 due to a high frequency of rear-end crashes.

What transit service is currently available in the study area?

King County Metro (Metro) and Sound Transit provide service in the study area. Only Sound Transit route 560 travels on I-405 between I-5 and SR 167. Several bus routes serve the Westfield Shoppingtown Mall (Southcenter) in Tukwila.

Only Metro route 952 travels on the section of I-405 between SR 167 and SR 169. Instead of using this section of I-405, the majority of buses use surface streets to serve the South Renton Park-and-Ride, the Renton Transit Center, and the Boeing Renton Park-and-Ride.

Four bus routes travel on SR 167 between I-405 and the SW 43rd Street interchange: Metro routes 167 and 952; and

How is a high accident location (HAL) or a high accident corridor (HAC) determined?

Based on historical accident records, this is an area where an above-average number of accidents occur.

Sound Transit routes 564 and 565. Existing transit service in the study area is further described in Appendix A.

How well do the local streets operate under existing conditions?

The I-405 Team evaluated local street operations using CORSIM microsimulation software. The CORSIM model calculates the average delay experienced by vehicles approaching an intersection. We provide the LOS definition for signalized and unsignalized intersections in Exhibit 3-1 on page 3-4.

We used 2005 peak-hour traffic volumes for the morning and afternoon periods to measure delay and LOS in the study area. We selected 47 intersections in Tukwila and Renton for the analysis of the local street system. In the morning peak hour, five intersections perform at LOS D. The remaining study intersections operate at LOS C or better during the 2005 morning peak hour. In the afternoon peak hour, one intersection performs at LOS E, and the intersection of Rainier Avenue S (SR 167) and S Grady Way performs at LOS F. This intersection operates at LOS F due to high volumes on Rainier Avenue S (SR 167) and S Grady Way competing for limited green time of the traffic signal. The remainder of the study intersections perform at LOS D or better in the afternoon peak hour.

Exhibit 4-5 shows the LOS for the 2005 morning peak hour, and Exhibit 4-6 shows the LOS for the 2005 afternoon peak hour.

