I-5 Boone Bridge and Seismic Improvement Project: Evaluation of Travel Demand and Land Use Impacts

I-5 Wilsonville Facility Plan recommended improvements: Add a southbound auxiliary lane to I-5 between the Wilsonville Road entrance ramp and the Canby-Hubbard exit ramp (OR 551), with a two-lane exit.

Analysis request

Recognizing ODOT's intent to study the feasibility to provide a widened and seismically resilient I-5 Boone Bridge between the Wilsonville Road and OR 551 interchanges, Metro asked that the agency also consider the potential for increased travel demand to statewide routes and facilities inside the Metro region due to such improvements. Specifically, Metro requested ODOT to consider impacts to travel demand from both rural and urban areas located in northern Marion County and rural Clackamas County on I-5, OR 99E and OR 551, including the cities of Canby, Barlow, Aurora, Donald, Hubbard and Woodburn and the intervening rural areas due to implementation of the I-5 Wilsonville Facility Plan. As part of Metro's request, ODOT also considered the potential for increased urban development from demand on the areas mentioned above and potential pressure for UGB expansion. Lastly, ODOT considered potential impacts of the proposed improvements to I-5 southbound in generating non-farm rural uses outside of existing UGBs, especially along OR 551 in the vicinity of the Aurora Airport.

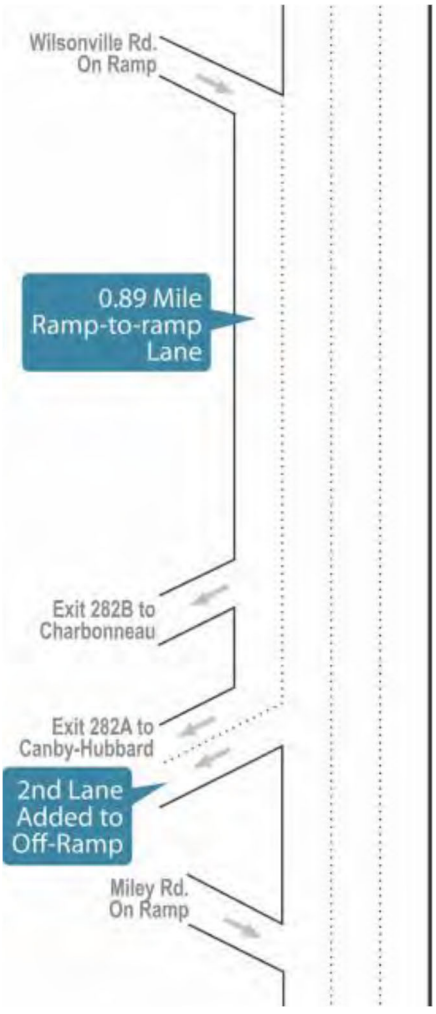
ODOT analysis approach and methodology

Given the geographic boundary constraints of the Metro travel demand model, staff employed the Oregon Statewide Integrated Model (SWIM)[1] to prepare model simulations of travel demand and land use with and without the I-5 Wilsonville Facility Plan implementation, specifically focused on estimating the impact of the Boone Bridge auxiliary lane project. This project was added to the SWIM road network in approximately analysis year 2030 and run out to year 2040. The results of the Boone Bridge scenario are compared to a no-build reference scenario in order to identify impacts of an auxiliary lane on I-5 southbound from the Wilsonville Road entrance to the Canby-Hubbard Highway exit, with a two lane exit. This project is designed to alleviate a bottleneck on I-5, improving reliability and safety.

SWIM is an integrated land use transport model covering the entire State of Oregon and surrounding counties in neighboring states. It is designed to help inform how regionally significant transportation projects, such as reconfigurations of key river crossings, impact both travel demand and land use development patterns.

