

Potential Effects

How did we develop travel demand forecasts for the freeway?

What tools did we use?

We used the Puget Sound Regional Council (PSRC) four-county travel forecast model as a starting point for determining future traffic volumes. This model predicts traffic volumes and travel patterns based on adopted population and employment projections within the region. We then refined the model to include the specific details of the I-405 freeway.

What time periods did we evaluate and why?

The assumed opening of the Bellevue Nickel Improvement Project is 2014, although this is a conservative assumption and improvements will be in place by 2010. The design year, 2030, is consistent with the corridor planning horizon and the requirement for environmental documentation. However, we are reporting only the results for 2014 because the assumed population and employment growth by 2030 will increase traffic volumes to the point of overwhelming the limited improvements of the Bellevue Nickel Improvement Project.

We have placed the 2030 results in Appendix B. The project improves a portion of the I-405 corridor but does not offer the full solution for the I-405 corridor. The Bellevue Nickel Improvement Project is the first step in implementing the Master Plan for the I-405 corridor. The Master Plan includes additional



Typical highway construction scene

freeway and transit capacity and will substantially replace and upgrade interchanges along the entire length of the I-405 corridor. These improvements will address the 2030 traffic volumes.

The morning and evening commutes along the I-405 corridor last for several hours. To capture these peak commute periods, we considered 6 hours in the morning (5:00 to 11:00 A.M.) and 6 hours in the evening (2:00 to 8:00 P.M.). We evaluated 6 hours to determine how the freeway becomes congested, how it operates during congestion, and how congestion dissipates. Although we evaluated 6 hours, the results in this report reflect the morning and afternoon peak hours, or highest traffic demand hours for the freeway.

We used the hour of greatest traffic volume to evaluate how the local street network would operate under worst-case conditions.

How did we determine the GP and HOV lane volumes?

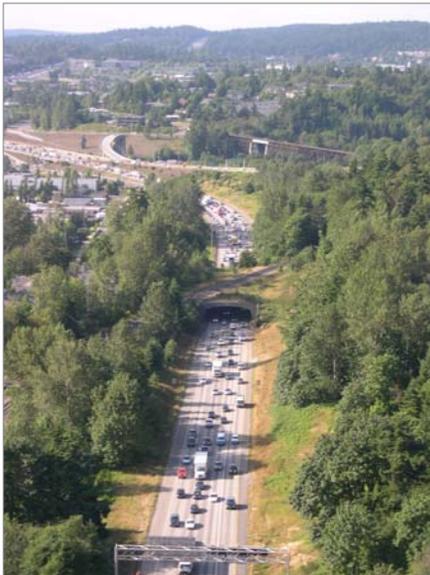
We started with existing GP and HOV lane volumes and used the regional travel forecast model to estimate future changes. The forecasts for years 2014 and 2030 both assume the HOV lanes will operate differently in the future than they do today. Based on future growth in HOV volumes and the WSDOT policy on HOV lane operations, this analysis assumes the HOV lanes will require three or more persons in a vehicle. Currently, vehicles with two or more persons qualify to use HOV lanes.

What improvements does the travel forecast model include?

The travel forecast model includes funded regional improvement projects and projects that will likely be built. Appendix C lists the baseline projects included in the travel forecast model. We assumed some projects would be completed by 2014; others by 2030.

How will the project affect freeway travel demand for the study area?

Projected future regional population and employment growth increases I-405 demand for the No Build Alternative and the Bellevue Nickel Improvement Project compared to existing



Southbound I-405 and the Wilburton Tunnel, looking north

conditions. With the Bellevue Nickel Improvement Project, the I-405 freeway daily demand increases compared to the No Build Alternative. As planned, the added capacity of the Build Alternative allows for more vehicles to travel through the study area and for traffic to shift from the local arterials to I-405. We do not project the Build Alternative will generate new vehicle trips. We describe the weekday demand volumes as two-direction totals with northbound and southbound freeway traffic added together. In the year 2014, we project the Bellevue Nickel's weekday demand to be 225,000 vehicles for the section of I-405 between I-90 and SE 8th Street. Daily demand increases by 3 percent over the No Build Alternative, which we project to have a weekday demand of 218,000 vehicles.

While the daily travel demand increases with the Bellevue Nickel Improvement Project, during the A.M. and P.M. peak hours, the improvements will have little effect on increasing travel demand. In the 2014 peak hours, the existing bottlenecks on I-405 south of the study area at 112th Avenue SE/Coal Creek Parkway and north of the study area on State Route (SR) 520 will remain and prohibit drivers from substantially changing their travel patterns. The Bellevue Nickel Improvement Project will provide more benefit before and after the A.M. and P.M. peak travel periods when the traffic volumes are lower.

