

TECHNICAL MEMORANDUM #4

Woodburn Southwest Subarea Transportation Plan

Alternatives Analysis Memorandum (Subtask 5.1)

January 10, 2025

Project# 29264

To: Chris Kerr, City of Woodburn

Heidi Hinshaw, City of Woodburn

From: Matt Hughart, AICP, McKenna Stramler, Russ Doubleday, AICP, and Julia Kuhn, PE

As highlighted in the No Build Analyses, the anticipated growth in the southwest part of the City and the inclusion of the Urban Reserve Area lands into the Urban Growth Boundary (UGB) necessitates a different and more refined set of transportation connectivity, safety and capacity needs for inclusion in the City's adopted Woodburn Transportation System Plan (TSP). In particular, the need to provide additional connectivity for people driving, walking and riding bikes in the area between Butteville Road and Settlemier Avenue to the south of OR 214 is important to support continued economic and residential growth. The enclosed memo builds upon the No Build Analyses and presents three conceptual transportation network alternatives to support this growth. The three alternatives are generally characterized by the following changes:

- Alternative #1 – This alternative fundamentally maintains the study area's existing roadway network and accommodates the conceptually envisioned future network as outlined in the TSP. In order to support the future development of the lands within the UGB expansion area, the existing sight distance constraint at the Butteville Road/Parr Road intersection will need to be addressed, Parr Road will need to be upgraded from its current rural, two-lane configuration to a 3-lane street with sidewalks and bike lanes, and additional collector and local street connectivity changes will be needed. Some of these changes are anticipated to be completed as part of site frontage improvements and/or through conditions of approval placed on future land development. This alternative also includes the connection of the planned South Arterial to Parr Road.
- Alternative #2 – Rather than connect the planned South Arterial to Parr Road in Alternative #1, this alternative shows the South Arterial extending all the way to Butteville Road on a completely separate east-west alignment. This connection to Butteville Road will be located approximately one-quarter mile south of and will replace the existing Parr Road/Butteville intersection.
- Alternative #3 – This alternative is similar Alternative #2 but connects the South Arterial to I-5 via a partial interchange along Butteville Road. Although a full interchange is unlikely to receive approval from ODOT considering the close spacing to the nearby OR 214/OR 219 interchange, a modification to Alternative #3 that provides a full interchange was assessed to determine its significance on larger local and regional traffic patterns.

As described herein, the alternatives evaluation revealed the following:

- There are minimal differences in forecast traffic volumes/operations between Alternatives #1 and #2.

- The partial I-5 connection under Alternative #3 increased demand along the South Arterial compared to Alternatives #1 and #2. However, the increased demand along the South Arterial did not significantly lessen projected demand along the OR 214 corridor.
- The full interchange modification to Alternative #3 did not significantly increase demand along the South Arterial when compared to the partial interchange.
- There are several intersections that will require changes to the existing traffic control and/or lane configurations regardless of the alternative considered.
- If the Parr Road/Butteville Road intersection remains in its current location, the existing sight distance constraints will need to be addressed to support urbanization of the UGB expansion area.

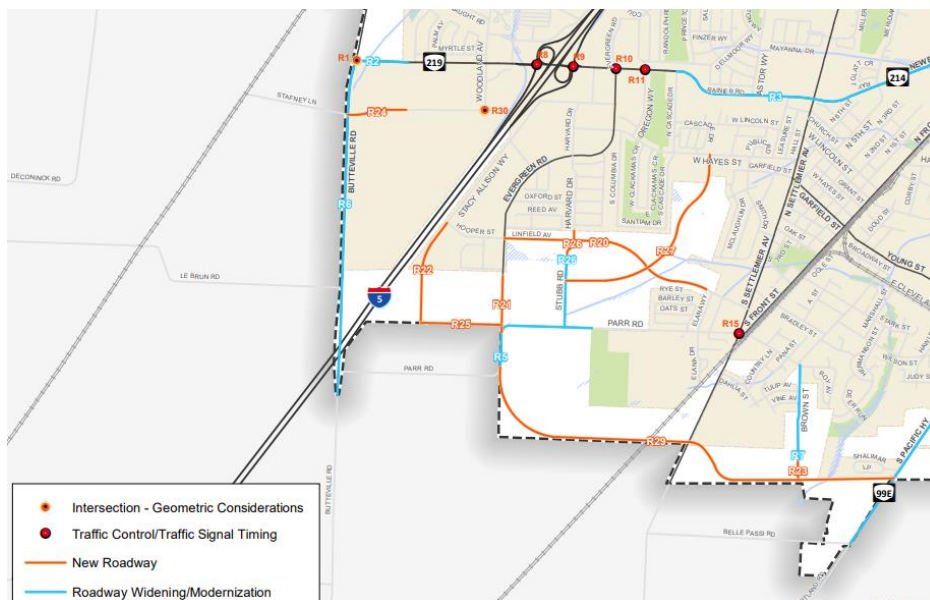
Detailed Description of the Alternatives

Exhibit 1 illustrates the currently planned roadway plan elements in the TSP. The projects in the adopted TSP are limited to the City’s current UGB. As such, there are no planned circulation improvements that would serve the UGB expansion area. Other needed changes to the TSP projects include:

- Because it was outside of the UGB, a significant portion of the Parr Road corridor east of Butteville Road is not identified in the TSP for urban upgrades. This corridor plays an important role in serving employment, residential and retail lands on both sides of I-5. With the inclusion of the Urban Reserve area, the City can now plan for urban upgrades of Parr Road.
- The location and alignment of the future South Arterial was general in nature. More details on how the South Arterial could connect to Butteville Road, particularly to provide a continuous east-west connection through the southern part of the City is needed.
- There are no identified intersection traffic control improvements at many of the existing and future intersections that will serve the existing UGB and Urban Reserve Area.

For these reasons, new circulation alternatives were investigated to help complete the transportation network with the inclusion of the Urban Reserve Area lands and address projected deficiencies.

Exhibit 1 Roadway Plan Elements (Source: Woodburn TSP Figure 3)



ALTERNATIVE #1

Alternative #1 builds upon the conceptually envisioned TSP circulation projects with changes that would address the existing system limitations. These circulation changes include:

- Realignment of the western extent of Parr Road so that it connects to Butteville Road further to the south. This realignment would address the existing sight distance deficiency at the Butteville Road/Parr Road intersection.
- A refined alignment of the South Arterial so that it connects to Parr Road at the existing east to north bend in the corridor. This connection would eliminate the sharp curve in Parr Road and form a new intersection with appropriate geometry and intersection traffic control. Parr Road, the previously noted realignment of its western extents, and the South Arterial would then constitute east-west travel through southern Woodburn.
- Parr Road is upgraded to urban minor arterial standards to accommodate its role in providing a key east-west travel corridor through the Urban Reserve Area.
- Stacy Allison Way extended as a collector from its current southerly terminus to Parr Road. South of Parr Road, Stacy Allison Way would be extended to provide access to a future network of local industrial streets to serve future development.