Exhibit 4-5: 2005 Morning Peak-Hour Intersection Level of Service

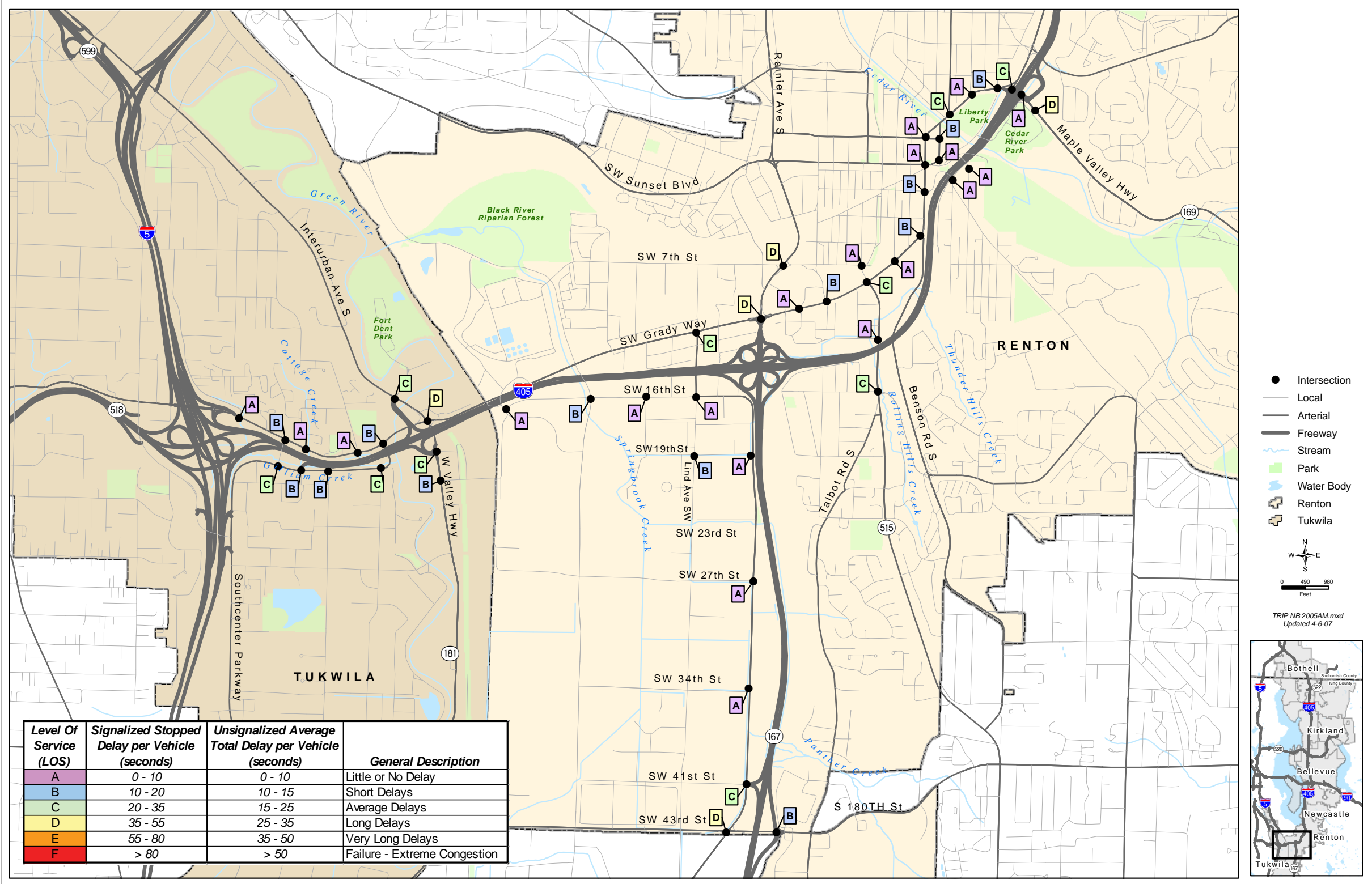
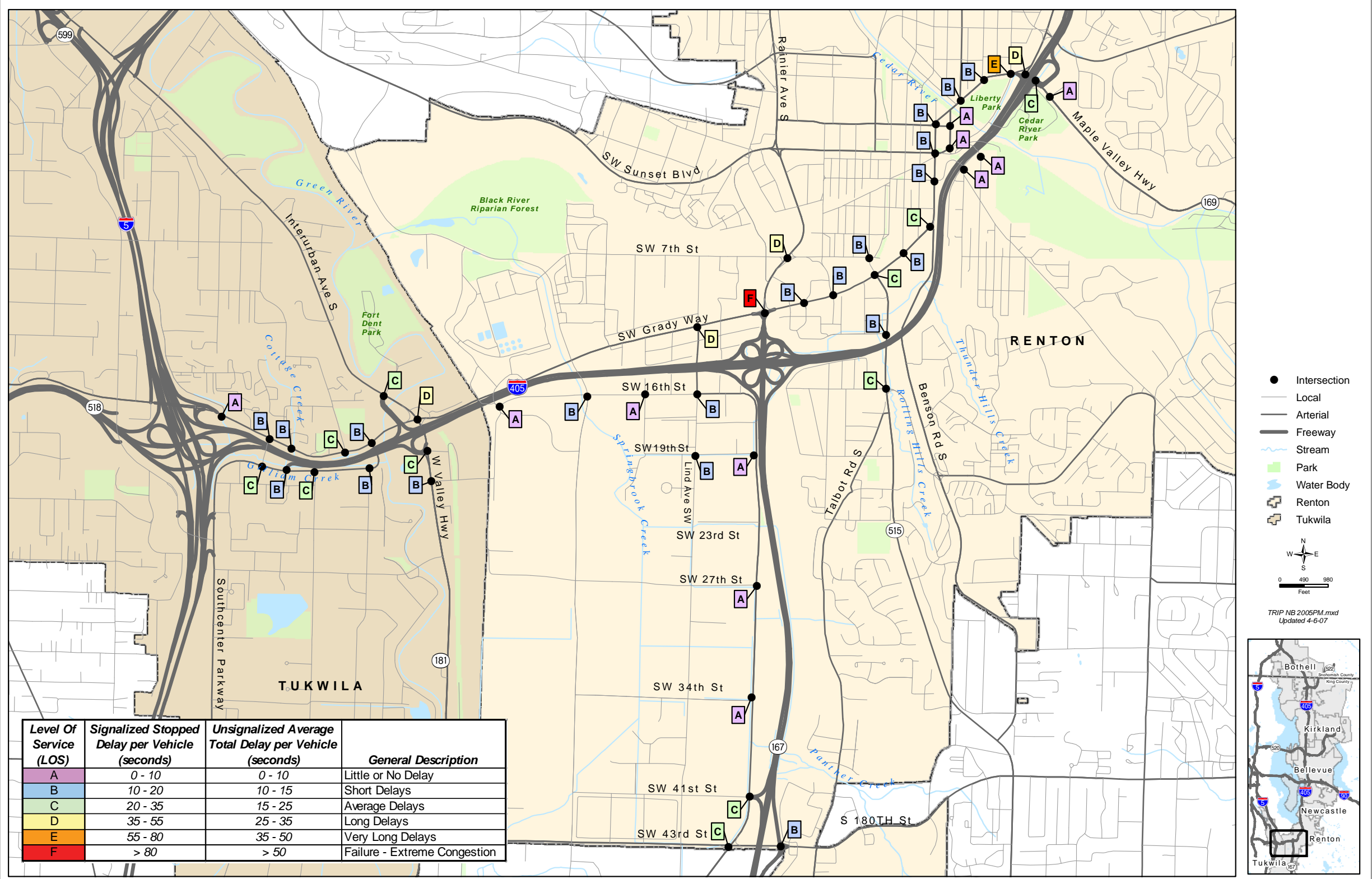


