PLEASANT VALLEY

TRANSPORTATION REFINEMENTS

CITY OF GRESHAM OREGON

# PLEASANT VALLEY TSP REFINEMENT

## >>> Operations Evaluation Summary

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# OPERATIONS EVALUATION OVERVIEW

This memorandum describes the operational evaluation of four alternatives for the Pleasant Valley Transportation System Plan (TSP). Five initial alternatives were developed; however, Alternative 5 was eliminated based on input from the technical advisory committee (TAC) and citizen advisory committee (CAC).

IN THIS PAPER>>>

- *Network assumptions of the four alternatives*
- *Travel demand model results*
- *Future traffic conditions*

Key findings of this memorandum are as follows:

- SE 174th Avenue/Powell Boulevard and SE 182nd Avenue/Powell Boulevard are not projected to meet jurisdictional operational standards during the future weekday PM peak hour under all alternatives.
- All other study intersections are projected to operate acceptably under future weekday PM peak hour conditions for all alternatives given the assumed future traffic control and lane configurations.
- Each alternative operates relatively similarly at the study intersections, with similar requirements for turn-lanes.
- The SE 174th Extension (Alternative 2) results in fewer vehicles utilizing SE Jenne Road.

# OPERATIONS EVALUATION

The four alternatives were evaluated under 2035 weekday PM peak hour conditions. In the *Existing and Future Planned Conditions Report* (Reference 1), the weekday AM peak hour was found to have better operations than the weekday PM peak hour. Therefore, while the weekday PM peak hour is the focus of this analysis, the weekday AM peak hour operations will also be reviewed for the preferred concept to determine the appropriate lane configurations and turn lane lengths. The network assumptions, travel demand model analysis, and resultant future traffic operations are described below.

## JURISDICTIONAL OPERATING STANDARDS AND THRESHOLDS

The City of Portland identifies interim deficiency thresholds and operating standards per the Regional Mobility Policy (Reference 2). The volume-to-capacity (v/c) ratio threshold of 0.99 applies to Powell Boulevard/SE 174th Avenue and SE Jenne Road/SE Foster Road. All other study intersections are either currently under the City of Gresham's jurisdiction or will be incorporated into the City of Gresham, and thus will be evaluated under the City of Gresham standards. The City of Gresham operating standards for signalized and unsignalized intersections is level-of-service (LOS) D and a v/c ratio of 0.90. Individual movements are required to operate at LOS E or better and a v/c ratio of less than 1.0.

## NETWORK ASSUMPTIONS

Network assumptions near the study area were detailed in the *Existing and Future Planned Conditions Report* prepared as part of Task 4 of this project. Assumed new connections include the SE Cheldelin Road extension,