Future volumes in the HOV lane would decrease compared to existing volumes. This outcome results from the change in HOV lane occupancy designation from the current number of two or more occupants (HOV 2+) to three or more (HOV 3+) for the 2014 No Build and Build Alternatives.

How did we analyze freeway traffic operations?

WSDOT used Vissim, microsimulation software to analyze the freeway traffic operations. Vissim models the movement of individual vehicles and can describe how vehicles accelerate, decelerate, and change lanes in response to freeway geometry and the behavior of other vehicles. To evaluate the performance of freeway traffic operations, we developed the following measures of effectiveness: vehicle trips, person trips, and speed.

Measure of Effectiveness

The term we use to assess how a roadway performs. Typically, we use multiple measures. For the I-405 Project, we use the number of vehicles moved, the number of persons moved, and the average travel speed to determine how well the roadway performs.

Vehicle Trips

Vehicle trips are the total number of vehicles that pass through a section of roadway over a given time. For this project, we calculated the trips on an hourly basis.

Person Trips

Person trips are the total number of persons that pass through a section of roadway over a given time. We calculated hourly trips by estimating the number of passengers in vanpools, carpools, and transit buses.

Speed

Travel speeds are a function of traffic congestion and driver comfort. The microsimulation model calculates the average travel speed of vehicles in the GP and HOV lanes over time. For this project, we calculated the speeds on an hourly basis.



Congested southbound I-405 at Coal Creek Parkway, looking north

How will the project affect freeway operation in the study area?

The Bellevue Nickel Improvement Project will increase vehicle throughput and improve travel speeds up to 15 miles per hour when it opens in approximately 2008. Projected future regional population and employment growth in the region will increase freeway demand compared to existing conditions. As traffic volumes increase, the benefits of the project will decrease during the morning and afternoon peak travel periods.

Future increased demand amplifies congestion in locations where I-405 is already at capacity. By 2014, with or without the project, freeway speeds fall and throughput volumes decline compared to conditions today.

In the 2014 A.M. and P.M. peak hours, the Build Alternative would have limited benefits on I-405 traffic operations. While the Bellevue Nickel Improvement Project improves the section of I-405 between I-90 and SE 8th Street, traffic bottlenecks north and south of the study area would continue to restrict vehicle throughput. In the 2014 A.M. peak hour, a northbound I-405 bottleneck at 112th Avenue SE/Coal Creek Parkway would slow vehicles traveling to the study area. In the 2014 P.M. peak hour, a southbound I-405 traffic bottleneck at 112th Avenue SE/Coal Creek Parkway would delay vehicles traveling southbound and traffic would back up into the study area. The 2014 P.M. peak

hour would also have a northbound bottleneck at SR 520. Congestion on westbound SR 520 would back up onto the northbound I-405 mainline and limit vehicle throughput.

For both the A.M. and P.M. peak hours, the Bellevue Nickel Improvement Project delivers more benefits during the time before and the time after the peak hours when traffic volumes are lower. Compared to the No Build Alternative, the Bellevue Nickel Improvement Project would delay the onset of congestion during the peak travel periods and clear congestion more quickly after the peak travel periods.

Exhibits 12 and 13 respectively show the No Build Alternative's 2014 A.M. and P.M. peak hour vehicle and person trips, mode split, and average travel speeds. Exhibits 14 and 15 show the same information for the Build Alternative in the 2014 A.M. and P.M. peak hour.

No Build Alternative

Peak Directions

In the A.M. peak hour, the I-405 peak travel direction is northbound in the study area. With the 2014 No Build Alternative, traffic congestion continues to worsen and vehicle throughput and travel speeds decline compared to existing conditions.

Exhibit 12. 2014 No Build A.M. Peak Hour Vehicle and Person Trips, Mode Split, and Average Travel Speed