In terms of analyzing the potential impacts of the project on non-farm rural land use, it is important to consider existing factors that contribute to the development pattern including local policy, regional housing costs, fuel price, demographics (e.g. car ownership), etc. regardless of whether the I-5 Wilsonville Facility Plan is ultimately implemented.

Figure 1: I-5 Facility Plan Recommended Improvements



[1] Documentation of SWIM is available online: https://www.oregon.gov/odot/Planning/Documents/Statewide-Integrated-Model-Vers2-5.pdf

Findings

Table 1 reports the annual average daily traffic (AADT) volumes on the Boone Bridge and nearby roads where impacts of the project might be anticipated to occur. Volumes are reported for the most recent year published for Oregon roadways (2018 data per ODOT TransGIS), as well as the forecast volumes in 2040 for the no-build and build scenario. The change in AADT attributed to the additional auxiliary lane is relatively modest. Growth in AADT is expected to be about 3% higher over the ten-year period (2030-2040) forecast after the project is built. Such results are consistent with expectations for a project such as this, which is designed to help alleviate a congestion bottleneck, improve traffic flow and reliability for a location with multiple points of traffic weaving.

Photo credit: Google, July 2018

Table 1: 2018 AADT and 2040 Forecast AADT for No-Build and Build Scenarios for Roadways on or near Boone Bridge

Roadway	2018 AADT	2040 Forecast AADT No-Build Scenario	2040 Forecast AADT Build Scenario	Build Scenario Difference in AADT
I-5 SB at Boone Bridge	63,216	76,407	78,549	2,142
I-5 NB at Boone Bridge	68,484	82,625	84,100	1,475
I-5 SB to Woodburn	46,848	60,146	61,252	1,106
I-5 NB to Woodburn	50,752	63,864	64,670	806
SB Off-Ramp to Miley Rd	4,700	5,371	5,501	130
SB On-Ramp from Miley Rd	380	478	496	18
NB Off-Ramp to Miley Rd	560	951	1,034	83
NB On-Ramp from Miley Rd	5,400	6,272	6,475	203
Miley Rd East of the Interstate	9,400	10,747	11,041	294
OR 551 SB Off-Ramp	12,250	13,148	13,616	468
OR 551 NB On-Ramp	10,850	11,726	11,954	228
OR 551 From Arndt To Ehlen	12,500	13,459	13,838	379
OR 551 From Ehlen To 99E	9,500	10,962	11,559	597
99E Canby to Aurora	23,100	31,382	31,666	284
99E Aurora to Woodburn	16,500	20,689	21,431	742

The model considered regional impacts to county-level vehicle miles traveled (VMT) for five counties neighboring the project area (Clackamas, Washington, Marion, Yamhill and Multnomah counties). Comparing the two 2040 forecasts reveals negligible change in regional VMT between the build and no-build scenarios.

The model evaluated forecast population and employment growth for the 2040 build and no-build scenarios. Comparing the two forecast scenarios indicates negligible differences (<1%) in population and employment in the five counties included in the analysis. Population and employment trends relate to the potential for land development impacts, attributable to the project, which were considered for the area south of the Willamette River near Miley Road in Marion County and in communities along OR 99E and OR 551 between Canby and Woodburn. Comparison of the two forecast scenarios side-by-side reveals no land use changes are expected to occur due to the I-5 Wilsonville Facility Plan project.

Project Benefits:

The I-5 Wilsonville Facility Plan identifies the following benefits from the recommended project combined with the associated seismic upgrade of the Boone Bridge:

- Improve performance of I-5 compared to no-build
- Reduce congestion on I-5 to below state mobility targets
- Improve travel time reliability
- Improve I-5 speeds during the evening peak hour
- Expect reduced crash rates due to greater separation of traffic entering I-5 from mainline traffic
- Provide critical link to I-5 seismic lifeline route, connecting the Willamette Valley to the Portland metro area

Metro asked ODOT to consider conducting additional analysis - beyond the evaluation of travel demand and land use impacts described above - related to managed lanes, active traffic management and access management. A summary of the Metro analysis requests and agency response is provided below, grouped by issue area.

