SUNRISE WEST INTERCHANGES MANAGEMENT AREA

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SUNRISE WEST INTERCHANGE MANAGEMENT AREA

Introduction

The Sunrise Project would construct a 4.9-mile, limited access facility, the Sunrise Expressway, between the Clackamas area near the Milwaukie Expressway (OR 224) and I-205 and the Rock Creek Junction near the cities of Happy Valley and Damascus. The Sunrise Expressway would add needed capacity in the east-west corridor now served primarily by OR 212/224, a 4-lane state highway through the Clackamas industrial area. The state highway currently has serious congestion and safety problems, and forecasted 2030 traffic will far exceed roadway capacities, impacting residential, freight and emergency vehicle traffic.

The Sunrise West Interchanges for the Sunrise Project will be located on or near I-205 in the western end of the Sunrise Project area. There are four interchanges and an arterial connector between two state highways within this Interchange Management Area.

These interchanges are:

- Sunrise Project Interchange Complex –
  - System Interchange – Sunrise Expressway / Milwaukie Expressway / I-205
  - I-205 / OR 213 N (82nd Avenue) Half Interchange
  - Sunrise Expressway / OR 213 N (82nd Avenue) Half Interchange
- Rebuilt Clackamas Interchange – OR 212/224 and 82nd Drive Area
- A new arterial connector linking OR 213N (82nd Avenue) and OR 224 (Milwaukie Expressway)

The Sunrise Interchange Complex is a group of interwoven interchanges that primarily accommodates expressway to expressway movements between I-205, the Milwaukie Expressway (OR 224) and the new Sunrise Expressway. There are two signalized intersections on the expressway mainline within the interchange complex that are needed to allow traffic movements that cannot be accommodated by free flow ramps between expressways.

Clackamas Regional Center is located immediately to the north of the Interchange Management Area and is a major destination for future users of the Sunrise Expressway. But the system interchange complex cannot accommodate all of the necessary movements to support the existing land uses located in the Clackamas Regional Center due to interchange spacing requirements on I-205. In order to accommodate some of these movements the Sunrise Expressway / OR 213 N (82nd Avenue) Half Interchange was added to the interchange complex. Similarly, that is a strong demand for a connection between I-205 and OR 213 N (82nd Avenue). In order to accommodate some of these movements the I-205 / OR 213 N (82nd Avenue) Half Interchange.

The existing Clackamas Interchange and the OR 212/224 /82nd Drive Intersection are also slated for major reconstruction as part of this project.

The land uses in the Interchange Management Area are classified as Full Developed Urban. See Appendix B Sunrise West Interchanges Land Use Analysis for information on household and employment in this Interchange Management Area.

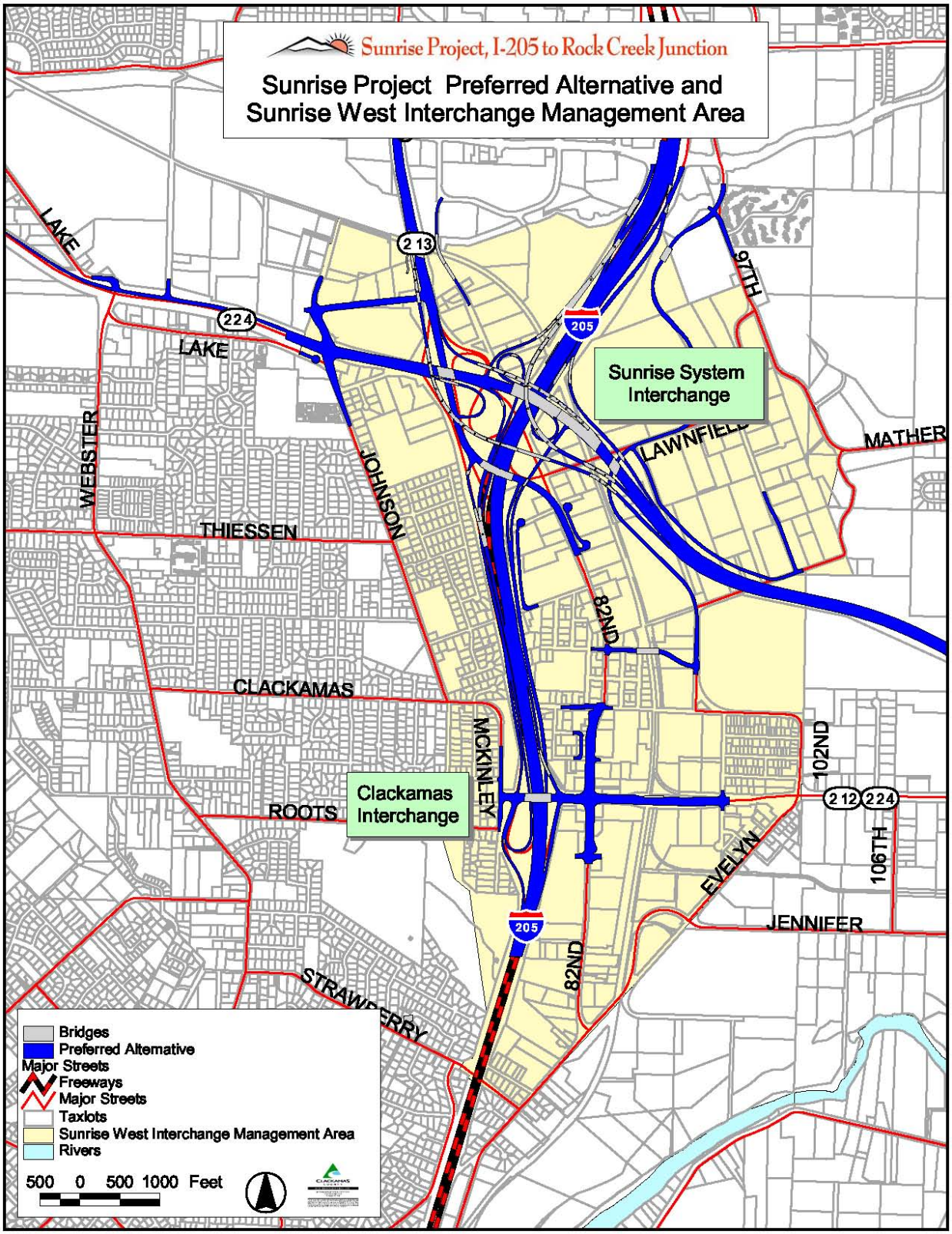


Figure 1 Sunrise Project Preferred Alternative

Comparison of Existing Operations to Applicable Operations Standards

The traffic operation standards that the transportation system should meet for existing and future conditions are outlined in **Table 1**. The criteria are from the following sources:

- the 1999 Oregon Highway Plan (OHP), August 2006 Version (Oregon Department of Transportation);
- the 2003 ODOT Highway Design Manual (HDM)
- the 2004 Regional Transportation Plan (Metro's RTP); and,
- Clackamas County's Comprehensive Plan, Chapter 5 (County TSP)

Within the Sunrise West Interchanges Interchange Management Area, the state highway operations meet existing standards. Metro's and Clackamas County's standards also are currently met.