Exhibit 2 conceptually illustrates the Alternative #1 projects consistent with the TSP Figure 3 mapping format.

Exhibit 2 Alternative #1 Roadway Plan Elements



ALTERNATIVE #2

Alternative #2 incorporates a new alignment of the western end of the South Arterial that is independent of the Parr Road corridor. Specific circulation projects include:

- The South Arterial would connect to Butteville Road approximately ¼-mile to the south of Parr Road. This alignment would be independent of Parr Road and would help promote continuous east-west travel along the southern extents of Woodburn. This extension would also serve as the primary east-west corridor through the Urban Reserve Area.
- With the new South Arterial connection to Butteville Road, the existing Parr Road would be disconnected from Butteville Road. Parr Road would revert to a local industrial roadway network serving existing and future redevelopment of the adjacent parcels.
- Stacy Allison Way would be extended as a collector from its current southerly terminus, connecting to Parr Road, and ultimately connecting to the new South Arterial alignment.
- Evergreen Road would be extended as a collector from its current southerly terminus at Parr Road and ultimately connecting to the South Arterial.

Exhibit 3 conceptually illustrates the Alternative #2 projects consistent with the TSP Figure 3 mapping format.

Exhibit 3 Alternative #2 Roadway Plan Elements



ALTERNATIVE #3

This alternative is identical to Alternative #2 except that it includes a partial interchange with I-5 using Butteville Road. Specific circulation projects include:

- All of the projects identified and described under Alternative #2.
- A new partial interchange to I-5. The partial interchange would be limited to serving northbound exiting movements from I-5 and southbound entering movements to I-5. These movements would be served through new interchange ramps that would connect to the Butteville Road corridor. Specifically, a northbound off-ramp that would connect to Butteville Road forming a new intersection with the South Arterial and a include a looping southbound on-ramp to I-5 accessed off Butteville Road on the west side of the freeway.

Exhibit 4 conceptually illustrates the Alternative #3 projects consistent with the TSP Figure 3 mapping format.

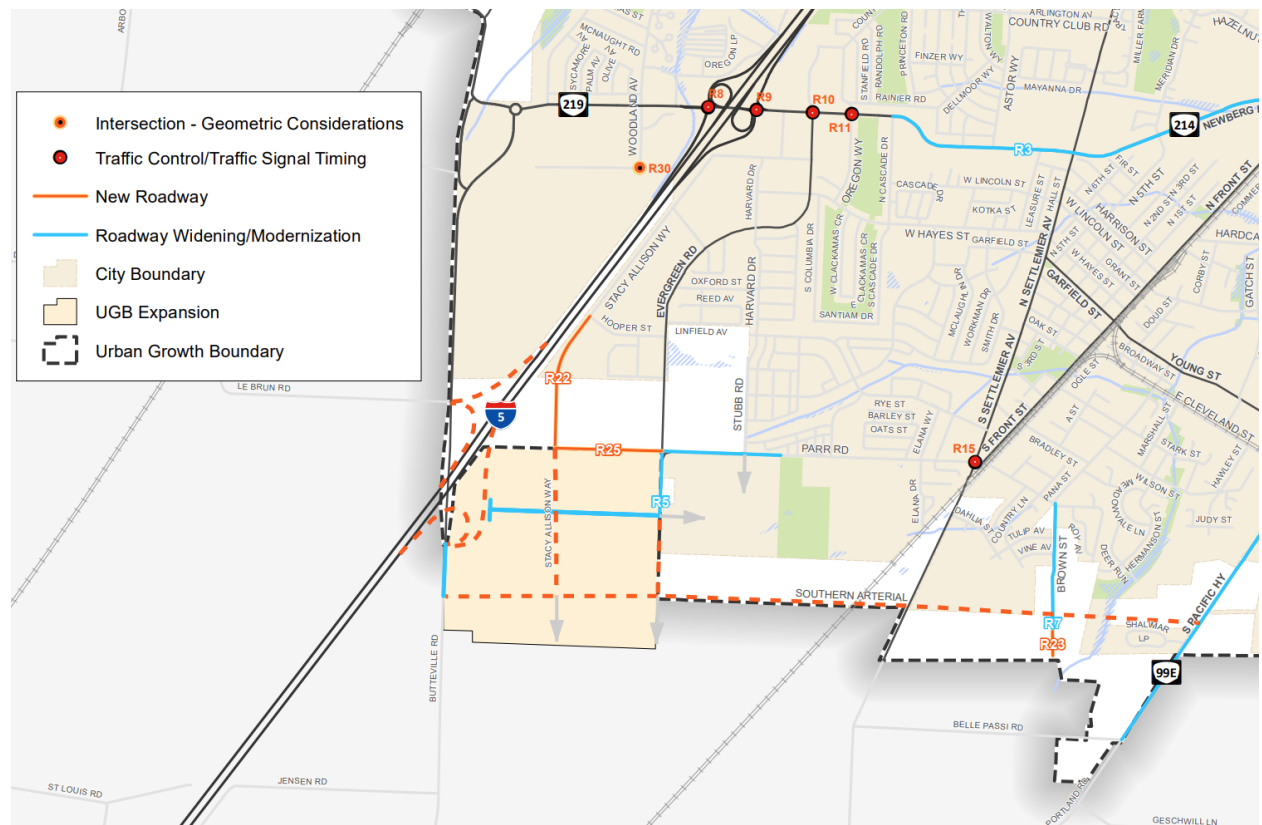
Exhibit 4 Alternative #3 (with Partial I-5 Interchange) Roadway Plan Elements



ALTERNATIVE #3 VARIATION WITH A FULL INTERCHANGE

Although it is recognized that any interchange with I-5 is likely to be difficult to justify and design considering the close spacing to the existing I-5/OR 214/OR 219 interchange, a variation to Alternative #3 was included that would provide a full access interchange to Butteville Road. Building upon the overall circulation elements from Alternative #3, Exhibit 5 conceptually illustrates one potential full interchange layout configuration consistent with the TSP Figure 3 mapping format. This includes a partial cloverleaf interchange configuration that keeps the interchange ramps fully within Woodburn’s UGB. While this represents a more likely and buildable geometric configuration, it is purely conceptual and for illustrative purposes.