Managed Lanes

Analysis request: *Consider managed-lane strategies that improve the use of each lane, such as a barrier-separated auxiliary lane from Wilsonville Road entrance ramp to the Charbonneau exit. This would be a separate entrance to Boone Bridge only from Wilsonville Road and other on-ramp lanes would be used for I-5 southbound traffic. This lane would be assessed for improving local connectivity for the Wilsonville and Charbonneau communities and improving related transit operations. Consider making the barrier separated auxiliary lane to create a bike/pedestrian and emergency vehicle path.*

Agency response: Traffic analysis conducted in support of the I-5 Wilsonville Facility Plan indicates that local trips on I-5 southbound between the Wilsonville Road entrance and Charbonneau/Miley Road exit account for roughly 5% of vehicles using the Boone Bridge during the PM peak. ODOT anticipates the investment associated with building a new structure that would serve southbound trips to be significant. A barrier-separated auxiliary lane would likely require additional widening and investment without providing additional benefit towards local connectivity beyond those provided by a non-barrier-separated auxiliary lane.

The City of Wilsonville has previously completed substantial evaluation of alternatives for a bike/pedestrian and emergency vehicle crossing of the Willamette River in the vicinity of the Boone Bridge and has identified a preferred alignment for the French Prairie Bridge adjacent to the existing railroad bridge to the west of the Boone Bridge. ODOT will evaluate if there is a need for an additional bike/pedestrian facility following the French Prairie Bridge facility. Shoulders on a replaced Boone Bridge will be able to accommodate emergency vehicles and allow disabled vehicles a place to pull out of traffic.

Figure 2: Preferred French Prairie Bridge alignment

Source: City of Wilsonville

Analysis request: *Evaluate 2+ or 3+ person carpool lane options and High Occupancy Toll lane options to understand related reductions in vehicle demand.*

Agency response: ODOT's Toll Program, through its environmental review process, is evaluating tolling options on I-5 from the Boone Bridge to just south of the Interstate Bridge and may consider High Occupancy Toll lane options and carpool lane options in the area of the Boone Bridge. When evaluating such managed lane strategies, criteria ODOT would consider include the length and feasibility of such facilities and expected effect on safety, reliability and congestion management. If a corridor carpool lane study is desired, ODOT would partner with Metro in the future to accomplish this evaluation.

Analysis request: *Consider transit reliability issues that reduce on-time performance and ridership. Consider appropriate options for integrating freeway operations with transit such as bus-on-shoulder on the approaches to and crossing the Boone Bridge to serve transit providers Wilsonville SMART, ODOT's Point Service, etc.*

Agency response: A widened Boone Bridge, per the I-5 Wilsonville Facility Plan, will have shoulders sufficient to accommodate bus-on-shoulder operations. ODOT is currently working with TriMet and SMART to plan pilot bus-on-shoulder projects for 2020-2021 and will conduct a study to determine other viable locations in the region.

Analysis request: *Study time of day demands for northbound and southbound traffic to consider a movable "zipper" barrier to change the number of lanes by time of day. Traffic on the I-5 bridge is similar to the Golden Gate Bridge in San Francisco where a "zipper" barrier is used.*

Agency response: ODOT can consider the feasibility of the "zipper" barrier concept and has considered such technology in the past as it relates to work-zone safety, recently employing this strategy during the I-5 Interstate Bridge Trunnion Replacement Project. ODOT would need to understand the extent of expected impacts to both directions of travel resulting from the movable barrier application. For reference, the Golden Gate Bridge system is 13,340 feet, whereas the area between the Wilsonville Road and Canby-Hubbard interchanges that could possibly accommodate such a movable barrier is about 3,600 feet. The Golden Gate Bridge system cost $30 million in 2015. If deemed physically feasible on I-5, operational and maintenance costs would need to be evaluated.