TABLE 1 OPERATION STANDARDS FOR EXISTING AND FUTURE ROADWAYS

Criteria Thresholds	Existing/No-Build	Build
Freeway	1.1 (1st hour v/c) [1]	0.75 v/c [2]
Signalized Intersections in Interchange Area (ODOT)	0.90 v/c [1]	0.75 v/c [2]
Metro [4] -		
Regional Centers	LOS F (1st hour) LOS E (2nd hour)	LOS F (1st hour) LOS E (2nd hour)
Outside Regional Centers	LOS E	LOS E
Clackamas County [3] -		
Regional Centers	LOS E	LOS E
Outside Regional Centers	LOS D	LOS D

5. Existing and no-build requirements outlined in 1999 OHP and based on v/c.
6. Build requirements outlined in 2003 ODOT HDM and based on v/c.
7. Clackamas County operating standards outlined in County Comprehensive Plan: Chapter 5.
8. Metro operating standards outlined in the 2004 RTP: Table 1.2

Summary of Operations of the Sunrise West Interchanges Interchange -- SDEIS

A substantial amount of traffic analysis was conducted as part of the Sunrise Project SDEIS and FEIS. All of the analysis contained in this appendix was taken from that work. In general this traffic analysis found the following:

- The traffic analyses for the year SDEIS 2030 No Build Alternative shows that the existing intersections within the interchange management area are forecast to experience failure under all operational standards that are applicable to the area.
- The two 2030 Build Alternatives – Alternative 2 and Alternative 3 – would construct a set of similar interchanges and signalized intersections. The distinction between them is that Alternative 2 would have a Midpoint Interchange at approximately SE 122nd, connecting the Sunrise Expressway to OR 212/224. Alternative 3 would not have a midpoint interchange.
  - Both of the Build Alternatives function comparably in terms of highway capacity and most intersection operations.

- o Both of the Build Alternative experience continuing intersection capacity problems along OR 212/224 and in the West End area along OR 224.

- The SDEIS has one Design Option A-2 which would build the a new Overcrossing of the Union Pacific Rail Road between Tolbert Street and Industrial Way instead of the Lawnfield North Extension to 97th Avenue.

  - o Alternative 2 and Alternative 3 with this Design Option A-2 would function comparably in terms of highway capacity and most intersection operations. Both of the Build Alternatives function comparably in terms of highway capacity and most intersection operations.

  - o Both of the Build Alternative experience continuing intersection capacity problems along OR 212/224 and in the West End area along OR 224.

- The Preferred Alternative which consists of Alternative 2 with the inclusion of the Tolbert Overcrossing, a refined OR 212/224 and 82nd Drive Intersection with prohibited left turns (Michigan Left Turn Configuration)and a set of modest refinements on Milwaukie Expressway in the West End Area. The Preferred Alternative performs better that Alternatives 2 and 3 from a traffic operations perspective.

Preferred Alternative

In July 2009, the Sunrise Project's Policy Review Committee (PRC) selected the Preferred Alternative for the Sunrise Project based on the analysis presented in the SDEIS, public comments and recommendations from the Project Advisory Committee (PAC).

The Preferred Alternative in its entirety is described in Appendix D and is shown in Figure 1.

Inside the Interchange Management Area:

- The Sunrise Expressway is 6-lanes with auxiliary lanes between Johnson Road and the Midpoint Interchange
- I-205 is relocated to the east by the Sunrise Project between the Clackamas Interchange and the bridge that crosses over the Union Pacific Railroad in order to provide adequate space for a set of braided ramps on either side to I-205.
- A system interchange is constructed that provides connections between the Milwaukie Expressway (OR 224), the Sunrise Expressway and I-205. Two half interchange are included in the System Interchange complex to provide addition necessary moves to support the Clackamas Regional Center.
- The existing Clackamas Interchange (I-205 and OR 212/224) is rebuilt and expanded.
- The adjacent OR 212 / 224 / 82nd Drive Intersection is reconfigured to prohibit all left turns at the intersection. These left turn movements are accommodated through the reconstruction to 82nd Drive and the addition of two signalized intersections which permit U-turns. This "Michigan Left Turn" configuration allows all of the necessary movement to be accommodated indirectly.
- A new arterial connector (Deer Creek Land and Johnson Road) is created linking OR 213N (82nd Avenue) and OR 224 (Milwaukie Expressway

Adjacent to the Interchange Management Area:

- In the West End Area along the Milwaukie Expressway (OR 224), a 3rd westbound lane is added between Johnson Road and Webster Road.

The Sunrise Project includes approach road control consistent with the expressway designation of this highway and for the segments of OR 212 and OR 224 within the IAMP area.

Preferred Alternative System Intersection Performance

The traffic model forecasts for the Preferred Alternative show that it performs better that the SDEIS Alternatives with respect to intersection operations in the Sunrise West Interchanges Management Area. A summary of the intersection operation analysis is show in Figures 2 and is described in more detail in Table 2 through 9.