Exhibit 5 – Alternative #3 (with Full I-5 Interchange) Roadway Plan Elements



Scope of the Evaluation

The future intersection operations were identified at the following intersections under each alternative:

1. OR 219/Butteville Road;
2. OR 219/Woodland Avenue;
3. OR 214/I-5 SB Ramps;
4. OR 214/I-5 NB Ramps;
5. OR 214/Evergreen Road;
6. Evergreen Road/Stacy Allison Way;
7. Evergreen Road/Hayes Street;
8. Hayes Street/Killian Spring Drive;
9. Evergreen Road/Harvard Drive;
10. Parr Road/Settlemier Avenue;
11. Parr Road/Kirksey Street;
12. Parr Road/Stubb Road;
13. Parr Road (south)/Butteville Road (modified to Butteville Road/South Arterial under Alternative #2 & #3);
14. Parr Road (north)/Evergreen Road; and
15. Parr Road (south)/Evergreen Road

In addition, Alternatives #1, #2 and #3 include the following future intersections:

15. Parr Road (south)/Evergreen Road/South Arterial (future under Alternative #1);
16. Evergreen Road/South Arterial (future under Alternative #2 and #3);
17. Stacy Allison Way/South Arterial (future under Alternative #2 and #3);
18. Stacy Allison Way/Parr Road (south) (future under Alternative #1, #2, & #3); and
19. Stacy Allison Way/Parr Road (north) (future under Alternative #1, #2, & #3)

Development of Year 2040 Traffic Volumes & Intersection Operations

Working with TPAU, the 2040 Baseline travel demand model used in the TSP was modified to include the major circulation elements from the three noted alternatives. Each of the alternatives includes the updated population and employment forecasts for the year 2040 assuming UGB expansion to include future development in the Urban Reserve Area. As described in Technical Memorandum #3, future year traffic volumes at the study intersections were developed using the methodology included in National Cooperative Highway Research Program (NCHRP) Report 765: *Analytical Travel Forecasting Approaches for Project-Level Planning and Design* (2014).

Intersection operations associated with the forecast intersection traffic volumes for each alternative were evaluated and compared to the applicable performance metrics. Per the existing and No Build analyses, the I-5 ramp terminal intersections are subject to a 0.85 volume-to-capacity (V/C) mobility target whereas the remaining ODOT study intersections have a volume-to-capacity mobility target of 0.90 or 0.95 (depending on the roadway speed). City intersections are subject to the following mobility standards:

- Level of Service (LOS) "E" for signalized intersections
- V/C ratio less than 1.00 regardless of LOS

- V/C ratio of less than 0.90 on the critical movement should be maintained, provided the queues on the critical approach can be appropriately accommodated.

Comparison of the Alternatives

Figures 1A – 3A illustrate the existing and future assumed intersection lane configurations¹ and Figures 1B – 3B illustrate the future year volumes and intersection operations.

In review of the figures, we note the following:

- With the additional planned connectivity in each of the three alternatives, the Evergreen Road/Stacy Allison Way intersection is anticipated to operate at more acceptable operations whereas the Baseline analyses showed that this intersection would need traffic control or geometric changes to operate acceptably. However, future development along the Stacy Allison Way corridor may still trigger the need for future traffic control improvements at this intersection in order to better manage peak hour delays.
- There are no measurable differences between the forecast volumes and resultant intersection operations under each of the three alternatives. The changes being contemplated primarily have connectivity benefits for all users, particularly to support future economic development in this part of the City.
- Like the Baseline analyses, the Evergreen Road/Hayes Street intersection would need traffic control improvement under all of the alternatives to operate acceptably. The following section investigates potential traffic control improvements ranging from signalization to a roundabout.
- Under Alternatives #1 & #2, less than 2,500 vehicles per day (i.e., less than 250 vehicles per hour in both directions combined) are forecast to use the South Arterial to the east of Evergreen Road. Under Alternative #3's partial interchange with I-5, the volumes on the South Arterial to the east of Evergreen Road are forecast to increase to 3,500 vehicles per day.
- The addition of a partial interchange does not provide material changes to the forecast interchange operations at the OR 214/I-5 ramps. Further less than 200 vehicles per peak hour per direction are forecast to use a new partial interchange. This level of volume would need to be considered in light of other costs, benefits and trade-offs and may not align with applicable state and federal policies and requirements.
- Modeling shows the addition of a partial interchange would primarily benefit land uses on the west side of I-5 and existing/future trips to/from the south would heavily utilize the connection.
- Queuing is not expected to vary by any measurable degree along the OR 214 corridor among the alternatives. The exception being at OR 214/Evergreen Road, which is forecast to see a decrease of

¹ At the noted future study intersections, lane configurations and traffic control devices were assumed based on the City of Woodburn's design guidelines for the different roadway functional classifications and maintaining traffic movements on the primary north-south or east-west facilities. The intersection lane configuration assumptions are shown in Figures 1A, 2A, and 3A. Key assumptions include the continuous uncontrolled north-south movements on the Evergreen Road corridor (all the way to the South Arterial when applicable) and continuous uncontrolled east-west movements on the South Arterial east of the Butteville Road intersection.

approximately by three vehicles in the 95th percentile queue for the westbound left movement under all alternatives. Eastbound left turn movement queues are estimated to decrease by approximately four vehicles under Alternatives #2 and #3.

Test of Alternative #3 Full Interchange Concept

As previously noted, Alternative #3 was also modeled with a conceptual full access interchange rather than the previous partial interchange. A close review of the modeling results indicates that despite the benefits of a full interchange with I-5, overall traffic volumes are not forecast to significantly shift amongst the key travel corridors when compared to Alternative #3’s partial interchange form. This lack of major volume shift is summarized in Table 1 below. A closer review of the modeling data suggests that a second full access interchange would have limited benefit to regional through traffic in Woodburn.