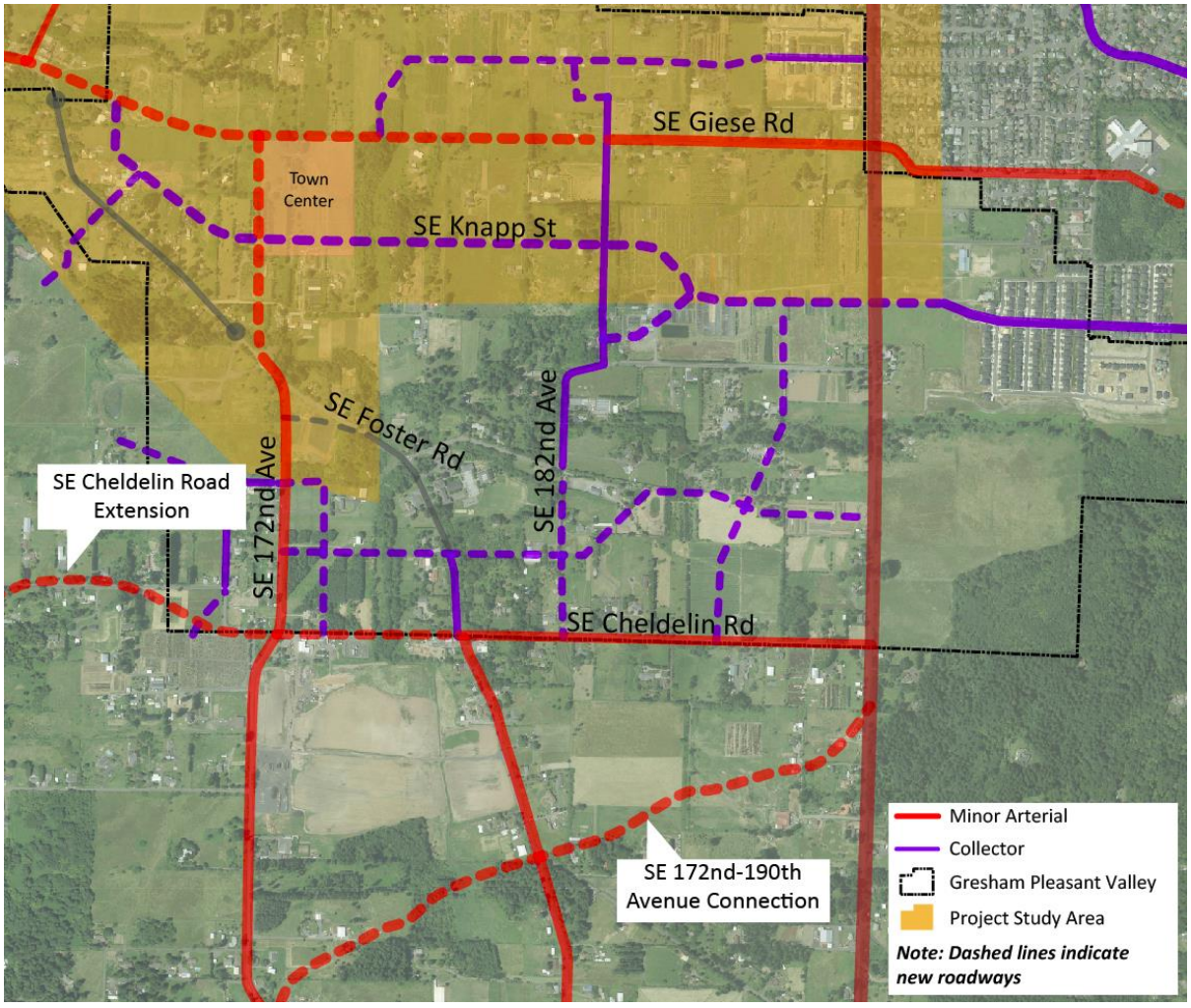
SE Sager Road Extension, and SE 172nd-190th Avenue Connection. Roadway cross-sections within the study area were assumed based on the City of Gresham Transportation System Plan (Reference 3). Table 1 summarizes the assumed roadway cross-sections and attributes in the study area and Figure 1 shows the future planned connections near the Pleasant Valley TSP study area and town center.

**Table 1. Assumed Future Cross-Sections**

| Functional Classification | Cross Section | Posted Speed Limit | Sidewalks | Bike Lanes | Right-of-Way Width |
|---|---|---|---|---|---|
| Jenne Road | 2-3 lanes[1] | 45 mph | Multi-Use Path | No | 47'-59' |
| SE 174th Avenue | 2-3 lanes[1] | 45 mph | Yes | Yes | 61'-72' |
| Powell Boulevard | 3-5 lanes[2] | 40 mph | Yes | Yes | 104' |
| SE 190th Avenue | 4-5 lanes[2] | 35-40 mph | Yes | Yes | 104' |
| Arterials[2] | 3 lanes | 35 mph | Yes | Yes | 80' |
| Collectors[2] | 2 lanes | 35-45 mph | Yes | Yes | 75' |
| Locals[2] | 2 lanes | 25 mph | Yes | No | 60' |

[1]*Turn lanes are provided on Jenne Road and SE 174th Avenue where needed.*
[2]*City of Gresham Transportation System Plan*

**Figure 1 - Future Planned Network**



## TRAVEL DEMAND MODEL ANALYSIS

The most-recent Metro 2035 Regional Transportation Plan model[1] was modified for each alternative to reflect the roadway networks shown in Figure 2 through Figure 5. *Appendix A includes the travel demand model network characteristics, volume capacities, and lane results.*

Model volumes were refined using the same process detailed in the *Existing and Future Planned Conditions Report*. Model volumes reflect weekday AM (7-9 AM) and PM (4-6 PM) peak two-hour periods. These volumes were converted to hourly volumes based on a 0.55 factor identified by Metro. The volumes were refined using recommended procedures for producing travel forecasts from *NCHRP 765: Analytical Travel Forecasting Approaches for Project-Level Planning and Design* (Reference 4), the update to *NCHRP 255: Highway Traffic Data for Urbanized Area Project Planning and Design*.