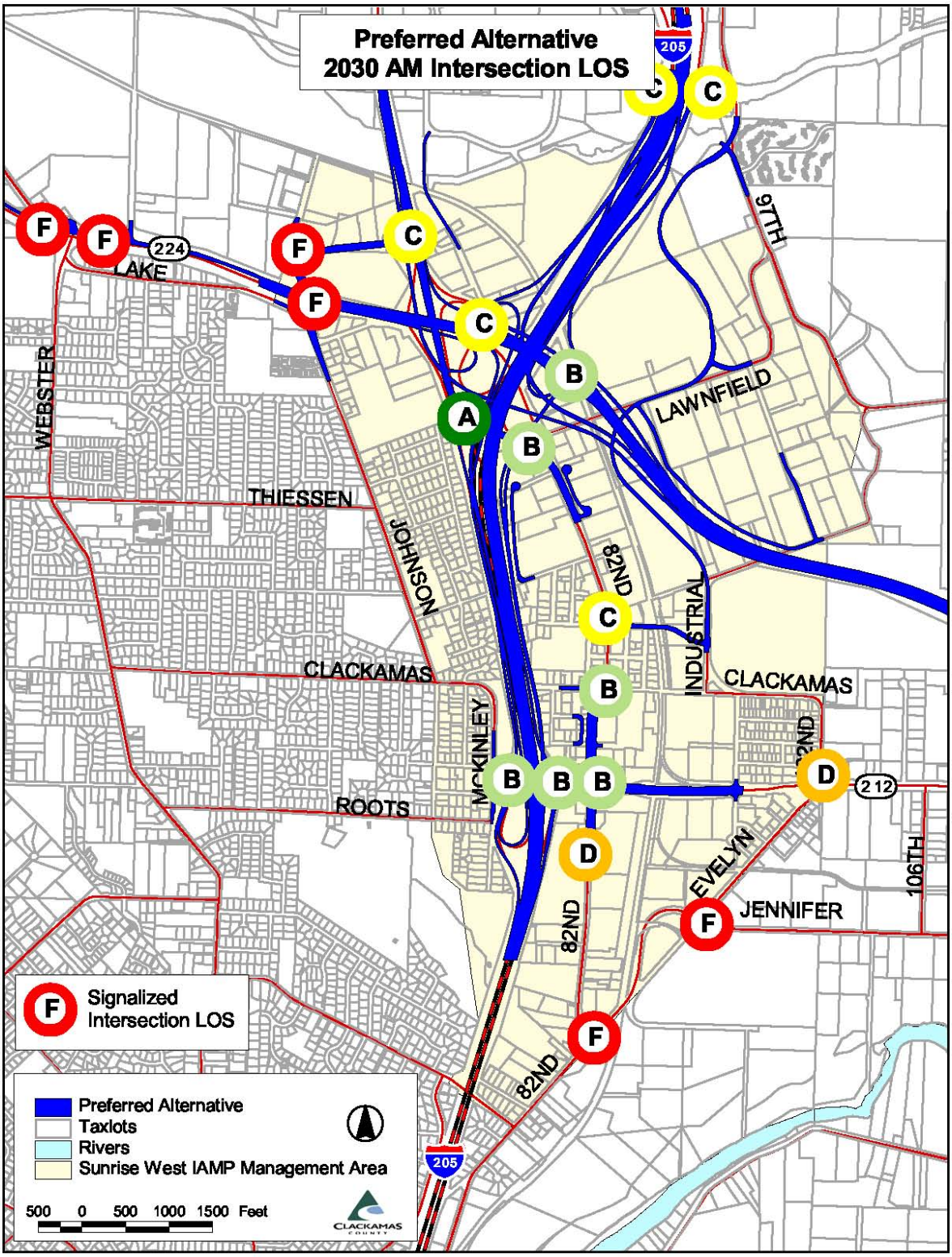


Figure 2 Preferred Alternative Intersections AM LOS - 2030

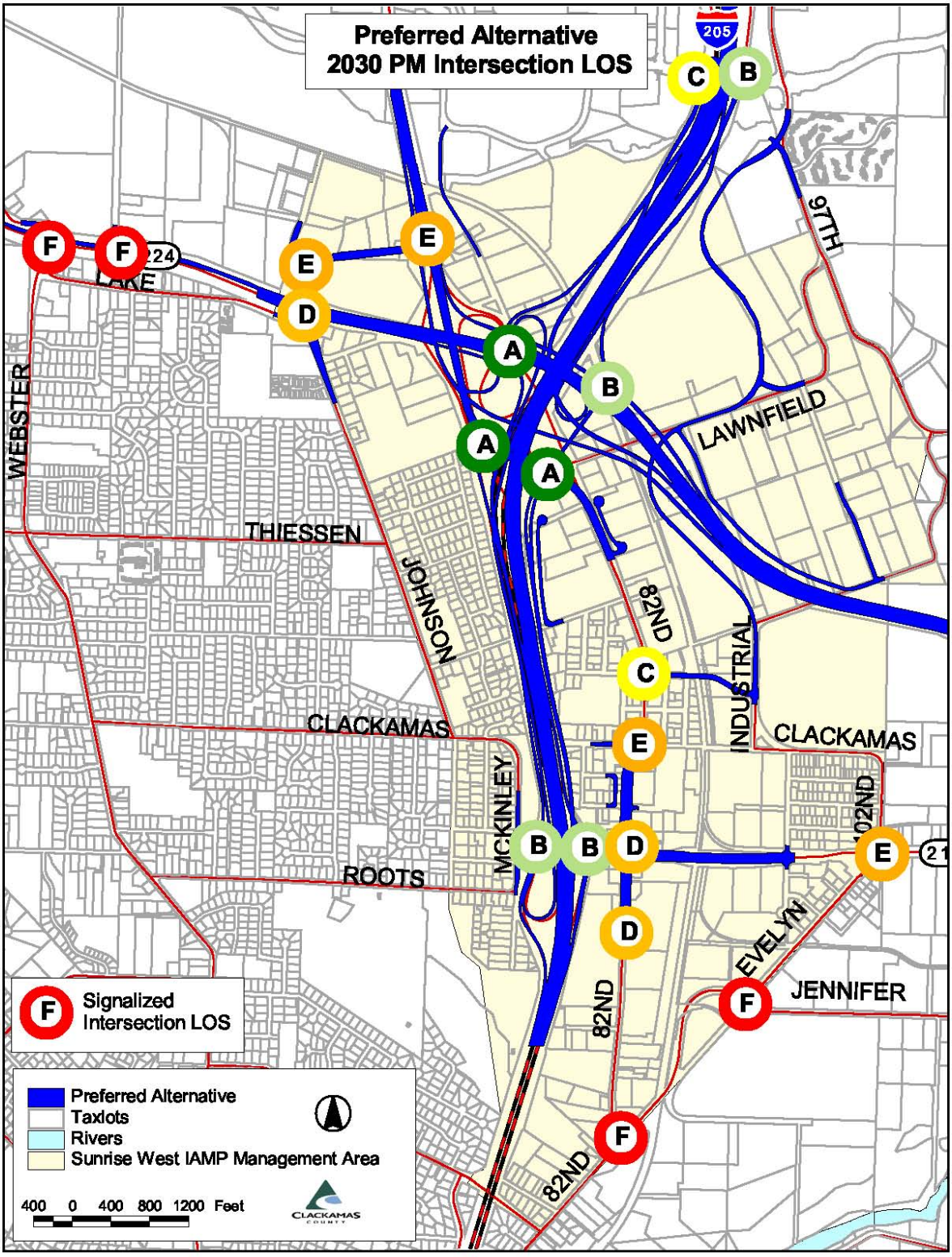


Figure 3 Preferred Alternative Intersections PM LOS - 2030

Sunrise System Interchange

Sunrise System Interchange accommodates most of the system to system movements between the new Sunrise Expressway, I-205 and the Milwaukie Expressway (OR 224). Most of these movements are complete on interchange ramps that do not have an traffic control. However there are two set of movements that could not be accommodated by the proposed system to system ramps network. Two signalized intersections were added to the Sunrise Expressway mainline to accommodate these other movements. As shown below in Table 2 Intersections 35 and 36 are forecast to exceed ODOT operation standards for new construction during portions of the AM and PM peak hours in 2030.