Table 1 – Partial vs. Full Interchange Roadway Segment Volume Comparison

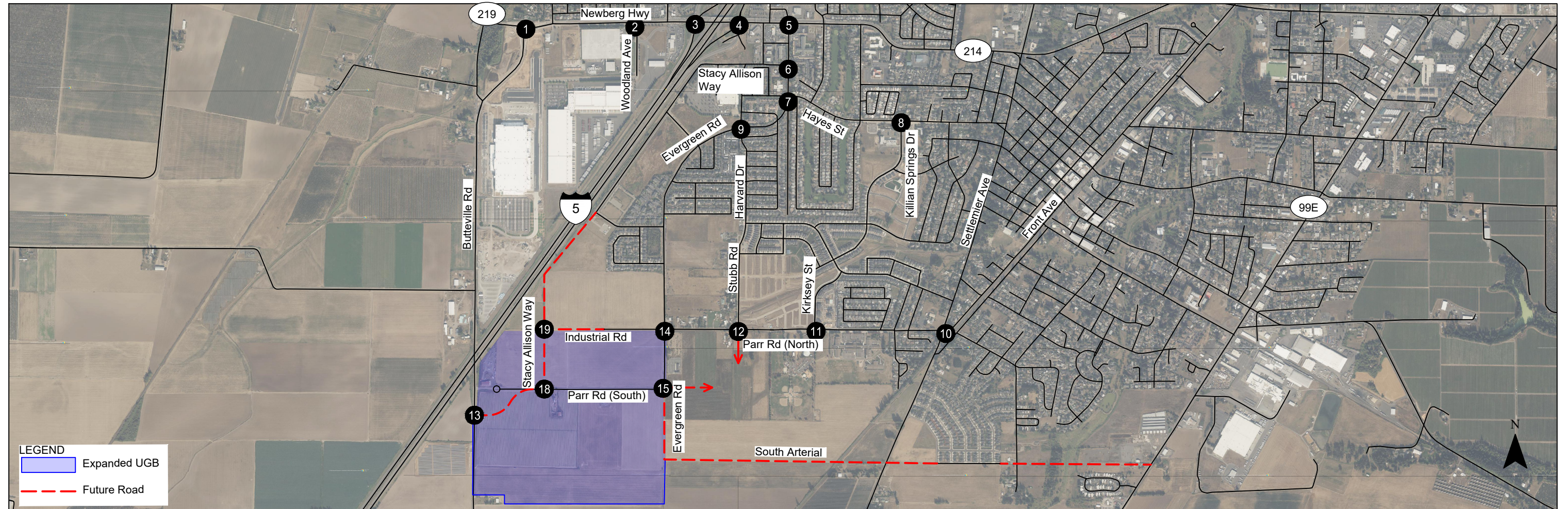
Roadway Segment	Alternative #3 (Partial Interchange with I-5)	Alternative #3 (Full Interchange with I-5)
OR 214 (between Evergreen Drive and Settlemier Ave)	~2,000 veh/hr	~1,975 veh/hr
South Arterial (between Evergreen Drive and Settlemier Ave)	~500 veh/hr	~515 veh/hr
OR 219 (between Butteville Road and Woodland Ave)	~1,625 veh/hr	~1,525 veh/hr
Butteville Road (north of the South Arterial)	~825 veh/hr	~860 veh/hr
South Arterial (east of Butteville Road)	~755 veh/hr	~785 veh/hr

As shown in Table 1,

With the models produced by ODOT’s Transportation Planning Analysis Unit (TPAU), it was determined that a full interchange did not produce a measurable difference to the predicted traffic volumes on the South Arterial compared to Alternative #3 with a partial interchange.

Based on the review of the three alternatives, the City will want to consider a variety of topics, including but not limited to those listed below as a preferred circulation alternative is confirmed:

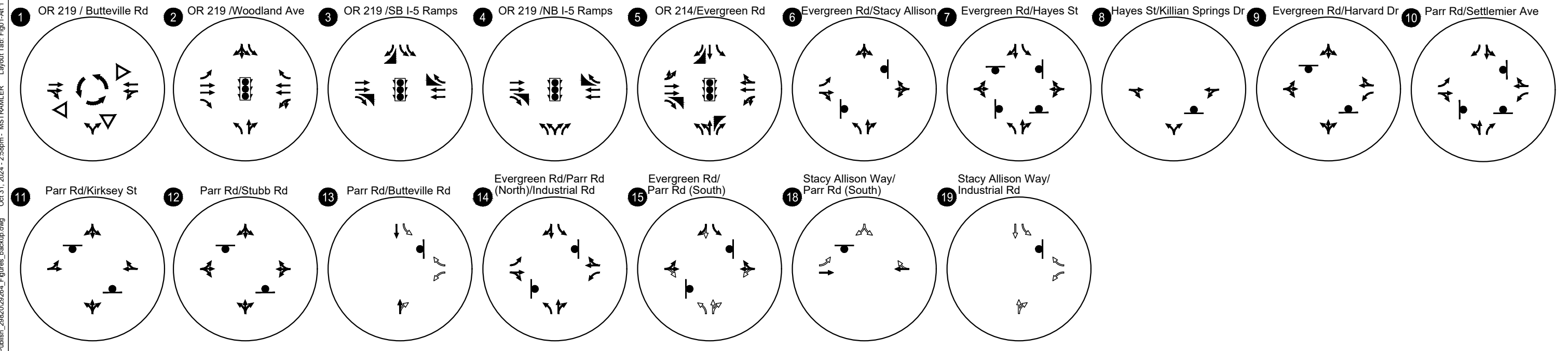
- The existing Parr Road/Butteville Road intersection cannot be maintained in its current location due to the existing sight distance constraints. All three alternatives offer a conceptual solution that either eliminates the intersection or moves it to a location free of the sight distance constraints.
- Classifying and designing the South Arterial as a minor arterial instead of a major arterial per the adopted TSP. Given the forecast traffic volumes and its location along the southern UGB, such a reclassification appears to be reasonable. The role that this new roadway plays in the local and regional freight system also could be considered through specific access management policies.
- The appropriate designation for Parr Road (south) between Stacy Allison Way and Evergreen Road if the south Arterial is extended to Butteville Road. This section of existing roadway would have reduced importance in overall levels of regional connectivity and would likely function more akin to the local industrial designation.
- The need for future environmental, planning and design studies that may be needed if the City seeks an exception to propose a new partial interchange with I-5 (more information on this is discussed below).
- Any new potential funding sources and/or cost-sharing mechanisms to enable future connectivity improvements to be made.
- The appropriate location of both on-street bicycle facilities, sidewalks and off-street multi-use paths can be planned to provide for local and area connectivity between the newly developing areas as well as the established commercial, employment, residential and school locations within the City.
- The adoption of new intersection traffic control measures at the Butteville Road/South Arterial intersection.
- The adoption of new intersection traffic control measures at the Evergreen Road/Hayes Street intersection (see following section).