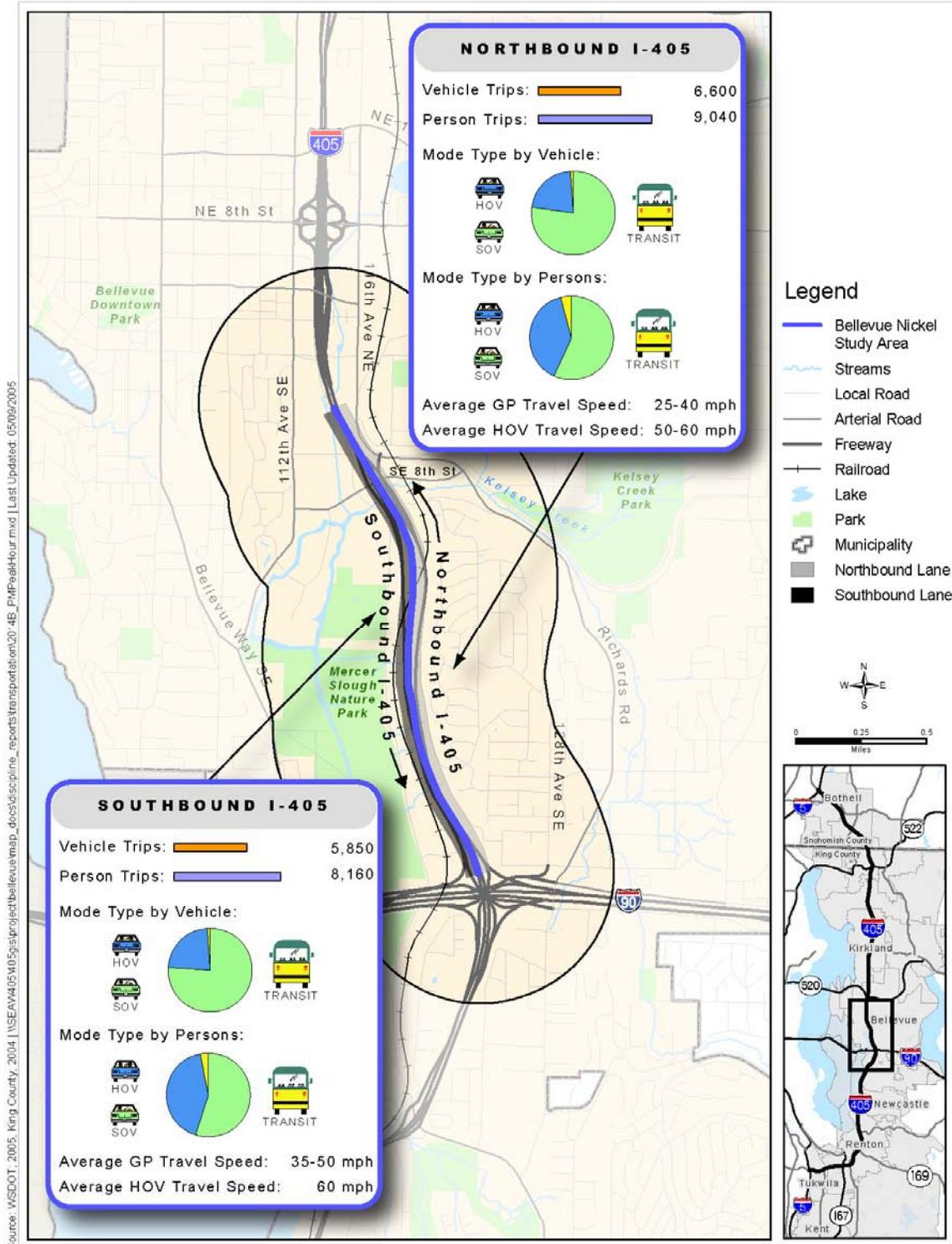


Exhibit 13. 2014 No Build P.M. Peak Hour Vehicle and Person Trips, Mode Split, and Average Travel Speed