Table 2 Sunrise System Interchange Intersection Capacity Analysis

FEIS Intersection	Intersection Name	AM Peak Hour Performance		PM Peak Hour Performance	
		1st Hour	2ND Hour	1st Hour	2ND Hour
35	System Interchange West Signal	**0.87 v/c**	**0.81 v/c**	0.56 v/c	0.63 v/c
36	System Interchange East Signal	**0.77 v/c**	0.71 v/c	**0.77 v/c**	**0.86 v/c**

Source: Sunrise Project Transportation Technical Report, David Evans, 2010

Clackamas Interchange - OR 212 / 224 82nd Drive

Preferred Alternative for the Clackamas Interchange is similar to the existing Clackamas Interchange with the exception of the OR 212/ 224 and 82nd Drive Intersection. This intersection is designed to prohibit left turns at the intersection using a concept call a Michigan Left Turn. This intersection works as follows:

- In order to turn left from OR 212/224, it is necessary to first turn right on to 82nd Drive, then proceed to the signalized intersection and make a permitted U-Turn and then proceed back up 82nd Drive in the desired direction.
- Left turns from 82nd Drive are addressed in a similar manner. To turn left from 82nd Drive it is necessary to first proceed through the OR 212/224 / 82nd Drive Intersection, then proceed to the signalized intersection and make a permitted U-Turn, then proceed back up 82nd Drive and make a right turn on to OR 212 / 224.
- Right turns are permitted on all legs of the OR 212/224 intersection and southbound 82nd Drive has dual right turn lanes.

The Preferred Alternative performs better from the perspective ODOT operation standards than the SDEIS Build Alternative but it still is forecast to not meet all of the operation standards for new construction as shown in Table 3, 4 and 5. It will also come closer to meeting the access management standards than either the build alternative or the existing intersection.

Table 3 Clackamas Interchange Area Intersection Capacity Analysis

FEIS Intersection	Intersection Name	AM Peak Hour Performance		PM Peak Hour Performance	
	OR 212 / 224 Intersections (ODOT Intersections)	**1st Hour**	**2ND Hour**	**1st Hour**	**2ND Hour**
12	Clackamas Interchange – South Bound Ramps	0.72 v/c	0.69 v/c	**0.91 v/c**	**0.93 v/c**
13	Clackamas Interchange – North Bound Ramps	**0.79 v/c**	0.71 v/c	**0.80 v/c**	**0.86 v/c**
14	OR 212/224 and 82nd Drive Intersection	0.73 v/c	0.71 v/c	**0.80 v/c**	**0.85 v/c**
15	OR 212/224 and 102nd Avenue Intersection Existing Intersection – Not Modified by Project	**0.94 v/c**	**0.95 v/c**	**1.07 v/c**	**1.06 v/c**
	82nd Drive Intersections (County Intersections)	**1st Hour**	**2ND Hour**	**1st Hour**	**2ND Hour**
46	82nd Drive and Tolbert Road Intersection	0.48 v/c	0.42 v/c	0.64 v/c	0.70 v/c
47	82nd Drive and Clackamas Road Intersection	0.52 v/c	0.47 v/c	0.74 v/c	0.80 v/c
48	82nd Drive and North FM Access Intersection	0.66 v/c	0.62 v/c	0.79 v/c	0.86 v/c

Source: Sunrise Project Transportation Technical Report, David Evans, 2010

Table 4 Clackamas Interchange Area Access Spacing for Existing Intersections

Access Location	Type of Area[ii]	Distance Standard (Z)	Existing Access Distance
OR 212/224 and 82nd Drive Intersection -- Signalized	Fully Developed Urban	1,320 feet	350 feet
OR 212/224 and McKinley Avenue Intersection - Stop Controlled	Fully Developed Urban	990 feet / 750 feet	200 feet

Source: Sunrise Project Transportation Technical Report, David Evans, 2010

Table 5 Clackamas Interchange Area Intersections with Forecast Over Capacity Queues, Year 2030

Preferred Alternative Intersection # / Location	Movement	Storage Length	Preferred Alternative Over capacity queue periods
OR 212/224 and I-205 Southbound Ramps	EBT	150 ft.	AM and PM Peak
	EBT	150 ft.	PM Peak
	WBL	450 ft.	AM and PM Peak
	WBT	525 ft.	PM Peak
OR 212/224 and 82nd Drive Intersection	WBR	500 ft.	PM Peak
	NBT	900 ft.	PM Peak
	NBT	900 ft.	PM Peak
82nd Drive and Tolbert Road Intersection	NBL	200 ft	AM Peak
82nd Drive and Clackamas Road Intersection	NBUL	600 ft.	PM Peak
	NBL	600 ft.	PM Peak
	NBT	1,050	PM Peak
	NBTR	1,050	PM Peak
82nd Drive and North FM Intersection	EBL	150 ft.	PM Peak
	EBL	150 ft	PM Peak
OR 212/224 and 102nd Avenue Intersection	WBL	325 ft.	AM and PM Peak
	WBT	1,225 ft.	PM Peak
	WBT	1,225 ft.	PM Peak
	WBR	275 ft.	AM and PM Peak
	NBTR	1,000 ft.	AM Peak

Source: Sunrise Project Transportation Technical Report, David Evans, 2010

OR 213 N (82nd Avenue) Half Interchange with I-205

The OR 213 N (82nd Avenue) Half Interchange with I-205 provide a partial connection to I-205 from a new bridge the reestablishes a direct connection between 82nd Avenue (OR 213 N) and 82nd Drive (a County Arterial). The interchange has an I-205 northbound off ramp and an I-205 southbound on ramp. All of the intersections in this half interchange meet the ODOT operation standards for new construction as shown in Table 6.

Table 6 OR 213 N (82nd Avenue) Half Interchange with I-205 Intersection Capacity Analysis

FEIS Intersection	Intersection Name	AM Peak Hour Performance		PM Peak Hour Performance	
		1st Hour	2ND Hour	1st Hour	2ND Hour
37	OE 213 N / 82nd Drive – South Bound Ramps	0.42 v/c	0.42 v/c	**0.60 v/c**	**0.66 v/c**
38	OE 213 N / 82nd Drive – North Bound Ramps	0.49 v/c	0.42 v/c	**0.50 v/c**	**0.55 v/c**

Source: Sunrise Project Transportation Technical Report, David Evans, 2010

OR 213 N (82nd Avenue) Half Interchange with Sunrise Expressway

The OR 213 N (82nd Avenue) Half Interchange with Sunrise Expressway uses ramps to provide access between the Sunrise Expressway and OR 213 N (82nd Avenue) and the Clackamas Regional Center. There are no operational capacity issues for this interchange within the boundaries of the Sunrise West Interchanges Management Area.

OR 213 N (82nd Avenue) / OR 224 Arterial Connection

The Deer Creek Land / Johnson Road arterial connection between OR 231 N (82nd Avenue) and the Milwaukie Expressway (OR 224) replaces a set of existing connect between these two state facilties. The new **OR 213N and Deer Creek Lane Intersection is forecast not to meeting the** ODOT **operation standards for new construction during the PM Peak Hour. The reconstructed OR 224 and Johnson Road Intersection likewise is forecast not to meet the** ODOT **operation standards for new construction during the Peak Hours. See Table 7. In additional both of these intersections are forecast to have** over capacity traffic queues in 2030 – see Table 8.