LEGEND

- Expanded UGB
- Future Road

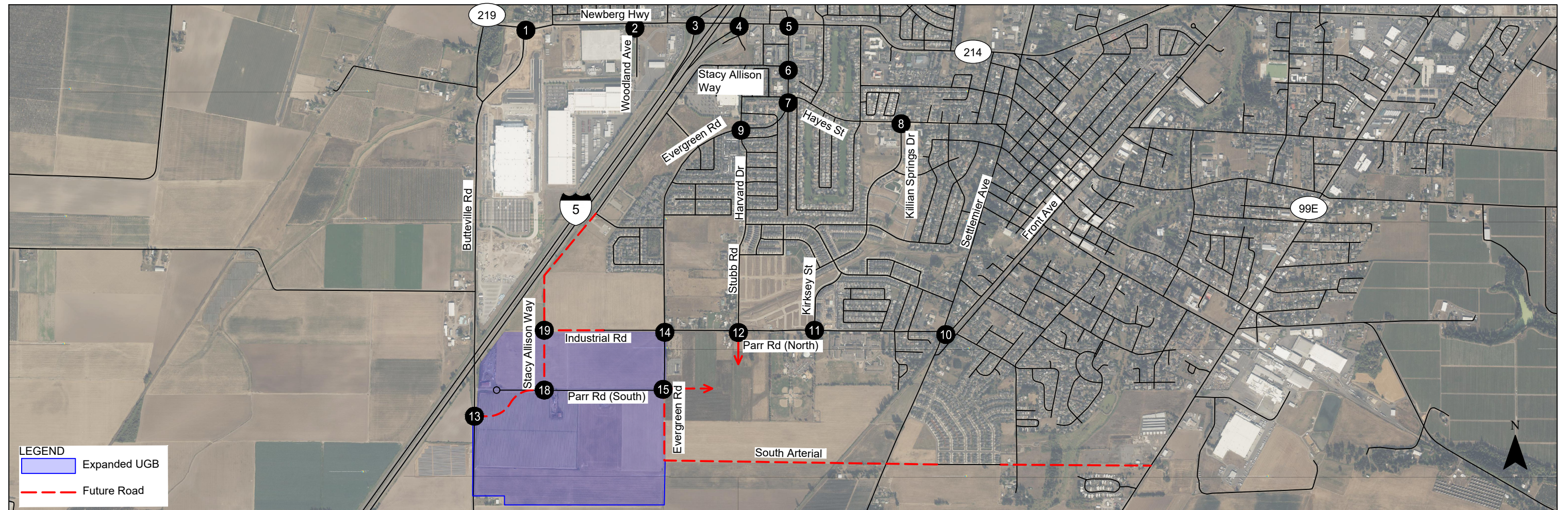
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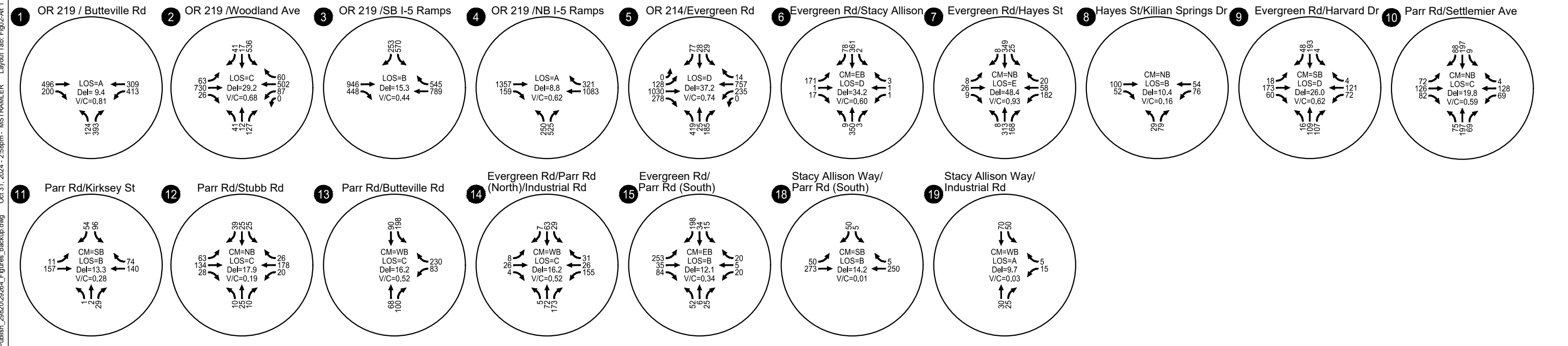
Alternative 1
2040 Assumed Lane Configurations & Traffic Control
Woodburn, OR

Figure
1A



LEGEND

- Expanded UGB
- Future Road

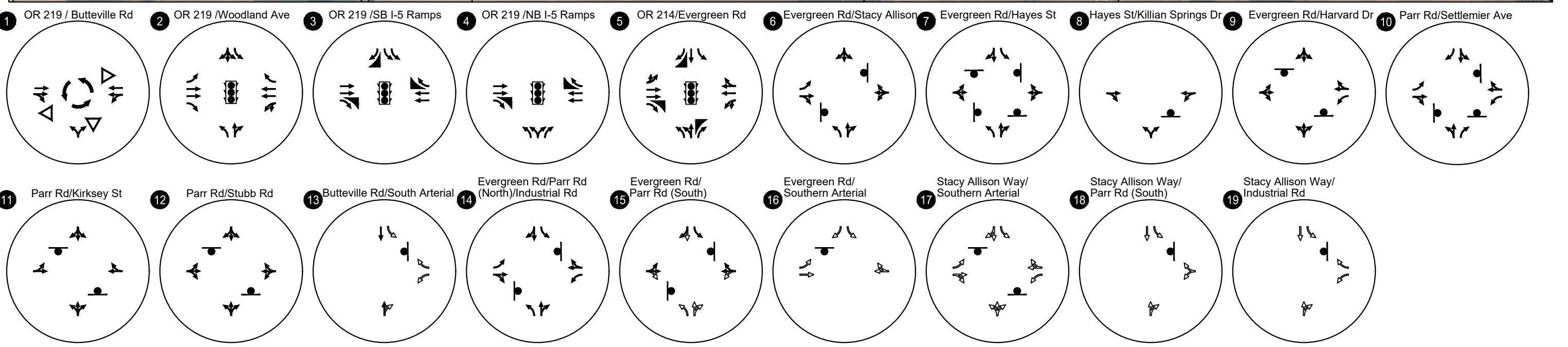
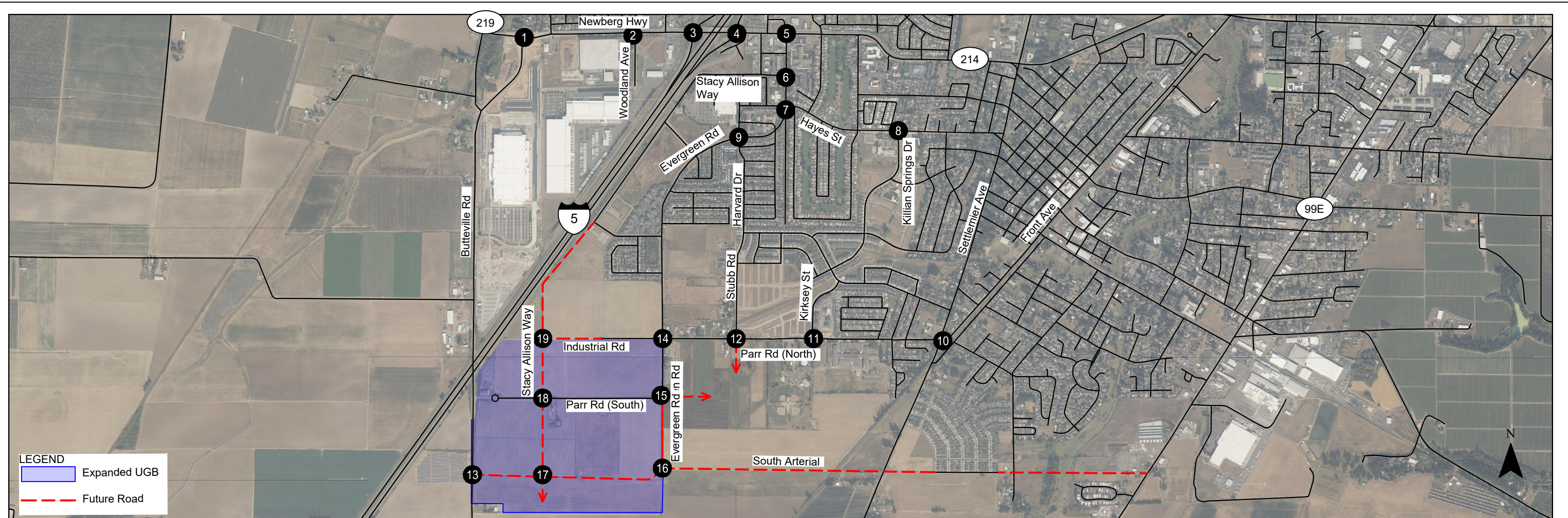