Exhibit 4-6: 2005 Afternoon Peak-Hour Intersection Level of Service



BASELINE CONDITIONS

What are the baseline conditions for the Tukwila to Renton Project?

The baseline conditions represent how the project area will look in 2014 after the previously-cleared and funded I-405 Renton Nickel Improvement Project will be constructed. In the study area, the Renton Nickel Improvement Project will add one lane in each direction of I-405 between I-5 and SR 169, one new lane to southbound SR 167 from I-405 to SW 41st Street, and extend the southbound SR 167 HOV lane north to I-405. For the year 2014, the baseline conditions are the same conditions that would occur if the No Build Alternative was adopted.

How many vehicles will use I-405 and SR 167 with the baseline conditions?

Daily Traffic

Transportation analysts defined weekday traffic volumes as two-directional totals with northbound and southbound traffic added together. We anticipate future population and employment growth in the region will increase freeway travel demand compared to existing conditions. In the year 2014, we expect the daily traffic volumes with the baseline conditions to be 167,000 vehicles for the section of I-405 between I-5 and SR 167, a 22-percent increase over 2005 Existing Conditions. For the section of I-405 between SR 167 and SR 169, we anticipate the 2014 baseline conditions daily traffic will be 166,000 vehicles, a 20 percent increase over existing conditions. For SR 167 between SW 43rd Street and I-405, we estimate the daily traffic will be 143,000 vehicles, a 13 percent increase over existing conditions.

Peak-Hour Traffic

While daily freeway traffic is projected to increase under the baseline conditions, during the morning and afternoon peak-hours, the number of vehicles traveling through the study area will decrease in many places compared to existing conditions. Travel demand on I-405 is higher with the baseline conditions, but the estimated increase in vehicles will create worsening congestion and will limit the number of vehicles traveling

through the study area. The Renton Nickel Improvement Project will increase vehicle capacity in the study area, but it will not improve the I-405/SR 167 interchange or other bottlenecks outside the study area.