Volumes were developed for Alternatives 1, 2, and 3. Alternative 4 volumes were developed based on Alternative 3; the networks are identical with the exception of the Jenne Road/Giese Road/Foster Road intersection area and Foster Road classification.

In addition, select link assignments were run for Alternatives 1, 2 and 3 on the roadway links listed below.

- SE Jenne Road (north of SE McKinley Road)
- SE Foster Road (south of SE Giese Road extension and southeast of SE 172nd Avenue)
- SE 172nd Avenue (south of SE Foster Road)
- SE 190th Avenue (north of SE Giese Road)
- SE 174th Avenue (south of SE Jenne Road, Alternative 2 only)

The select link assignments indicate where traffic volumes on the link are coming from/going to, helping identify overall traffic patterns. *Appendix B includes the select link assignments from the travel demand model for the three networks.* Key trends observed by comparing the select link assignments include:

- In Alternative 2, Jenne Road has notably lower volumes north of SE McKinley Road and attracts very little volume to/from SE 172nd Avenue or SE Foster Road. Instead, vehicles on SE 172nd Avenue and SE Foster Road use the SE 174th Extension.
- Volume are higher on SE 172nd Avenue in Alternative 2, with a large portion of vehicles on SE 172nd using the SE 174th extension to connect to/from SE 162nd Avenue.
- Volumes are higher on SE Foster Road south of SE 172nd Avenue in Alternative 2. More vehicles come to/from SE Tillstrom Road compared to the other alternatives. While the majority of vehicles to/from the

[1]2035 Regional Transportation Plan Model, Scenario 4178, 2014 update, weekday AM (7-9AM) and PM (4-6PM) Runs

north use the SE 174th Extension to connect to SE 162nd Avenue, a significant portion also use SE Foster Road to connect to SE 122nd Avenue.

- The majority of vehicles on SE 190th Avenue in the study area are traveling between SE 172nd Avenue to the south of the study area and 182nd Avenue to the north of the study area. Volumes do not significantly change on SE 190th Avenue between the alternatives. The SE 174th Extension primarily serves vehicles destined to SE 162nd Avenue or farther east.
- When Foster is converted to a local road under Alternative 1, volumes are notably lower compared to Alternative 3 where Foster carries significant traffic between Jenne Road and SE 172nd Avenue.