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Alternative 1
2040 Weekday PM Peak Hour Traffic Conditions
Woodburn, OR

Figure 1B

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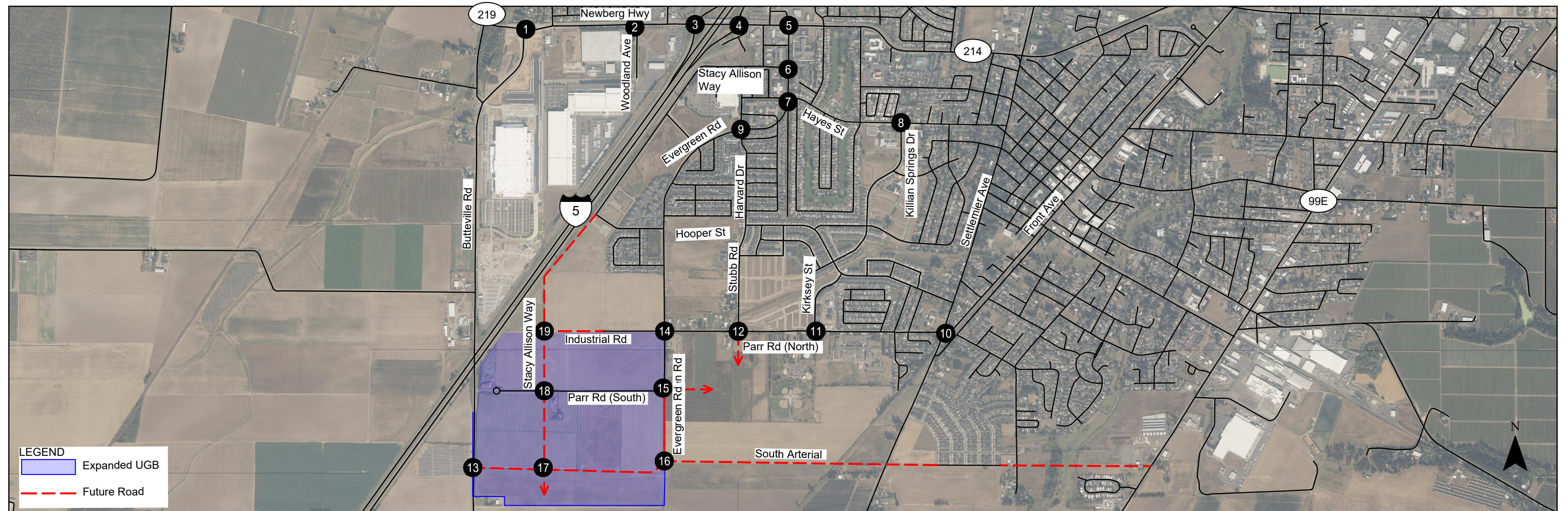


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Alternative 2
 2040 Assumed Lane Configurations & Traffic Control
 Woodburn, OR