Southbound I-405 between SR 169 and SR 167 carries the highest volumes in the study area during the 2014 morning and afternoon peak hours. During the morning peak hour, this section carries 4,510 vehicles and 5,300 persons in the general-purpose lanes, and 230 vehicles and 750 persons in the HOV lanes. In the afternoon peak hour, this section carries 3,990 vehicles and 5,250 persons in the general-purpose lanes, and 330 vehicles and 1,100 persons in the HOV lanes. Exhibits 4-7 and 4-8, show the year 2014 baseline conditions morning and afternoon vehicle and person trips for the general-purpose lanes and the HOV lanes, respectively.

We assume the HOV lanes will operate differently than they do today. We believe future HOV 2+ traffic levels will continue to increase, and the speeds in the HOV lanes will begin to fall below WSDOT's 45 mile-per-hour performance goal for HOV lanes. Consequently, we assume the HOV occupancy requirement will be increased from the current HOV 2+ to HOV 3+ by the year 2014. This will cause traffic volumes in the HOV lanes to decrease compared to existing conditions.

Exhibit 4-7: 2014 Baseline/No Build Morning Peak-Hour Vehicle and Person Trips, and Average Travel Speed

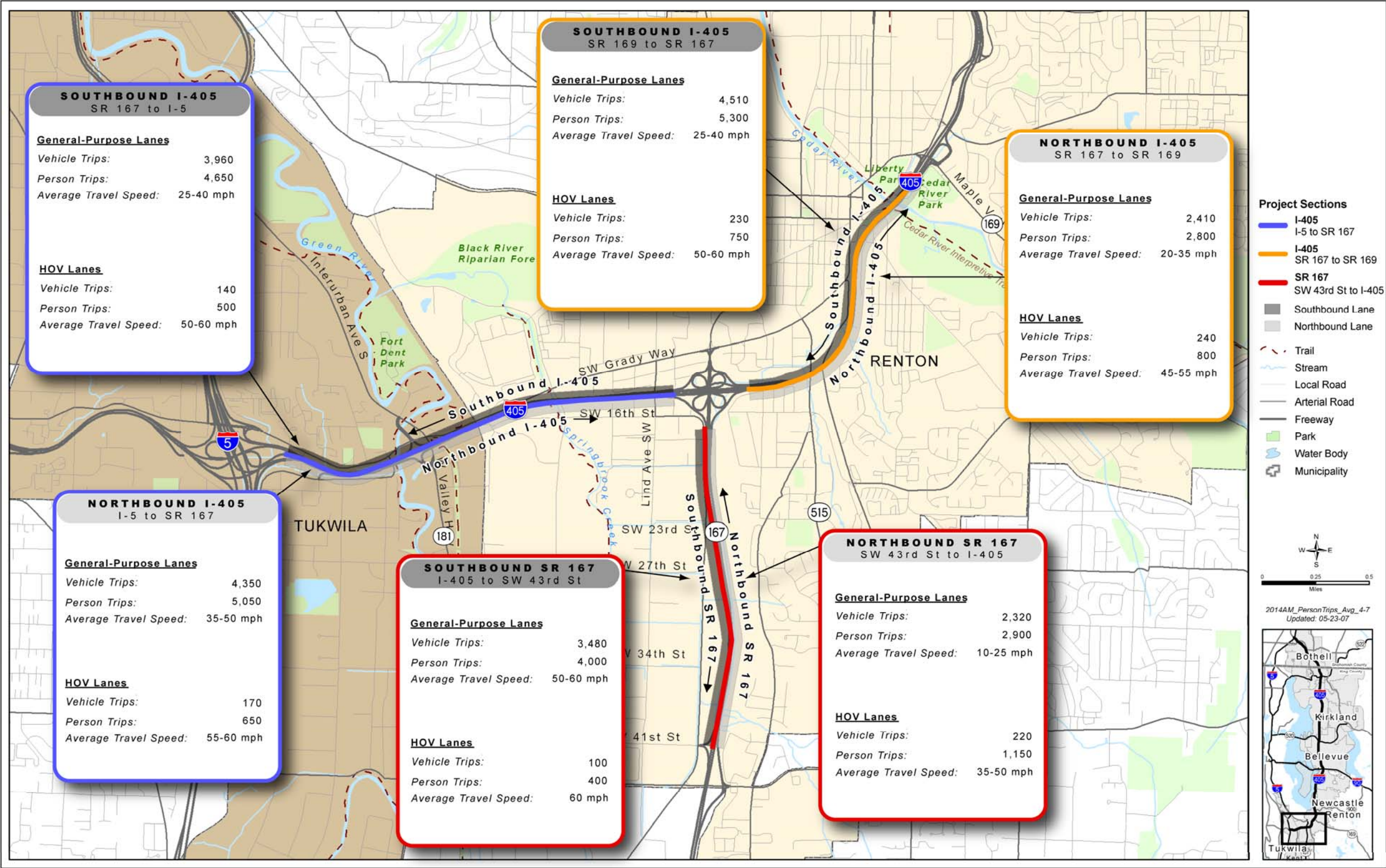
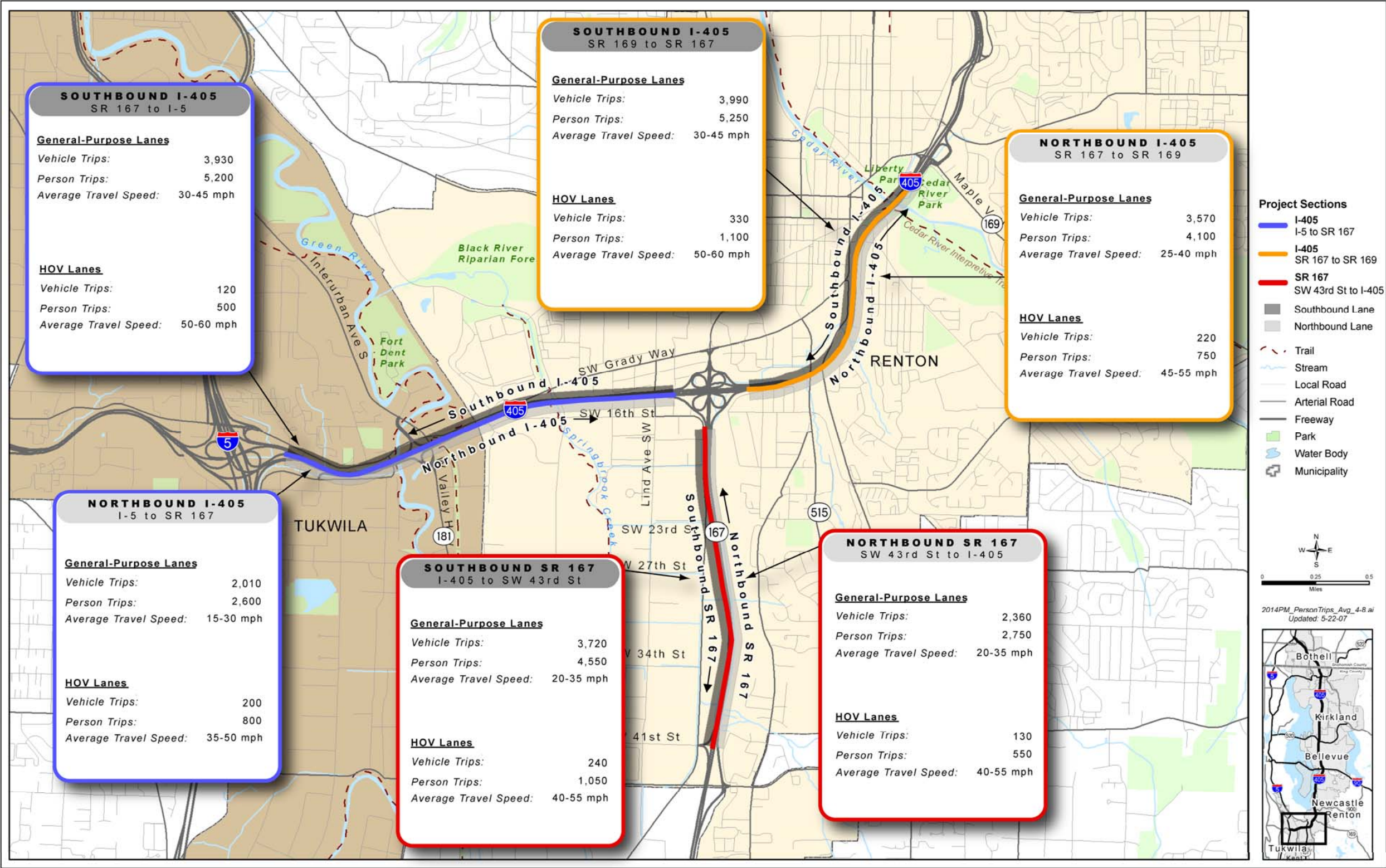