## FUTURE TRAFFIC OPERATIONS

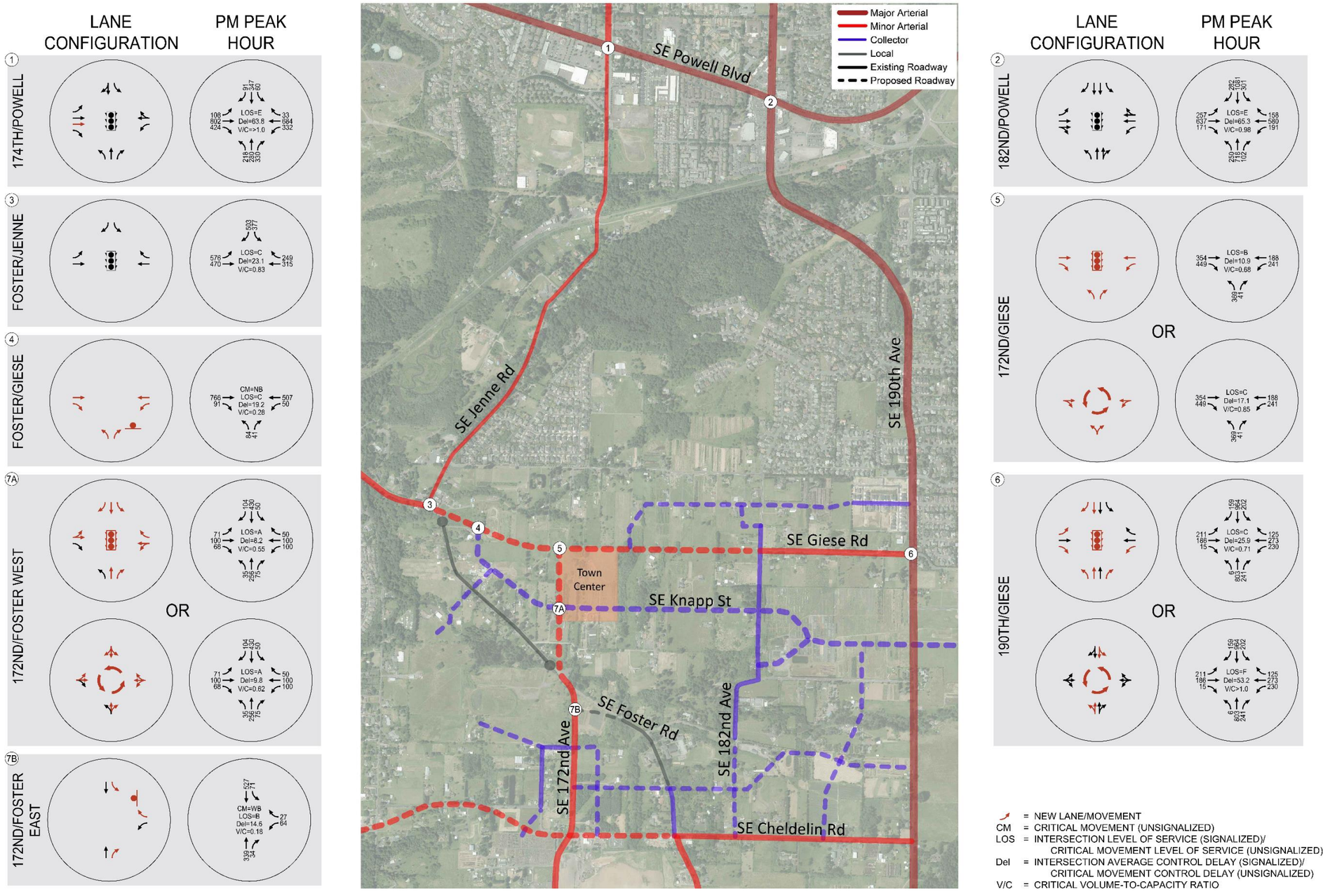
An operational analysis was conducted for the study intersections to assess how well they are able to accommodate the future traffic demands in each alternative. The analysis was performed using Synchro 9 and SIDRA roundabout analysis software in accordance with the procedures stated in the *2000 Highway Capacity Manual* (HCM, Reference 5).

The Pleasant Valley TSP identifies signalization of SE Foster Road/SE Giese Road, SE Giese Road/SE 172nd Avenue, SE Giese Road/SE 190th Avenue, and SE Foster Road/SE 172nd Avenue. Signal warrants were evaluated in the *Existing and Future Planned Conditions Report*. Study intersections with local and collector streets were first evaluated as stop-control intersections. If stop-control results in unacceptable operations and signal warrants are met, a signal and/or roundabout was evaluated. Left turn types (permissive and protected) were determined using the *Signal Timing Manual, Second Edition* (Reference 6) methodology. Turn lanes were implemented where needed to meet operational standards.

Roundabouts tend to require fewer approach lanes but have a larger footprint at the intersection itself. At the Jenne Road/Foster Road/Giese Road intersection, roundabouts were not evaluated in Alternatives 1, 2, and 4 due to property impacts and environmental constraints associated with the stream crossing under the intersection. A roundabout was evaluated at this intersection in Alternative 3. If signalized, the intersection requires left and right turn lanes on all approaches to meet operational standards, creating a larger intersection footprint. A roundabout was evaluated and was found to operate acceptably with one to two entrance lanes on each approach. With the intersection's shift to the east, less geometric constraints are expected and either a signal or roundabout could be explored moving forward.