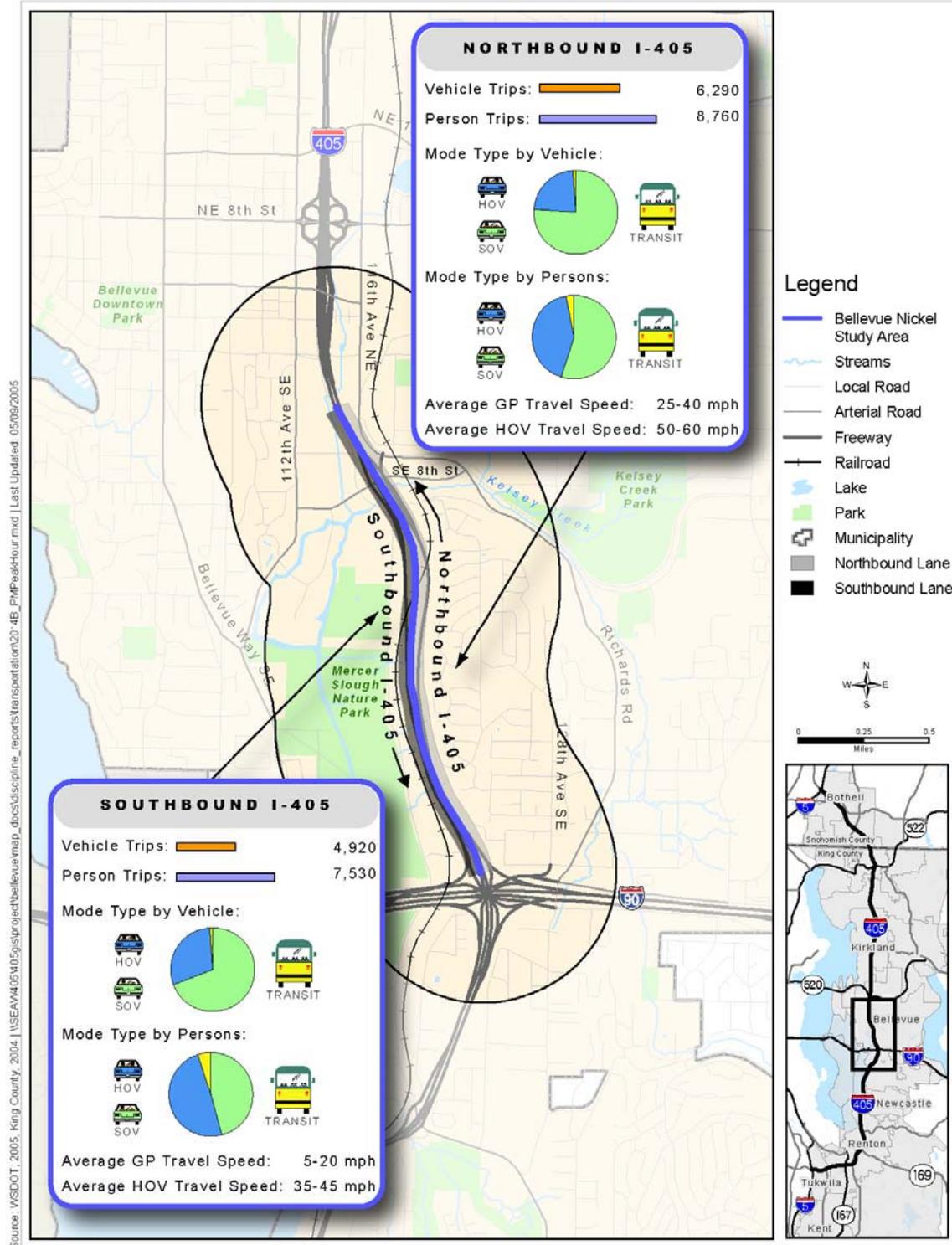


Exhibit 14. 2014 Build A.M. Peak Hour Vehicle and Person Trips, Mode Split, and Average Travel Speed