Exhibit 4-8: 2014 Baseline/No Build Afternoon Peak-Hour Vehicle and Person Trips, and Average Travel Speed



How well will I-405 and SR 167 operate under baseline conditions?

The general-purpose lanes will become more congested with the 2014 baseline conditions compared to existing conditions because of increased population and employment growth. General-purpose lane travel speeds will decrease for most locations in the study area, resulting in increased traffic backups at the bottleneck locations. The Renton Nickel Improvement Project will increase vehicle capacity in the study area. However, it will not alleviate the following existing peak-hour bottlenecks:

- SR 167/I-405 interchange
- I-405/I-5 interchange
- I-405 north of the study area
- Southbound SR 167, south of SW 41st Street

The I-405/SR 167 interchange constrains vehicles from traveling through the center of the study area. The other bottlenecks are outside the study area, and limit vehicles traveling to and from the study area.

The slowest average travel speeds in the general-purpose lanes are 10 to 25 miles per hour on northbound SR 167 during the morning peak hour.

The assumed change of the HOV lane occupancy requirement from HOV 2+ to HOV 3+ will decrease the number of vehicles in the HOV lanes, and will improve travel speeds in the HOV lanes. The HOV bypass lanes at the freeway on-ramps will retain the HOV 2+ requirement. Exhibits 4-7 and 4-8 show the baseline conditions 2014 morning and afternoon average travel speeds for the general-purpose lanes and the HOV lanes, respectively.

What will the safety conditions be with the baseline conditions?

As described above, I-405 and SR 167 will become more congested with the baseline conditions compared to 2005 existing conditions. This will increase congestion-related crashes in the study area.



I-405 and SR 167 interchange, looking south

How will transit and HOVs operate under the baseline conditions?

By the year 2014, the assumed change in HOV lane designation from the current HOV 2+ to HOV 3+ will decrease the number of vehicles in the HOV lanes. This change will improve the operations of the HOV lanes and increase travel speeds for buses using the HOV lanes. The HOV lanes will operate close to free-flow conditions, which is 60 miles per hour. However, the HOV lanes will likely experience slower speeds during the peak hours when the adjacent general-purpose lanes become congested. These reductions in speed result when HOV drivers slow down in anticipation of a driver from the adjacent slower lane entering the HOV lane.

How well would the local streets operate under baseline conditions?

The I-405 Team anticipates that future traffic volumes will increase and local traffic operations will generally worsen compared to existing conditions. We calculated baseline conditions intersection level of service with CORSIM microsimulation software. Refer to Exhibit 3-1 on page 3-4 for a definition of intersection LOS and delay.

By the year 2014, the City of Renton will construct an improvement project that will add lanes to SR 169 (Maple Valley Highway) east of I-405 for approximately 1,500 feet. This project will improve operations for vehicles traveling to and from I-405 via SR 169.

Exhibits 4-9 and 4-10 show the baseline conditions intersection LOS in the study area for the 2014 morning and afternoon peak hour. In the 2014 morning peak hour, four intersections perform at LOS E, and the remaining study intersections operate at LOS D or better. In the 2014 afternoon peak hour, five intersections perform at LOS F, and three intersections perform at LOS E. The remaining study intersections operate at LOS D or better. The three most congested areas are:

- North of the I-405/SR 167 interchange near the Rainier Avenue S/S Grady Way intersection in Renton;
- Around the SR 167 ramps at SW 41st Street and SW 43rd Street in south Renton; and
- Along SR 169 (Bronson Way N), west of I-405, in downtown Renton.