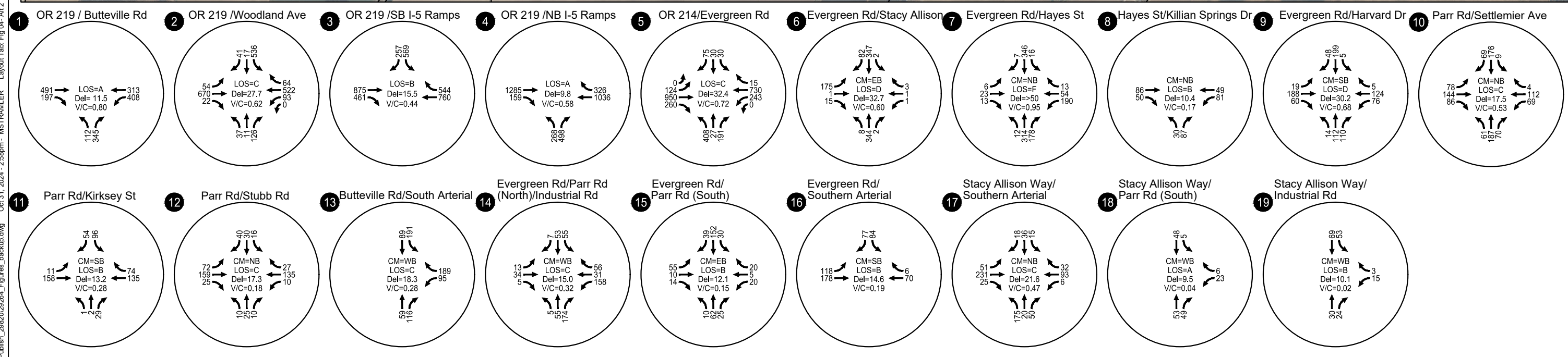
Figure
 2A

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LEGEND

- Expanded UGB
- Future Road

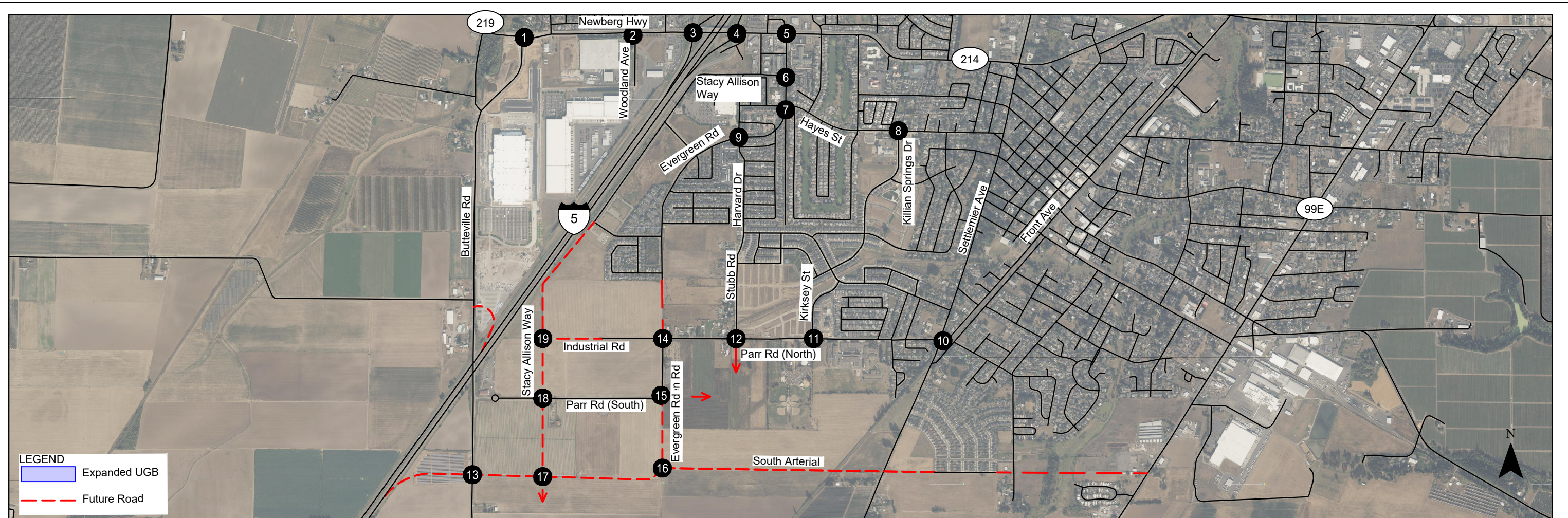


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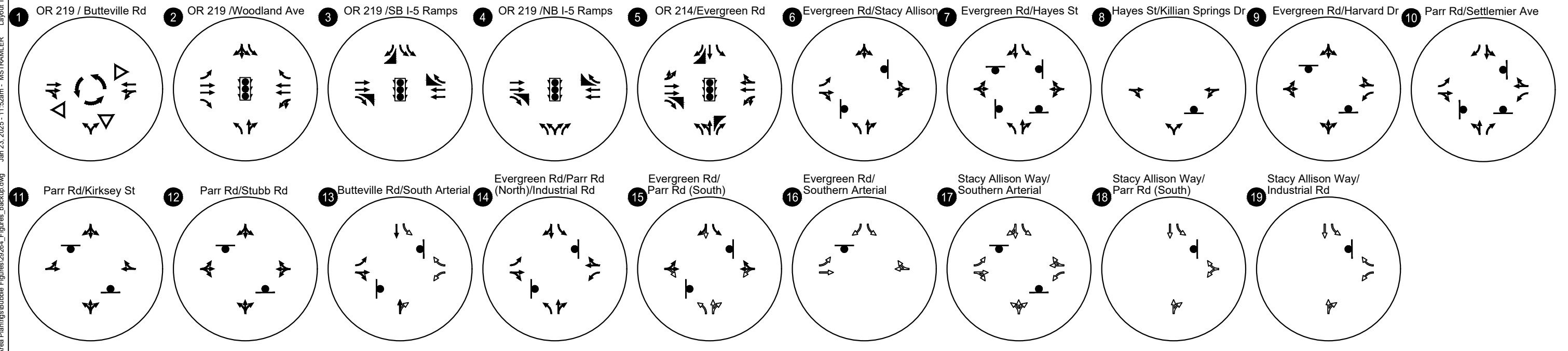
Alternative 2
 2040 Weekday PM Peak Hour Traffic Conditions
 Woodburn, OR

Figure 2B

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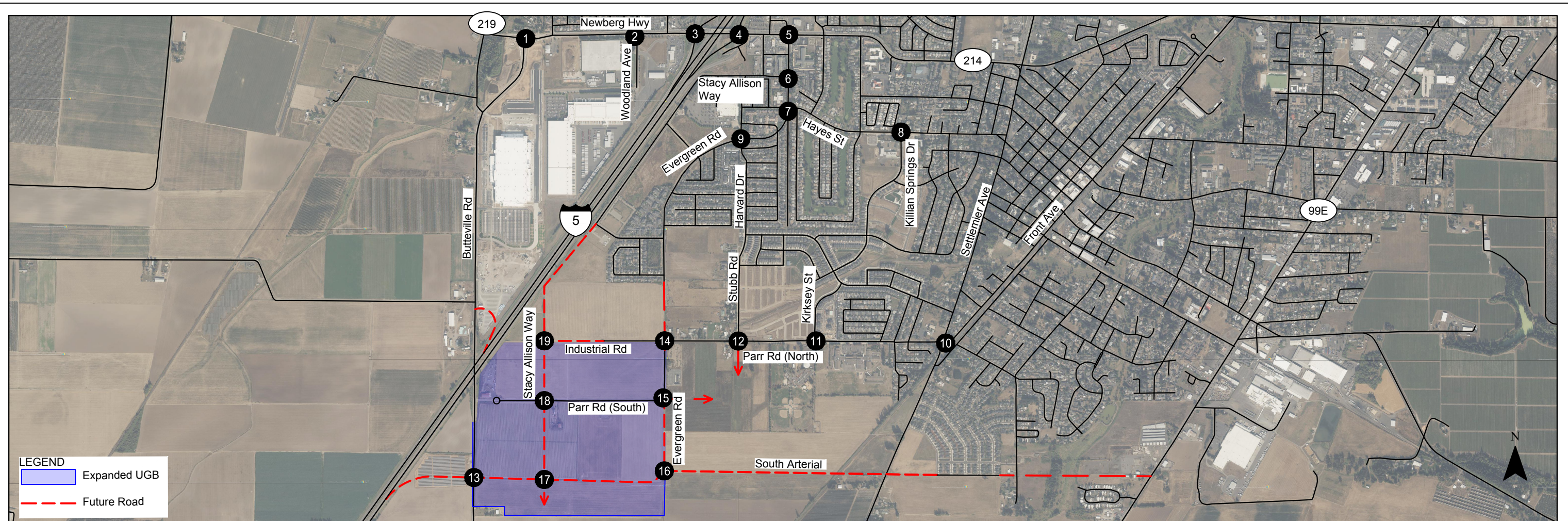
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Alternative 3
2040 Assumed Lane Configurations & Traffic Control
Woodburn, OR