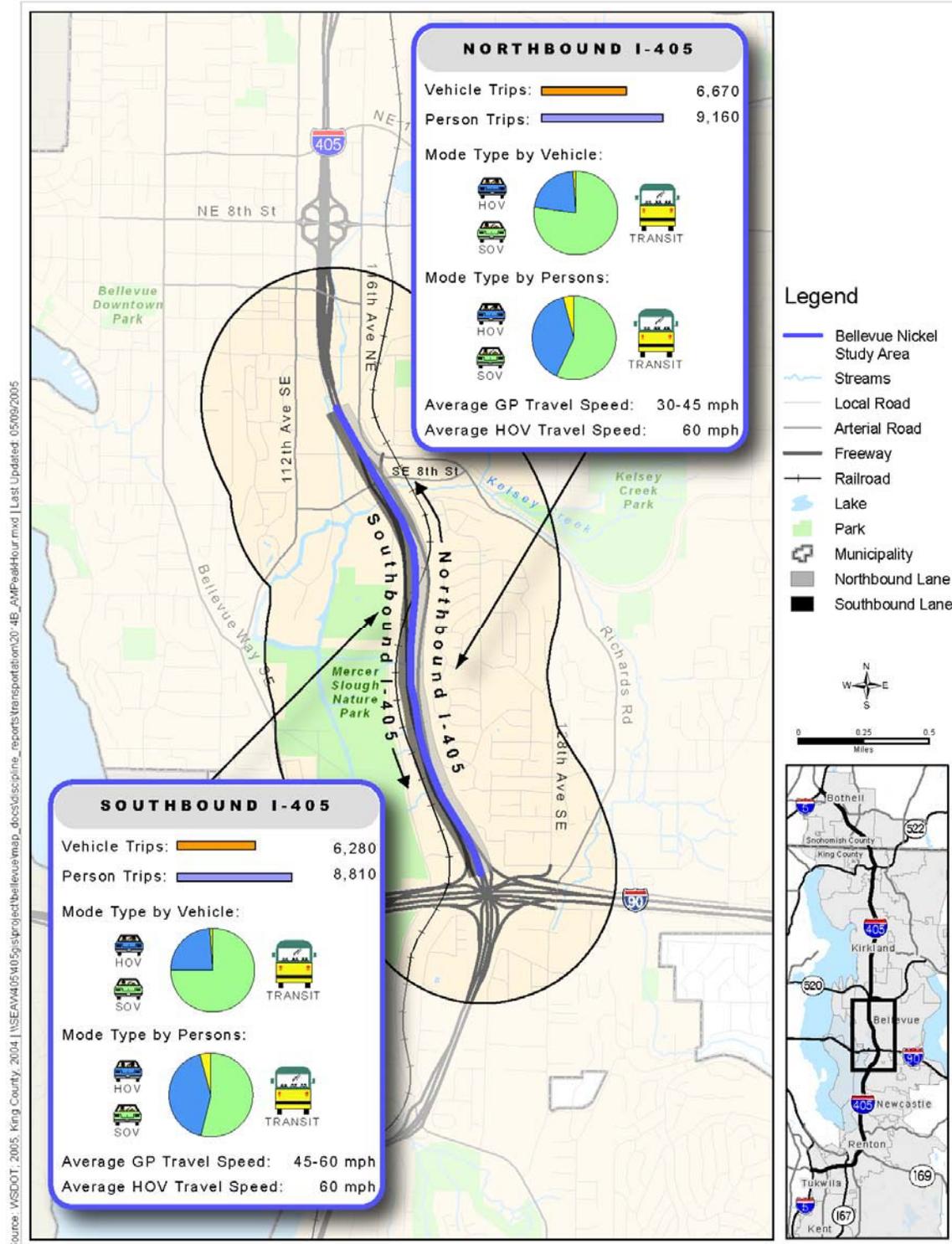
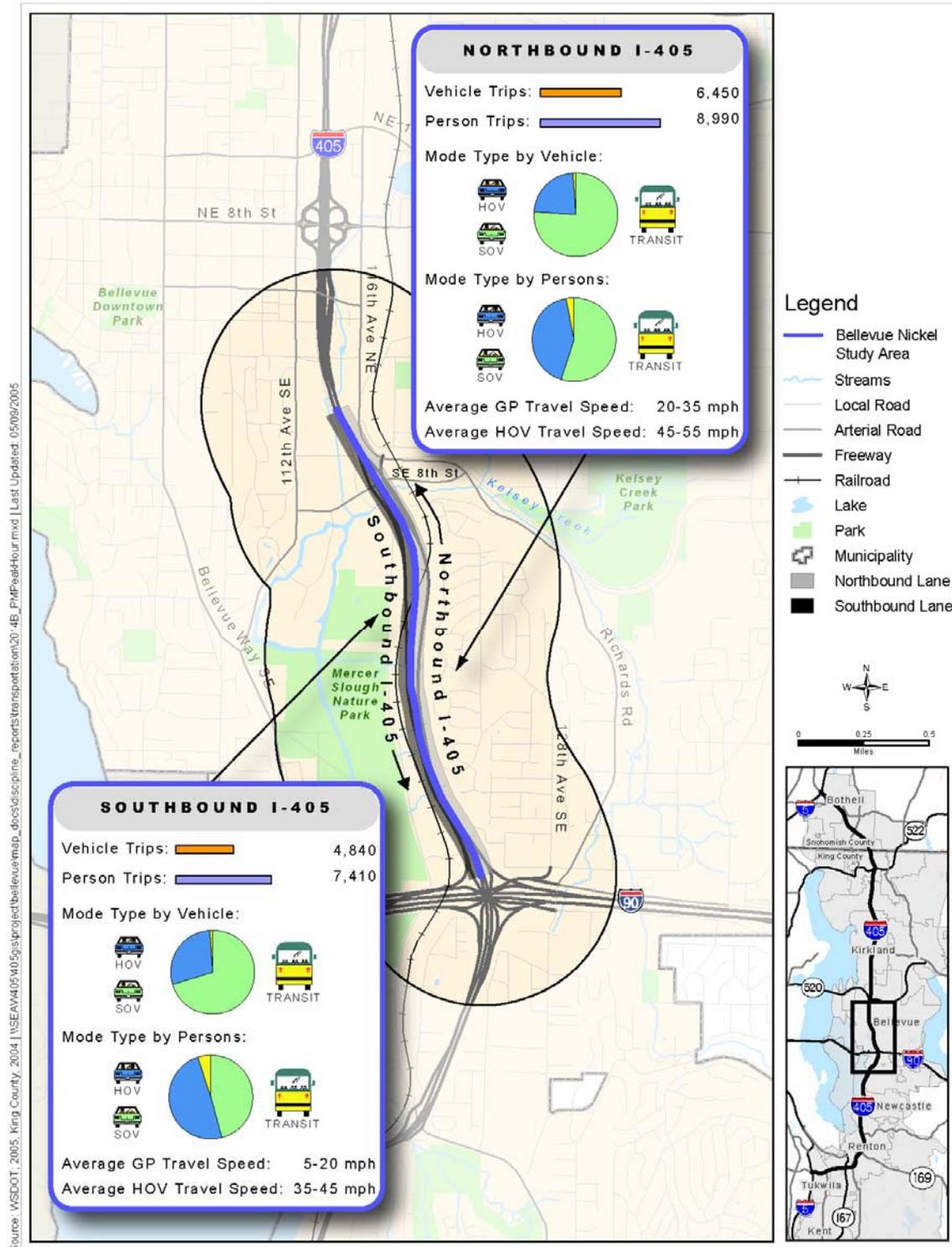