Exhibit 4-9: 2014 Baseline/No Build Morning Peak-Hour Intersection Level of Service

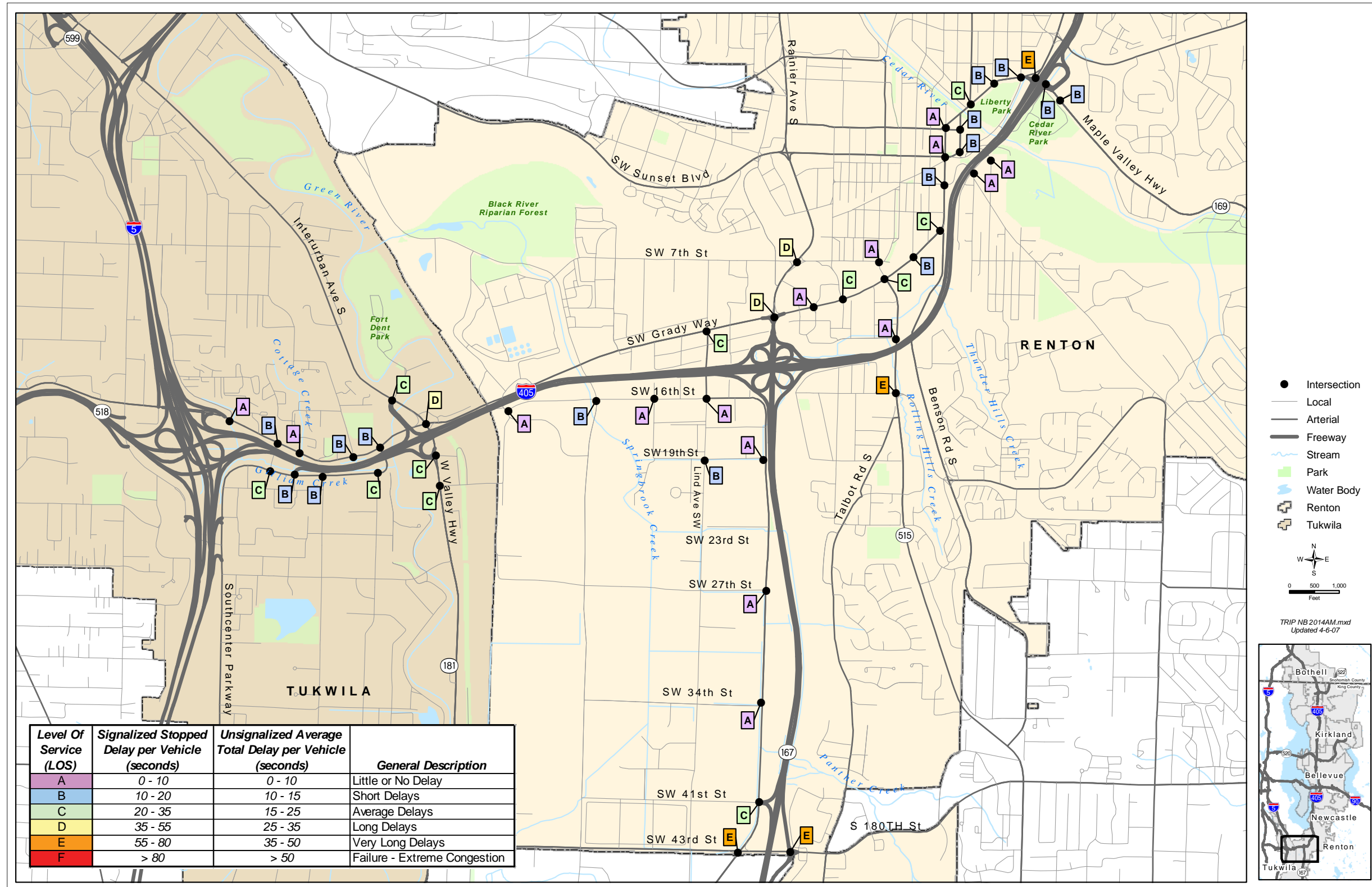


Exhibit 4-10: 2014 Baseline/No Build Afternoon Peak-Hour Intersection Level of Service