Table 7 OR 213 N (82nd Avenue) / OR 224 Arterial Connection Intersection Capacity Analysis

FEIS Intersection	Intersection Name	AM Peak Hour Performance		PM Peak Hour Performance	
		1st Hour	2ND Hour	1st Hour	2ND Hour
34	OR 213N and Deer Creek Lane Intersection	0.56 v/c	0.51 v/c	**0.75 v/c**	**0.81 v/c**
45	Deer Creek Lane and Johnson Road Intersection	0..46 v/c	0..45 v/c	0.74 v/c	**0.83 v/c**
3	OR 224 and Johnson Road Intersection	**1.01 v/c**	**0.95 v/c**	**0.90 v/c**	**1.01 v/c**

Source: Sunrise Project Transportation Technical Report, David Evans, 2010

Table 8 OR 213 N (82nd Avenue) / OR 224 Arterial Connection Intersections with Forecast Over Capacity Queues, Year 2030

Preferred Alternative Intersection # / Location	Movement	Storage Length	Preferred Alternative Over capacity queue periods
OR 231 N and Deer Creek Lane Intersection	NBL	400 ft.	PM peak
	NBL	400 ft.	PM peak
	SBR	400 ft.	PM peak
OR 224 and Johnson Road Intersection	WBL	800 ft.	AM Peak
	WBT	1,725 ft.	AM Peak
	WBT	1,725 ft.	AM Peak
	WBTR	1,725 ft.	AM Peak
	NBL	300 ft.	AM Peak
	NBT	1,000 ft.	AM Peak
	NBR	300 ft.	PM Peak
	SBR	300 ft.	AM and PM Peak

Source: Sunrise Project Transportation Technical Report, David Evans, 2010

West End Transition Area – Milwaukie Expressway OR 224

The West End Transition area is immediately to the west of the Sunrise West Interchanges Management Area and is the location of the western connection of the Sunrise Expressway to the existing Milwaukie Expressway. The existing intersections in this area are forecast to not meet the ODOT operation standards for existing intersection during the Peak Hours. See Table 9.

However during the Sunrise Project Alternative Refinement process a relatively modest alternative was developed to address this problem. For more information on this alternative see the Milwaukie Expressway Refinement – Pheasant Court Option analysis that is contained in the SDEIS Traffic Options Report by David Evans and Associates, Inc, August 2009 which is attached to this appendix.

Table 9 West End Transition Area Intersection Capacity Analysis

FEIS Intersection	Intersection Name	AM Peak Hour Performance		PM Peak Hour Performance	
		1st Hour	2ND Hour	1st Hour	2ND Hour
1	OR 224 and Webster Road Intersection	**1.01 v/c**	**0.95 v/c**	**1.31 v/c**	**1.39 v/c**
2	OR 224 and Pheasant Court Intersection	0.71 v/c	0.67 v/c	0.77 v/c	**0.81 v/c**
3	OR 224 and Johnson Road Intersection	**1.01 v/c**	**0.95 v/c**	**0.90 v/c**	**1.01 v/c**

Source: Sunrise Project Transportation Technical Report, David Evans, 2010

Accesses on State Facilities

The Sunrise Project Preferred Alternative, Alternative 2 and 3 and Design Options A-2, will create a new local circulation systems in and around the Sunrise West Interchanges Interchange Management Area that are very similar to one another. Accordingly, the future access systems also are essentially identical for all alternative and design options.

OAR 734 Access Spacing Standards

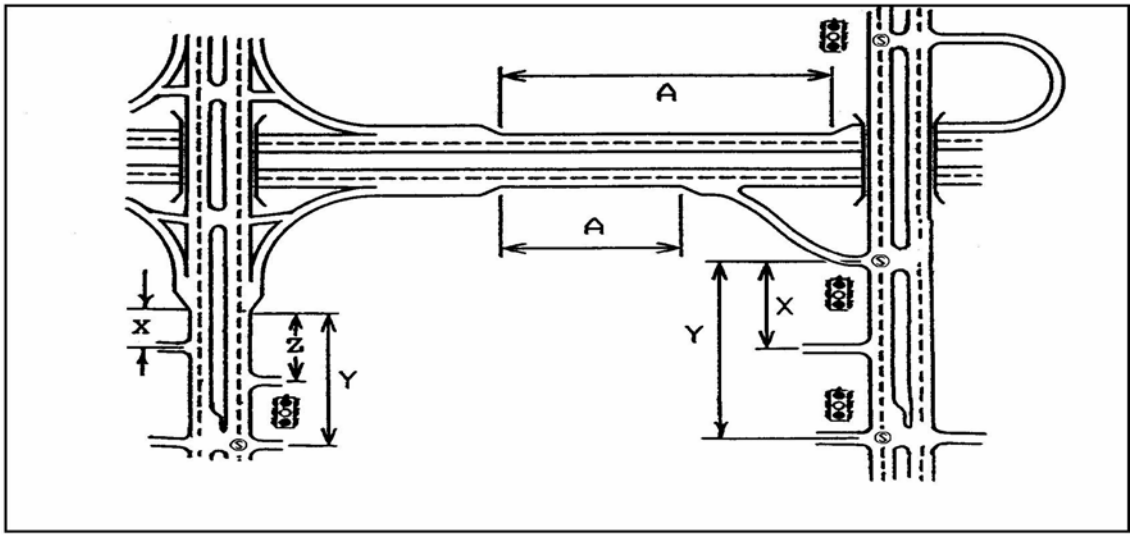
The Sunrise West Interchanges Interchange management area is substantially developed and there is little vacant land available to support new development. As such, the interchange area is classified as a "Fully Developed Urban" interchange management area, with associated spacing standards. (See Table 10)

Table 10 Minimum Spacing Standards Applicable to Freeway Interchanges with Multi-Lane Crossroads (OHP Table 19)

Type of Area* (OAR 734-051-0125)	Spacing Dimension			
	A = Distance between the start and end of tapers of adjacent interchanges	X = Distance to the first approach on the right; right in/right out only	Y= Distance to first intersections where left turns are allowed	Z = Distance between the last right in/ right out approach road & start of taper for the on-ramp
Fully Developed Urban	1 mile	750 feet	1,320 feet	990 feet

*A **Fully Developed Urban Interchange Management Area** occurs when 85% or more of the parcels along the developable frontage area are developed at urban densities and many have driveways connecting to the crossroad. (1999 Oregon Highway Plan)

Figure 4 Measurement of Spacing Standards



Sunrise Project Preferred Alternative Approach Road Changes

The primary source of changes to the approach roads on the state highway system within the Sunrise West interchanges management area will be the construction of the Sunrise Project facilities described as part of the Preferred Alternative. These new facilities will remove a number of existing approach road access points on the state highways and substantially modify most of the other approach road points to the existing state highways.

Existing Approach Roads Changes

The following section describes the existing approach road locations and types. See Figures 5, 6, 7, 8, and 9 and Tables 11, 12, 13 and 14. This inventory of road locations covers an area that is larger that the area impacted by the Preferred Alternative so the impacts of the possible refinement alternative could be considered as part of the evaluation process.

The tables also contain and initial assessment of the impacts to the road approach as defined in the Sunrise Project SDEIS build alternatives.

A subsequent section of this document describes the future access points that will exist as a result of the Sunrise Project in more detail.