Exhibit 15. 2014 Build P.M. Peak Hour Vehicle and Person Trips, Mode Split, and Average Travel Speed



In the P.M. peak hour, southbound I-405 is the peak travel direction in the study area. Southbound I-405 traffic operations would deteriorate further with vehicle throughput decreasing from the 2002 existing conditions of 6,130 vehicles to the 2014 No Build Alternative of 4,940 vehicles. Average travel speeds slow with the No Build Alternative as compared to existing conditions.

Off-Peak Directions

In the A.M. peak hour, the off-peak travel direction of southbound I-405 continues to operate well with the 2014 No Build Alternative.

In the P.M. peak hour, the off-peak travel direction of northbound I-405 becomes more congested with the 2014 No Build Alternative. The 2014 No Build vehicle throughput and travel speeds decrease compared to existing conditions.

Build Alternative

Peak Directions

In the A.M. peak hour, northbound is the peak travel direction on I-405 in the study area. Northbound I-405 will operate similarly for the No Build and Build Alternatives. Both Alternatives will experience high levels of congestion.

In the P.M. peak hour, southbound is the peak travel direction on I-405. Southbound I-405 will also operate similarly for the No Build and Build Alternatives with high levels of congestion.

Off-Peak Directions

In the 2014 A.M. peak hour, the off-peak travel direction of southbound I-405 would improve with the Build Alternative. We project the Build Alternative to carry 400 more southbound vehicles on I-405 than the No Build Alternative. This improvement would also benefit eastbound I-90. The Build Alternative would move 150 more vehicles from southbound I-405 to eastbound I-90 when compared to the No Build Alternative.

In the 2014 P.M. peak hour, northbound I-405 is the off-peak direction. Northbound I-405 performs similarly for the No Build and Build Alternatives with moderate levels of congestion.

How will the project affect freeway safety?

The Bellevue Nickel Improvement Project will add an additional lane northbound and southbound on I-405. The project will improve safety by reducing congestion-related accidents as compared to the No Build alternative.

Additionally, the project will improve safety at the I-90 connection to northbound I-405 because the eastbound and westbound I-90 ramps will no longer merge together. With the Bellevue Nickel Improvement Project, each of these ramps will become an additional lane on I-405 northbound. This change will reduce the potential for rear-end and sideswipe collisions at this location as compared to the No Build alternative. Removing the merge will also improve safety on I-90. The improvement will decrease the number of rear-end accidents with vehicles queuing on I-90 to use the ramps to NB I-405

The project will reconstruct the Wilburton Tunnel on southbound I-405 and widen the existing narrow shoulders through the tunnel to safer design standards. This improvement will reduce the potential for drivers to collide with fixed objects.

The Bellevue Nickel Improvement Project will not change traffic volumes at local street intersections. WSDOT does not anticipate that the Bellevue Nickel Improvement Project will negatively affect the HAL at the intersection of the I-405 northbound ramp and SE 8th Street.

How will the project affect transit service and HOV trips?

For both the 2014 No Build and Build Alternatives, the forecasts assume that the HOV lanes will operate differently than they do today. Based on future growth in HOV volumes and the WSDOT policy on HOV lane operations, this analysis assumes the HOV lanes will change from the current HOV 2+ to HOV 3+.

With the future HOV lane-occupancy designation of HOV 3+, the HOV lanes will perform well for both the Build and No Build Alternatives. The HOV lanes will operate close to free-flow conditions (i.e. 60 mph). However, the HOV lanes will experience slower speeds during peak hours when the adjacent GP lanes become congested. HOV drivers tend to slow down as a precaution in case a driver from the adjacent slower GP lane suddenly decides to enter the HOV lane.