Future traffic control devices, lane configuration assumptions, and traffic volumes and operations are shown in Figure 2 through Figure 5 and are summarized in Table 2.

**Figure 2 - Alternative 1 Network and Operations Results**




= NEW LANE/MOVEMENT
CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/ CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/ CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

**Figure 3 - Alternative 2 Network and Operations Results**

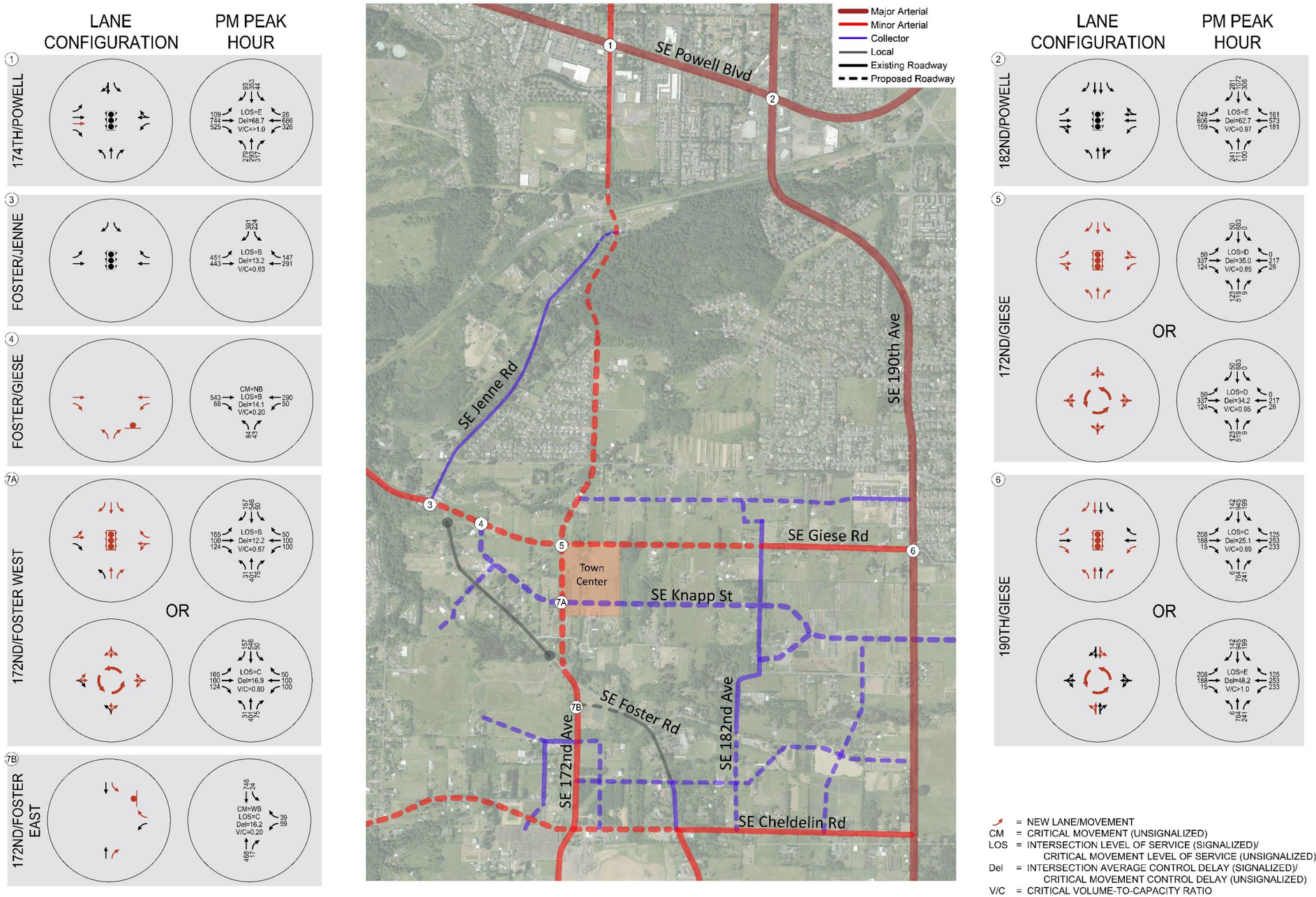


**Figure 4 - Alternative 3 Network and Operations Results**

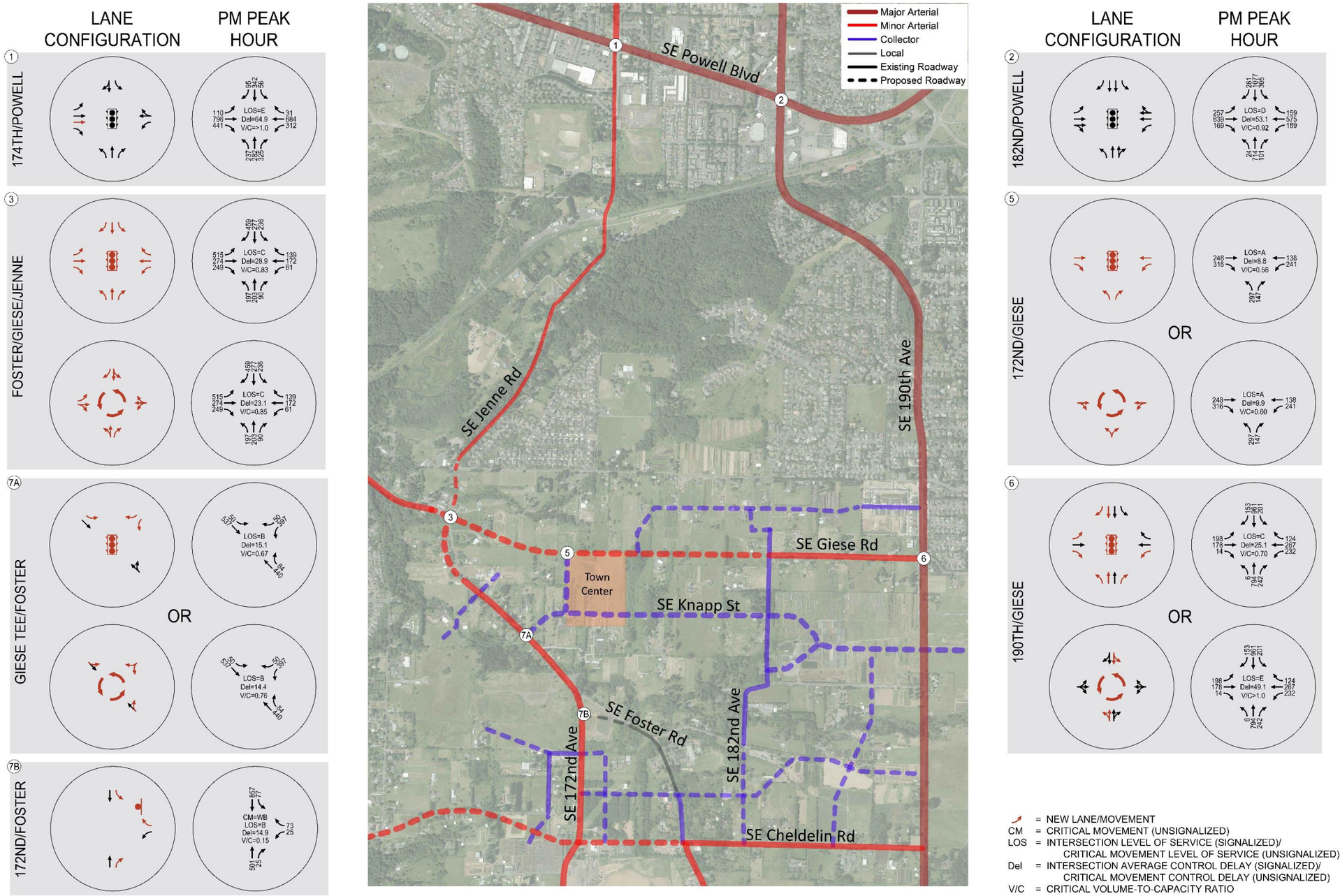


**Figure 5 - Alternative 4 Network and Operations Results**

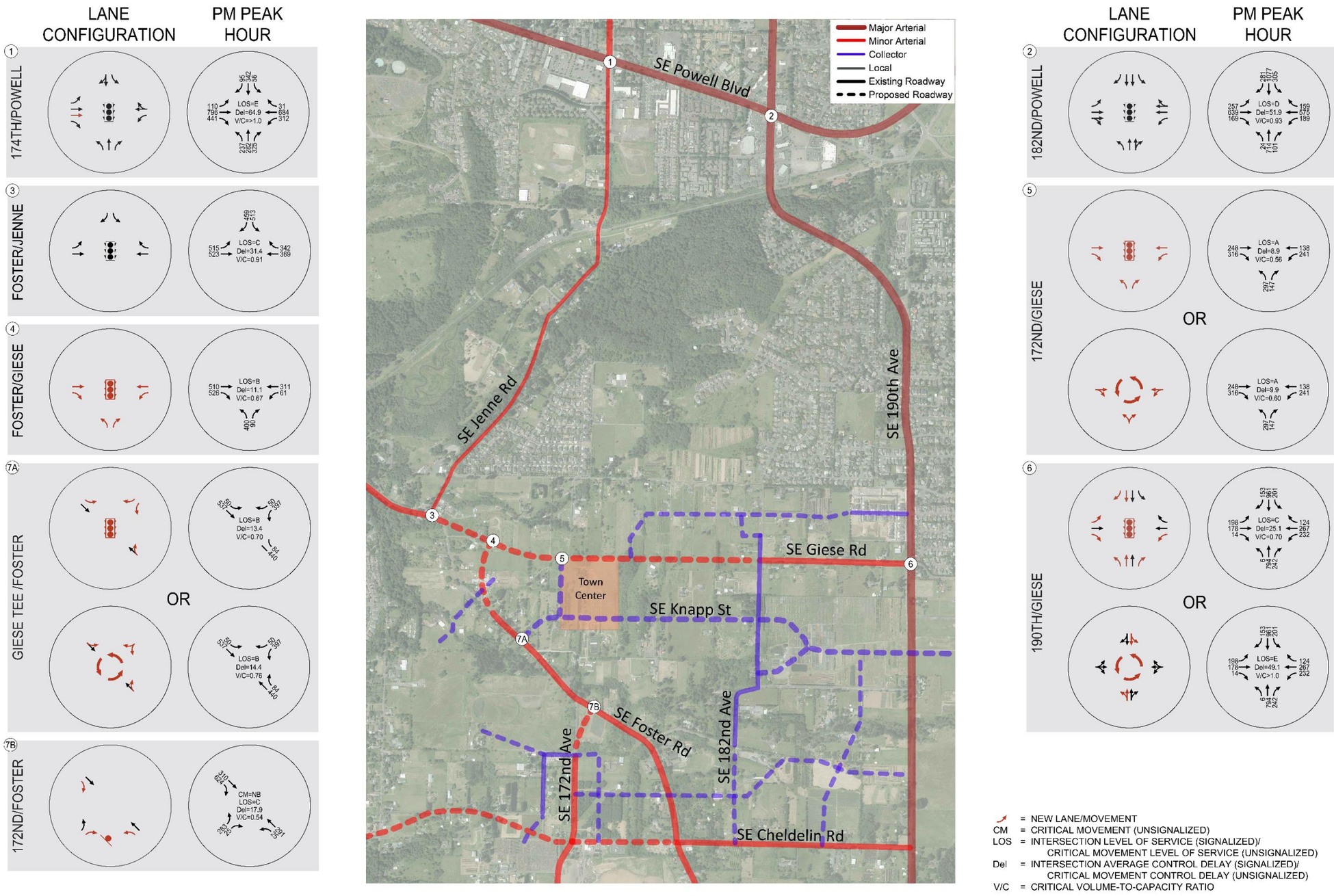


**Table 2. Key Facility Results**

| Intersection | Weekday PM Peak Hour Operations Results | | | |
|---|---|---|---|---|
| | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 |
| 174th Avenue/ Powell Boulevard | LOS E V/C > 1.0 | LOS E V/C > 1.0 | LOS E V/C > 1.0 | LOS E V/C > 1.0 |
| 182nd Avenue/ Powell Boulevard | LOS E V/C = 0.98 | LOS E V/C = 0.97 | LOS D V/C =0.92 | LOS D V/C =0.92 |
| Jenne Road/ Foster Road | LOS C V/C = 0.83 | LOS B V/C = 0.63 | LOS C[1] V/C = 0.83 | LOS C V/C = 0.91 |
| **Roadway Segment** | **Weekday PM Peak Hour Traffic Volumes** | | | |
| | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 |
| Foster Road – West of Jenne Road | 1,046 EB 818 WB | 894 EB 682 WB | 1,038 EB 828 WB | 1,038 EB 828 WB |
| Powell Boulevard – West of Jenne Road | 1,334 EB 993 WB | 1,378 EB 1038 WB | 1,347 EB 1,016 WB | 1,347 EB 1,016 WB |

[1]*Jenne Road/Foster Road intersects with the Giese Road extension as a four-leg intersection in Alternative 3*

As shown, Alternative 2 results in the lowest traffic volumes on Foster Road west of Jenne Road and Alternative 1 results in the lowest traffic volumes on Powell Boulevard west of Jenne Road. SE 174th Avenue/Powell Boulevard is forecasted to operate over capacity during the weekday PM peak hour for all alternatives. Volumes on SE 174th Avenue at Powell Boulevard are higher under Alternative 2 than the other alternatives (weekday PM peak hour segment volume of 2,093 south of Powell Boulevard, compared to 1,931 in Alternative 1), resulting in a slightly higher average delay at the intersection. Volumes at SE 182nd Avenue/Powell Boulevard are slightly lower under Alternative 2 than the other alternatives, but the difference is not as significant as at SE 174th Avenue/Powell Boulevard.

The intersection of SE 190th Avenue/Giese Road is forecasted to operate over capacity as a roundabout under all alternatives. As a signal, the intersection is projected to operate acceptably for all alternatives. The SE 174th Avenue/Powell Boulevard and SE 182nd Avenue/Powell Boulevard intersections are not projected to meet jurisdictional operational standards during the future weekday PM peak hour under all alternatives. All other study intersections operate acceptably and meet their respective LOS and/or v/c ratio standards with the assumed intersection control shown in Figures 2 through 5. *Appendix C includes the future conditions Synchro traffic analysis worksheets and Appendix D includes the future conditions SIDRA analysis worksheets.*

## MITIGATIONS

Mitigations were explored for the SE 174th Avenue/Powell Boulevard and SE 182nd Avenue/Powell Boulevard intersections. At the intersection of SE 174th Avenue/Powell Boulevard, an additional of a northbound left-turn lane and signal retiming would improve operations, meeting operational standards for the intersection. Two receiving lanes would need to be provided on westbound Powell Boulevard, which could be merged before impacting structures along Powell Boulevard. At the intersection of SE 182nd Avenue/Powell Boulevard, an additional northbound left-turn lane and signal retiming would improve operations, meeting operational standards for the intersection. However, the intersection is not projected to operate over capacity and

additional turn lanes would have several land use impacts. *Appendix D includes the mitigated future conditions Synchro traffic analysis worksheets.*

# NEXT STEPS

This analysis establishes the projected operational performance of the alternatives and informs the geometric needs for conceptual design and cost estimating. The operational assessment will be used alongside the environmental review, cost estimates, and goals and objectives to determine which alternatives to advance in the screening process.

## REFERENCES

1. Kittelson & Associates, Inc. *Pleasant Valley TSP Refinement Existing and Future Planned Conditions*. 2018.
2. City of Portland. *City of Portland Transportation System Plan*. 2016.
3. City of Gresham. *City of Gresham Transportation System Plan*. 2013.
4. Transportation Research Board. NC*HRP Report 765: Analytical Travel Forecasting Approaches for Project-Level Planning and Design*. 2014.
5. Transportation Research Board. *2000 Highway Capacity Manual*. 2000.
6. Transportation Research Board. *Signal Timing Manual, Second Edition*. 2015.

# Appendix A Travel Demand Model Results

# Appendix B Select Link Assignments from the Travel Demand Model

# Appendix C Future Traffic Conditions Synchro Worksheets

# Appendix D Future Traffic Conditions Sidra Worksheets