Active Traffic Management (ATM)

Analysis request: *Consider non-technology "nudge" treatments for reducing weaving with lane markings, reducing unnecessary slowing with visual barriers to oncoming traffic and reducing speeding with behavioral cues. In addition, assess toolkit elements from the existing ODOT RealTime strategies or recommend ATM tools that are improvements to the state of the art for use on I-5 from I-205 southbound.*

Agency response: ODOT will develop an ATM strategy to accompany the proposed improvements to I-5 in the vicinity of the Boone Bridge. ODOT Region 1 currently has an ATM strategy for I-5 southbound from I-205 to the Wilsonville Road interchange, which includes a proposed queue warning sign between the I-205 entrance and the SW Elligsen Road exit. The ATM strategy emphasizes opportunities and potential benefits of implementing traveler information, queue warning and variable speed signs in specific locations. In addition, ODOT will install ramp meters at both southbound on-ramps from Elligsen Road as part of an upcoming I-5 paving project scheduled for construction in 2021.

Access Management

Analysis request: *Interchange Area Management Plans should be reassessed for the 20-year horizon of the Boone Bridge Seismic Upgrade project. Consider solutions that improve the operations and management at the I-5 interchange at SW Elligsen Road. Currently, the facility plan focuses on southbound demand from Wilsonville Road only – it should also assess demand at the I-5 interchange at SW Elligsen Road on the north end of Wilsonville. In addition, access management plans should be developed where they do not already exist for approaching highways in northern Marion County and rural Clackamas County as part of the Boone Bridge replacement project, including Interchange Area Management Plans at the Charbonneau/Aurora, Donald and Woodburn interchanges on I-5 and access management plans on OR 551 from I-5 to OR 99E and on rural portions of OR 99E from Canby to Woodburn.*

Agency response: ODOT will have an opportunity to analyze the demand at the I-5 interchange at SW Elligsen Road by incorporating this work into previously programmed analysis through the Corridor Bottleneck Operations Study. Regarding Interchange Area Management Plans for the segment of I-5 south of the Boone Bridge, ODOT has recently completed the I-5: Aurora-Donald Interchange (Exit 278) Interchange Area Management Plan, which establishes a phased interchange improvement program, access management plan and mobility targets. As discussed above, the slight increase in 2040 AADT in the interchange areas and negligible difference in 2040 VMT population and employment growth and land use impacts between the build and no-build scenarios does not indicate a need for new access management plans to mitigate the proposed improvements to the Boone Bridge.

Note: Interchange Area Management Plans are not intended to minimize demand to or from a particular location. Rather they help ODOT and local jurisdictions manage transportation and land use in interchange areas. The basic purpose of such plans includes the following:

- Establish agreement with a local government about what, if any, transportation solutions or land use/policy actions are needed in an interchange area and how best to balance and manage transportation and land use issues over time.
- Protect the function and operations of the state highway interchanges and supporting local street network.
- Ensure local plans and zoning and planned local street network are consistent with and complement the function of the interchange.

Agency request: *In consultation with Metro Planning and Development staff, model the accessibility impacts of the proposed I-5 project in the vicinity, including the following in order to inform development of an access management plan – effects on accessibility for neighboring cities and potential growth in need for increased freeway access (including potential changes in trip time, trip length, trip frequency, vehicle miles traveled and mode split); effects of a planned long-term strategy for managing increasing travel along the I-5/Wilsonville corridor, particularly for OR 551 and the ability of inter-city transit service to/from neighboring cities to slow traffic growth along the corridor.*

Agency response: In relation to access management on rural highways and the potential for increasing demand for freeway access, consideration of vehicle miles traveled (VMT) and trip frequency, ODOT conducted analysis of project impacts to travel demand and land use as discussed above. The results indicate a slight growth in AADT and a negligible difference in VMT between the 2040 build and no-build scenarios, which indicates the project will not increase demand for freeway access.