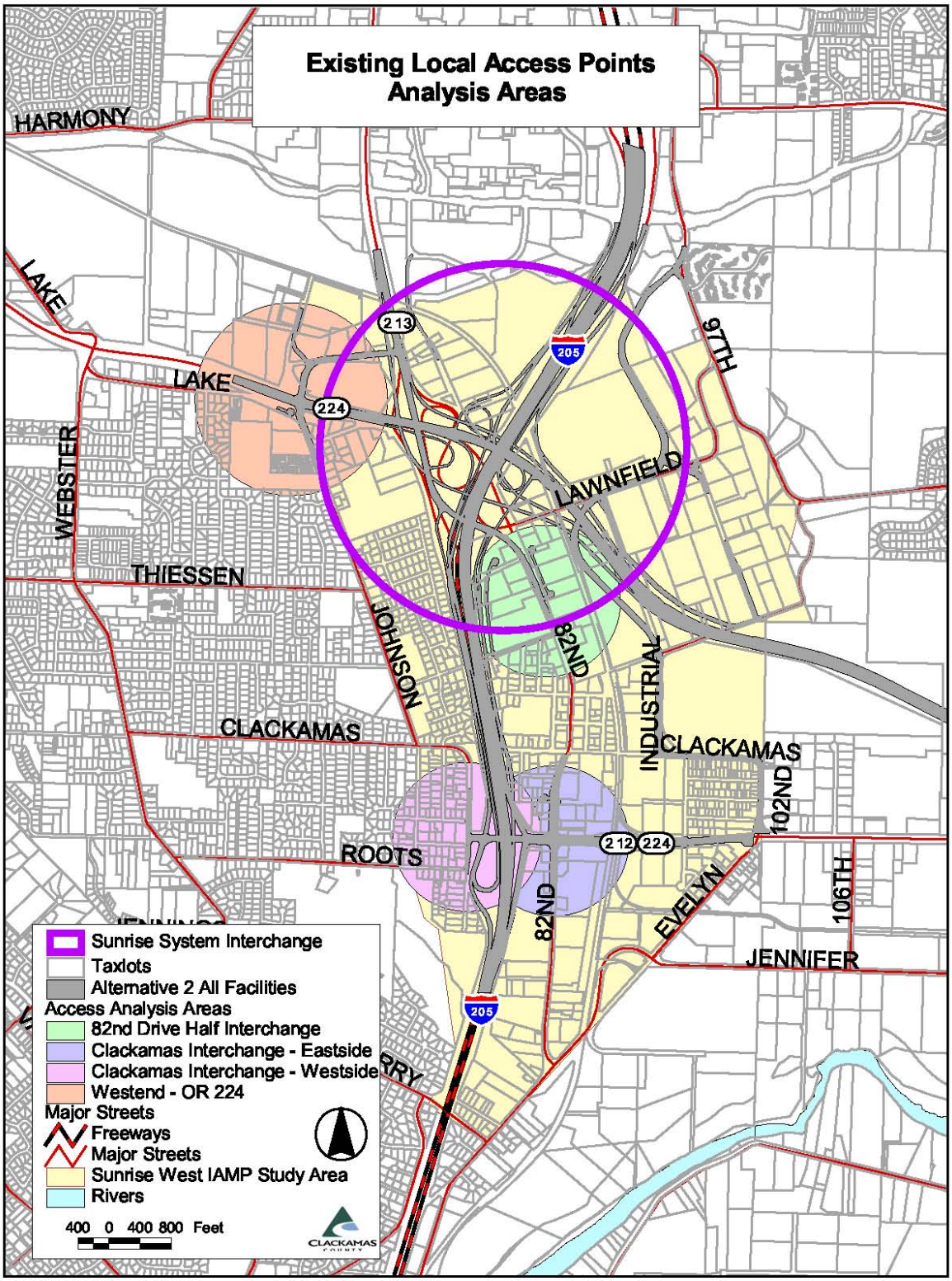


Figure 5 Existing Local Approach Road Points- Prior to Sunrise Project

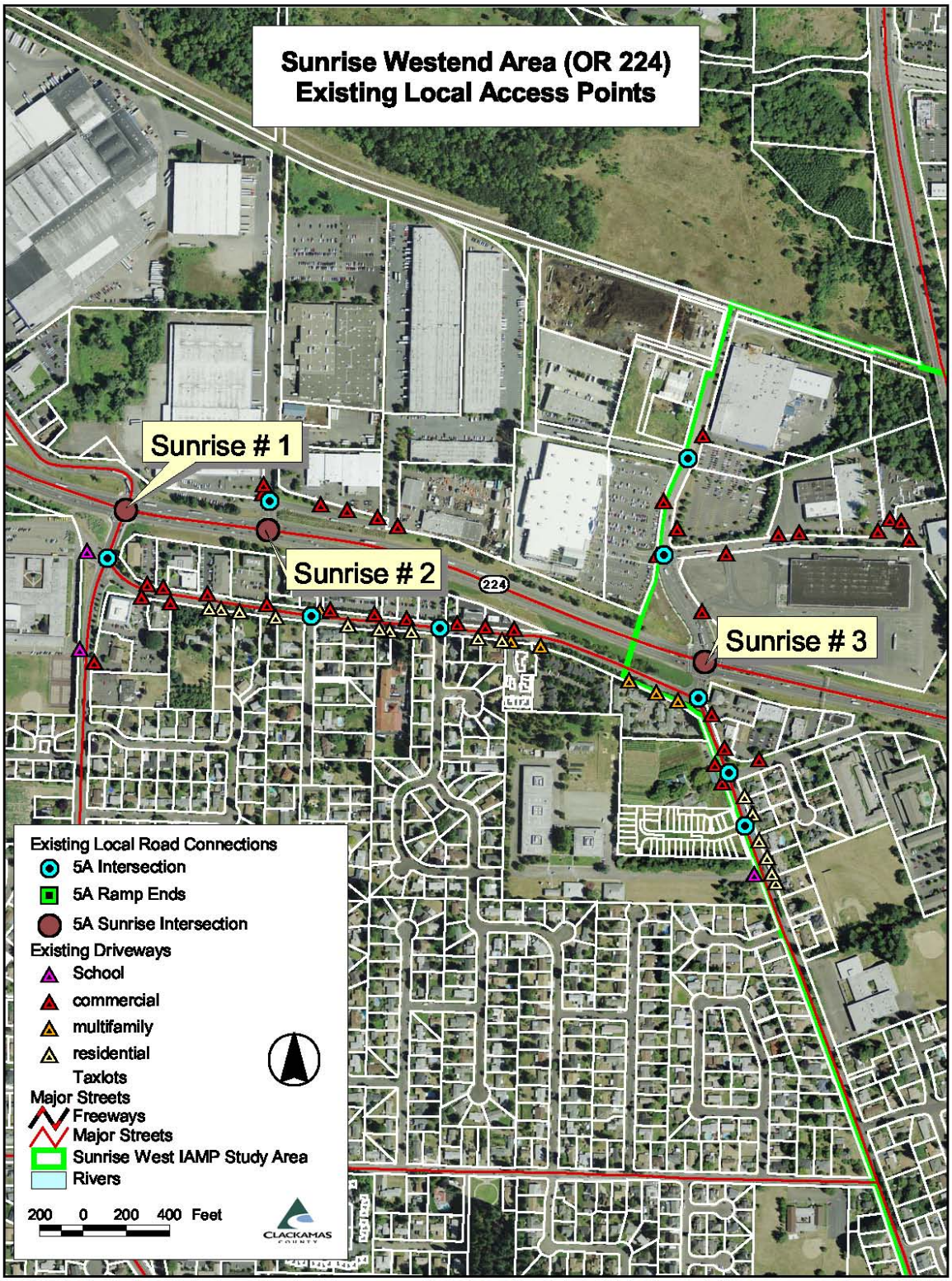


Figure 6 Existing Local Approach Road Points – West End Area

End of project – existing signals and intersections – no existing access to OR 224 expect for intersections -- minimal access modification on local street due to ROW purchases.

Table 11 West End Area Existing Local Approach Road Points – Driveways

ID Number	Address	Driveway Type	SDEIS Project Impacts
5a-27	13850 Se Autumn Ridge Terrance	Multifamily	No Project Impacts
5a-28	7612 Se Lake Road	Multifamily	No Project Impacts
5a-3	13801 Se Webster Road	School	No Project Impacts
5a-6	6915 Se Lake Road	Commercial	No Project Impacts
5a-8	6969 Se Lake Road	Commercial	No Project Impacts
5a-5	6901 Se Lake Road	Commercial	No Project Impacts
5a-4	6902 Se Lake Road	Commercial	No Project Impacts
5a-7	6910 Se Lake Road	Commercial	No Project Impacts
5a-12	7012 Se Lake Road	Commercial	No Project Impacts
5a-14	7015 Se Lake Road	Multifamily	No Project Impacts
5a-15	7303 Se Lake Road	Commercial	No Project Impacts
5a-20	7303 Se Lake Road	Commercial	No Project Impacts
5a-21	7320 Se Lake Road	Residential	No Project Impacts
5a-18	7316 Se Lake Road	Residential	No Project Impacts
5a-16	13818 Se Julie Lane	Residential	No Project Impacts
5a-13	7150 Se Lake Road	Residential	No Project Impacts
5a-11	7110 Se Lake Road	Residential	No Project Impacts
5a-10	71000 Se Lake Road	Residential	No Project Impacts
5a-25	7516 Se Lake Road	Residential	No Project Impacts
5a-26	7580 Se Laker Road	Residential	No Project Impacts
5a-24	7533 Se Lake Road	Commercial	No Project Impacts
5a-22	7525 Se Lake Road	Commercial	No Project Impacts
5a-23	7533 Se Lake Road	Commercial	No Project Impacts
5a-53	13350 Se Johnson Road	Commercial	Closed - Row Purchase
5a-52	13350 Se Johnson Road	Commercial	No Project Impacts
5a-47	13520 Se Pheasant Court	Commercial	No Project Impacts