I-405 and I-90 Interchange, looking north

The Build Alternative extends the southbound I-405 HOV off-ramp to westbound I-90 northwards to the SE 8th Street on-ramp. This HOV lane is on the west side of the freeway. The Build Alternative also modifies the intersection of the I-405 southbound ramps with SE 8th Street. An HOV right-turn lane from eastbound SE 8th Street to the I-405 southbound on-ramp would be moved from the current location to the outside of the ramp. This modification provides a direct HOV connection from the SE 8th Street on-ramp to the westbound I-90 HOV lane via I-405.

Average HOV lane travel speeds for the 2014 No Build Alternative A.M. and P.M. peak hours are shown in Exhibits 12 and 13, respectively. The same results for the 2014 Build Alternative are shown in Exhibits 14 and 15.

How will the project affect transit travel time?

The extension of the southbound I-405 HOV off-ramp to westbound I-90 northwards to SE 8th Street will improve transit travel time for that movement. The remaining transit peak-hour travel times will be similar for the Build and the No Build Alternatives in 2014 and 2030.

How will HOV and transit trips change?

The number of buses and HOV trips with the Build Alternative will be similar to the No Build Alternative for 2014 and 2030.

How will the project affect local traffic operations?

WSDOT projects that future traffic volumes will increase and local traffic operations will slightly worsen compared to existing conditions. We analyzed future traffic operations with Corsim, a microsimulation software. The Corsim model calculated intersection LOS for the No Build and Build Alternatives. The analysis focused on the 2014 A.M. and P.M. peak hour. See the Existing Conditions section for a more detailed definition of level of service and delay.

Within the study area, the Build Alternative will minimally increase traffic volumes on I-405 but will not affect surface street traffic volumes during the A.M. and P.M. peak hour. Therefore, the Build Alternative will have the same intersection LOS as the No Build Alternative.

With the No Build and Build Alternatives, all the intersections operate at LOS C or better during both the 2014 A.M. and P.M. peak hours (see Exhibit 16).

How will the project affect bicycle and pedestrian facilities?

The project will not have any long-term effects on bicycle or pedestrian facilities. The project will reconstruct the intersection of the I-405 southbound ramps at SE 8th Street. On eastbound SE 8th Street, an exclusive HOV right-turn lane to the I-405 southbound on-ramp will be added. During construction, there will be temporary sidewalk closures.

How will construction affect transportation?

The majority of the Bellevue Nickel Improvement Project construction will involve widening I-405. The addition of the new southbound I-405 lane will require the construction of a new Wilburton Tunnel. During construction of the new Wilburton Tunnel the Burlington Northern Santa Fe Railroad tracks will be temporarily realigned. No track closures are anticipated during this realignment; however speeds may be reduced through this area. Two bridges will also be widened with this project, one northbound over the BNSF Railroad and one southbound over SE 8th Street.

How will construction vehicle volumes affect the transportation network?

We estimate 8,200 fill-loaded and an equivalent number of unloaded trucks will be used during construction. The fill deliveries would occur over a period of approximately 15 months. The majority of trucks will be used to reconstruct the Wilburton Tunnel on southbound I-405 between SE 8th Street and I-90. There is no surface street access to the inside of the I-405 southbound lanes within the tunnel. Therefore, construction trucks will have to access the Wilburton Tunnel via I-405. This construction traffic may use the adjacent I-405 interchanges. The truck routes will not be known until a construction contract is assigned.

Exhibit 16. 2014 Build/No Build A.M. and P.M. Peak Hour Intersection Level of Service



How will project construction affect regional freeway traffic?

During the widening of I-405, WSDOT may have to shift and/or re-align the mainline lanes through the construction area.

We anticipate no weekday daytime lane closures for the construction of this project. Widening the Wilburton Tunnel on southbound I-405 may require temporary night and weekend lane closures. Full freeway closures may be necessary infrequently to shift traffic between phases of construction. Such closures would be brief and are anticipated to occur during nights or weekends. These closures will primarily affect traffic within the City of Bellevue.

The Bellevue Nickel Improvement Project will also widen two bridges on I-405, one northbound over the BNSF Railroad, and one southbound over SE 8th Street. We anticipate no closures on either of the bridges during the widening process. All freeway lanes can be maintained by narrowing the shoulders on the bridges. This shift would occur for the duration of the bridge widening, which would be approximately nine months per bridge.

How will project construction affect local arterials?

The Bellevue Nickel Improvement Project will widen the southbound I-405 bridge over SE 8th Street. The widening of the bridge will cause some temporary nighttime closures of SE 8th Street.