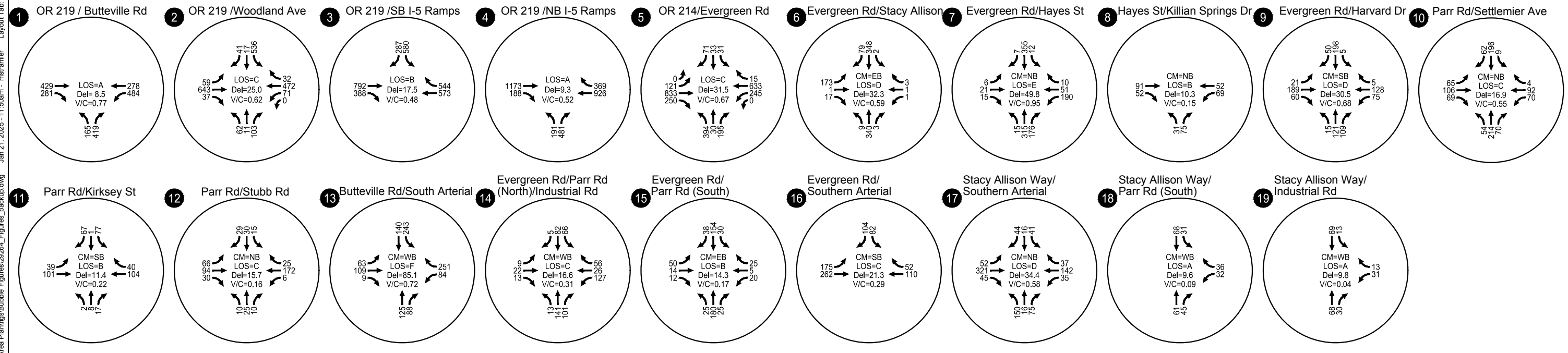
Figure
3A



LEGEND

- Expanded UGB
- Future Road

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Alternative 3
2040 Weekday PM Peak Hour Traffic Conditions
Woodburn, OR

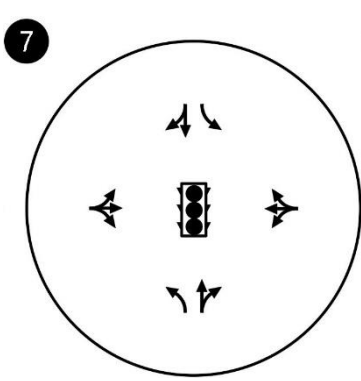
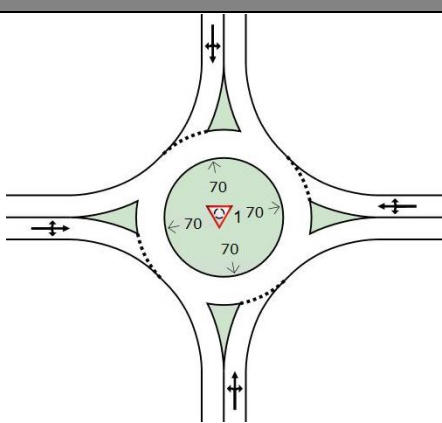
Figure 3B

Evergreen Road/W Hayes Street Intersection Traffic Control Improvements

Based on the review of the alternatives, the Evergreen Road/W Hayes Street intersection is forecast to operate below the Woodburn mobility standards under all three alternatives. A signal warrant analysis was conducted at the intersection using the future forecast volumes in all three alternatives per the guidelines and procedures outlined in the *Manual on Uniform Traffic Control Devices, 11th Edition*. Under all three alternatives, the intersection is forecast to meet the volume-based planning-level warrants for signalization. *The signal warrant worksheets are in Appendix D.*

Although future volumes are expected to warrant signalization, mitigation strategies have been identified that also include a roundabout. Using the projected traffic demands for all three alternatives, Table 1 summarizes the 2040 weekday PM peak hour operational findings under a signalization scenario and a single lane roundabout scenario. As shown, both forms of traffic control would restore the intersection to acceptable LOS and V/C standards with the single lane roundabout providing slightly better operations. *The 2040 traffic signal and roundabout traffic operations are provided in Appendix E and Appendix F, respectively.*

Table 2 – Evergreen Road/W Hayes Street Traffic Control Mitigation Comparison

	Conceptual Traffic Signal with Existing Lane Configurations and Protected-Permissive Left-Turn Phasing			Conceptual Single Lane Roundabout		
Lane Geometry Assumptions						
2040 Weekday PM Peak Hour Operations	Alt #1	Alt #2	Alt #3	Alt #1	Alt #2	Alt #3
	LOS - B Del - 13.6 V/C - 0.71	LOS - B Del - 12.7 V/C - 0.71	LOS - B Del - 13.2 V/C - 0.72	LOS - A Del - 7.8 V/C - 0.47	LOS - A Del - 7.8 V/C - 0.48	LOS - A Del - 7.7 V/C - 0.47

I-5/South Arterial Partial Interchange Planning and Design Considerations

If a new interchange is considered with I-5, there are a number of ODOT and Federal Highway Administration (FHWA) policy documents and requirements that must be evaluated. Section 600 of ODOT's Highway Design Manual (HDM, March 2024) provides a summary of the primary planning and design steps related to considerations of new overcrossings and/or interchanges. These include but are not limited to:

- Evaluation of the warrants for overcrossing and interchanges that consider locational characteristics, the designation of the highway, congestion, safety, topography, volume, user benefits, etc.;
- Interchange spacing requirements;
- Guidance on the evaluation needed to justify an overcrossing and/or interchange;
- The process for applying for an exception to both ODOT standards and the need for approval by FHWA for any added access to I-5; and,
- The purpose of and need for preparing an Interchange Area Management Plan (IAMP).

Next Steps

Based on feedback provided at the upcoming Transportation Advisory Group (TAG) meetings, the information contained herein will be refined and the preferred alternative will be selected for inclusion into a draft TSP amendment.

Appendix A Alternative #1 2040 Traffic Operations

Appendix B Alternative #2 2040 Traffic Operations



Appendix C Alternative #3 2040 Traffic Operations

Appendix D Evergreen & Hayes 2040 Traffic Signal Warrants

Appendix E Evergreen & Hayes 2040 Traffic Signal Operations

Appendix F Evergreen & Hayes 2040 Roundabout Operations