5a-45	13527 Se Pheasant Court	Commercial	No Project Impacts
5a-2	13801 Se Webster Road	School	No Project Impacts
5a-9	7012 Se Lake Road	Residential	No Project Impacts
5a-44	13527 Se Pheasant Court	Commercial	No Project Impacts
5a-48	13520 Se Pheasant Court	Commercial	No Project Impacts
5a-46	13520 Se Pheasant Court	Commercial	No Project Impacts
5a-49	13580 Se Pheasant Court	Commercial	No Project Impacts
5a-19	7316 Se Lake Road	Residential	No Project Impacts
5a-32	14000 Se Johnson Road	Commercial	Closed - Row Purchase
5a-33	7800 Lake Road	Commercial	Closed - Row Purchase
5a-29	7700 Se Lake Road	Multifamily	No Project Impacts
5a-30	7700 Se Lake Road	Multifamily	No Project Impacts
5a-31	7700 Se Lake Road	Multifamily	No Project Impacts
5a-42	14302 Se Johnson Road	Residential	No Project Impacts
5a-40	14288 Se Johnson Road	Residential	No Project Impacts
5a-41	14288 Se Johnson Road	Residential	No Project Impacts

5a-39	14180 Se Johnson Road	Residential	No Project Impacts
5a-38	14100 Se Johnson Road	Residential	No Project Impacts
5a-37	14090 Se Johnson Road	Residential	No Project Impacts
5a-34	7831 Se Lake Road	Commercial	No Project Impacts
5a-35	7924 Se Lake Road	Commercial	No Project Impacts
5a-36	7924 Se Lake Road	Commercial	No Project Impacts
5a-43	14211 Se Johnson Road	School	No Project Impacts
5a-51	13631 Se Johnson Road	Commercial	Closed - Row Purchase
5a-50	13631 Se Johnson Road	Commercial	No Project Impacts
5a-54	13750 Se Johnson Road	Commercial	Closed - Row Purchase
5a-55	13750 Se Johnson Road	Commercial	Closed - Row Purchase
5a-56	8085 Se Deer Creek Lane	Commercial	No Project Impacts
5a-57	8085 Se Deer Creek Lane	Commercial	No Project Impacts
5a-58	8155 Se Deer Creek Lane	Commercial	No Project Impacts
5a-59	8225 Se Deer Creek Lane	Commercial	No Project Impacts
5a-60	8277 Se Deer Creek Lane	Commercial	No Project Impacts
5a-61	8277 Se Deer Creek Lane	Commercial	Closed - Row Purchase
5a-17	7303 Se Lake Road	Commercial	No Project Impacts
5a-1	13800 Webster Road	Commercial	No Project Impacts