The Bellevue Nickel Improvement Project will reconstruct the intersection of the I-405 southbound ramps at SE 8th Street. The project will add an HOV right-turn lane from eastbound SE 8th Street to the I-405 southbound on-ramp. The construction will not require the closure of SE 8th Street or the I-405 southbound on-ramp.

What are the potential cumulative effects of the Build and No Build Alternatives?

The Bellevue Nickel Improvement Project is part of the first stage in constructing the I-405 Corridor Program long-term plan (Master Plan). Benefits from the Bellevue Nickel Improvement



Freeway construction

Project are limited but will contribute to the cumulative benefits realized under the Corridor Program.

The I-405 Corridor Program Final EIS describes and evaluates the Master Plan for the I-405 corridor and provides the appropriate background to address the transportation cumulative effects of the Bellevue Nickel Improvement Project. The FHWA does not require a cumulative effects report for every NEPA discipline studied. Rather, the disciplines subject to a cumulative effects analysis are determined on a case-by-case basis early in the NEPA process. We selected the Traffic and Transportation Discipline Report for this project to include a cumulative effects review due to the Bellevue Nickel's close association with other corridor projects.

The Bellevue Nickel Improvement Project funds another project called the I-405 to I-90 Re-Stripe Project that will re-stripe the I-405 ramps to westbound I-90. This project will likely be built before the Bellevue Nickel Improvement Project. WSDOT will review the I-405 to I-90 Re-Stripe Project in a separate environmental document but the combined operational transportation effects of the I-405 to I-90 Re-Stripe Project and the Bellevue Nickel Improvement Project are described together in this report.

The I-405 to I-90 Re-Stripe Project will re-stripe the ramp connections from I-405 and Bellevue Way to westbound I-90. WSDOT is proposing to re-stripe the on-ramp (formed from the I-405 ramps) into a two-lane on-ramp, which becomes two lanes to westbound I-90. The Bellevue Way on-ramp will then be re-stripped to merge with the second lane.

Specific improvements to the Bellevue area that will be realized by the Bellevue Nickel Improvement Project and the Corridor Program Master Plan are compared below.

The Build Alternative

The Bellevue Nickel Improvement Project Build Alternative provides the following benefits:

- Improves travel speeds and throughput when it opens in approximately 2008.
- Improves safety in the study area.
- Creates a direct HOV connection from SE 8th Street to the westbound I-90 HOV lane via I-405.
- Modestly improves travel speeds and throughput compared to the 2014 No Build Alternative.

In addition, the Bellevue Nickel Improvement Project will realize other transportation benefits when the I-405 corridor long-term plan is complete. Combined, these projects will result in:

- Substantial reductions in peak traffic congestion periods.
- Substantial improvements in travel speeds on I-405 and I-90.
- Substantial improvements in vehicle throughput on I-405 and I-90.
- Reductions in congestion-related accidents compared to the No Build Alternative.

These benefits will be realized through year 2030.

No Build Alternative

Assuming neither this project nor the Master Plan is constructed, the cumulative effects will remain the same as the current conditions. Traffic demand on I-405 would increase, and travel speeds and throughput would diminish. Additionally, the peak periods of traffic congestion would become longer than they are today. The specific results of the No Build Alternative appear earlier in this report. The No Build scenario would not result in any cumulative transportation benefits.

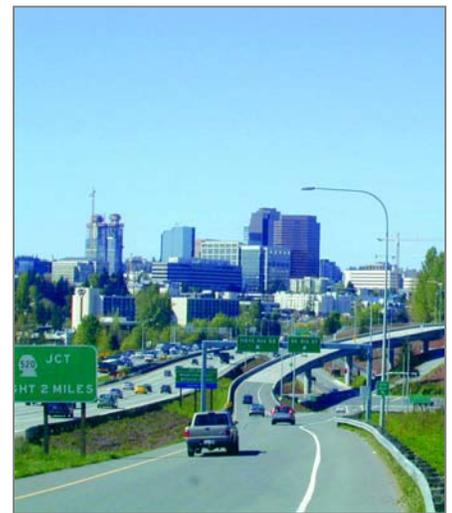
Measures to Avoid or Minimize Project Effects

How will WSDOT avoid or minimize adverse effects from construction?

WSDOT will fully comply with safety standards and requirements. As described in Appendix A, WSDOT will coordinate with local agencies and other projects to prepare and implement a Traffic Management Plan (TMP) prior to making any changes to the traffic flow or lane closures. We have included all avoidance and minimization measures to be incorporated into the project in Appendix A.

How will WSDOT avoid or minimize adverse effects from an improved transportation system?

We foresee no adverse effects that will require additional mitigation.



Bellevue skyline from NB I-405