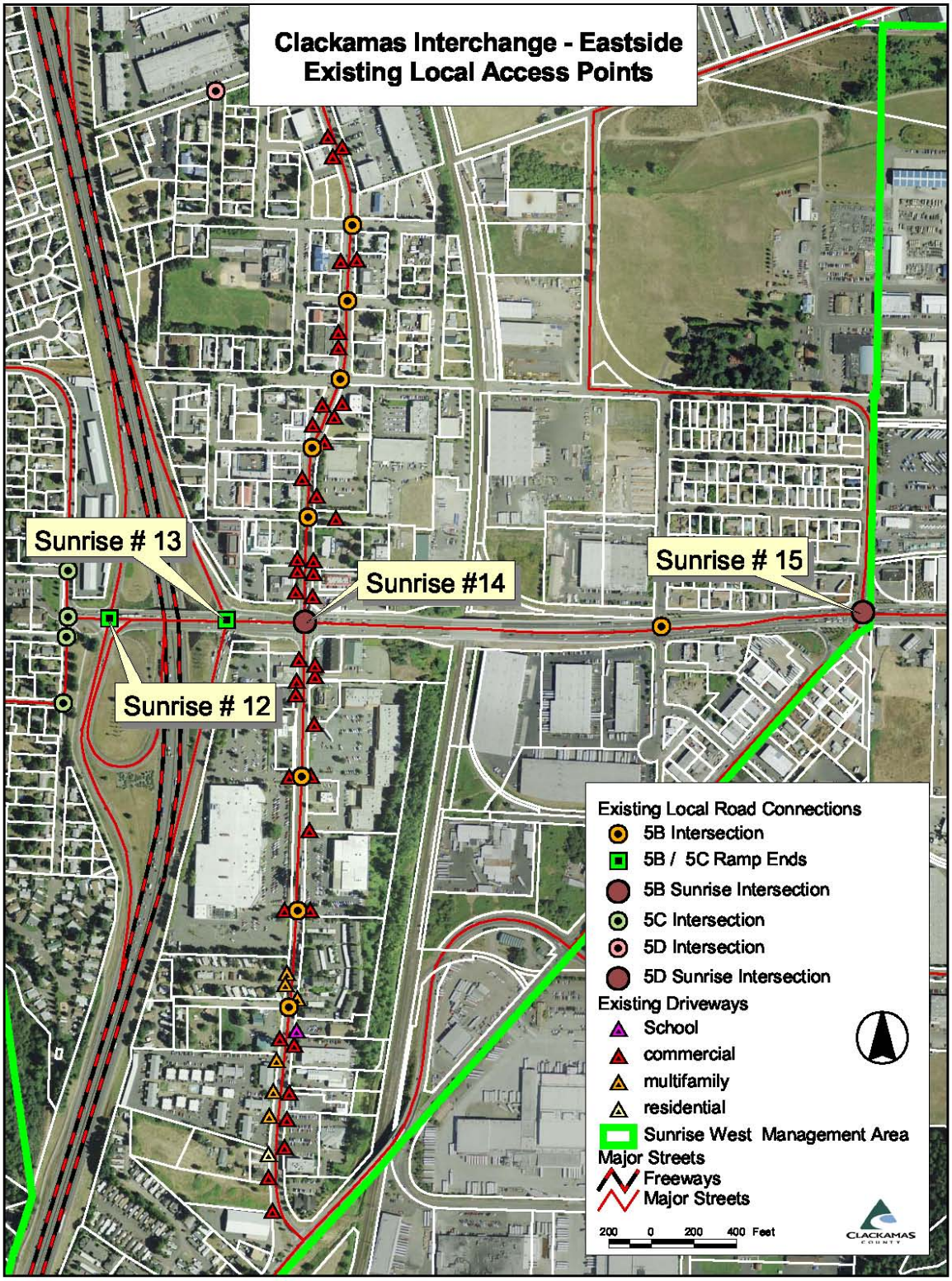


Figure 7 Existing Local Approach Road Points- Prior to Sunrise Project

Table 12 Clackamas Interchange Eastside Area Existing Local Approach Road Points – Driveways

ID Number	Address	Driveway Type	SDEIS Project Impacts
5b-23	15901 Se 82nd Drive	Commercial	Closed - Row Purchase
5b-21	15901 Se 82nd Drive	Commercial	Closed - Row Purchase
5b-19	15851 Se 82nd Drive	Commercial	Changed To Right In / Right Out Access
5b-24	15970 Se 82nd Drive	Commercial	Closed - Row Purchase
5b-22	15960 Se 82nd Drive	Commercial	Closed - Row Purchase
5b-20	15950 Se 82nd Drive	Commercial	No Project Impacts
5b-17	15700 Se 82nd Drive	Commercial	Changed To Right In / Right Out Access
5b-13	15630 Se 82nd Drive	Commercial	No Project Impacts
5b-12	15536 Se 82nd Drive	Commercial	Changed To Right In / Right Out Access
5b-16	15675 Se 82nd Drive	Commercial	Closed - Row Purchase
5b-15	15700 Se 82nd Drive	Commercial	Changed To Right In / Right Out Access
5b-14	15571 Se 82nd Drive	Commercial	Closed - Row Purchase
5b-10	15431 Se 82nd Drive	Commercial	No Project Impacts
5b-9	15431 Se 82nd Drive	Commercial	No Project Impacts
5b-7	15330 Se 82nd Drive	Commercial	No Project Impacts
5b-5	15140 Se 82nd Drive	Commercial	No Project Impacts
5b-4	15027 Se 82nd Drive	Commercial	No Project Impacts
5b-3	14993 Se 82nd Drive	Commercial	No Project Impacts
5b-2	14950 Se 82nd Drive	Commercial	No Project Impacts
5b-1	14950 Se 82nd Drive	Commercial	No Project Impacts
5b-6	15111 Se 82nd Drive	Commercial	No Project Impacts
5b-34	16301 Se 83nd Drive	Commercial	No Project Impacts
5b-35	16440 Se 82nd Drive	Commercial	No Project Impacts
5b-32	16050 Se 82nd Drive	Commercial	No Project Impacts
5b-31	16301 Se 83nd Drive	Commercial	No Project Impacts
5b-30	16050 Se 82nd Drive	Commercial	Changed To Right In / Right Out Access
5b-27	16016 Se 82nd Drive	Commercial	Changed To Right In / Right Out Access
5b-26	16010 Se 82nd Drive	Commercial	Changed To Right In / Right Out Access
5b-25	16002 Se 82nd Drive	Commercial	Closed - Row Purchase
5b-28	16002 Se 82nd Drive	Commercial	Closed - Row Purchase
5b-29	16087 Se 82nd Drive	Commercial	Changed To Right In / Right Out Access
5b-33	16050 Se 82nd Drive	Commercial	No Project Impacts
5b-36	16551 Se 82nd Drive	Multifamily	No Project Impacts
5b-37	16551 Se 82nd Drive	Multifamily	No Project Impacts
5b-38	16551 Se 82nd Drive	Multifamily	No Project Impacts
5b-40	16631 Se 82nd Drive	Commercial	No Project Impacts
5b-41	16650 Se 82nd Drive	Commercial	No Project Impacts
5b-39	16640 Se 82nd Drive	School	No Project Impacts
5b-42	16751 Se 82nd Drive	Multifamily	No Project Impacts
5b-44	16740 Se 82nd Drive	Commercial	No Project Impacts
5b-43	16751 Se 82nd Drive	Multifamily	No Project Impacts
5b-45	16751 Se 82nd Drive	Multifamily	No Project Impacts

5b-46	16770 Se 82nd Drive	Commercial	No Project Impacts
5b-48	16869 Se 82nd Drive	Residential	No Project Impacts
5b-47	16770 Se 82nd Drive	Commercial	No Project Impacts
5b-49	16771 Se 82nd Avenue	Commercial	No Project Impacts
5b-50	17015 Se 82nd Drive	Commercial	No Project Impacts
5b-8	15259 Se 82nd Drive	Commercial	No Project Impacts
5b-11	15525 Se 82nd Drive	Commercial	Closed - Row Purchase
5b-18	Alansa Drive	Commercial	Changed To Right In / Right Out Access

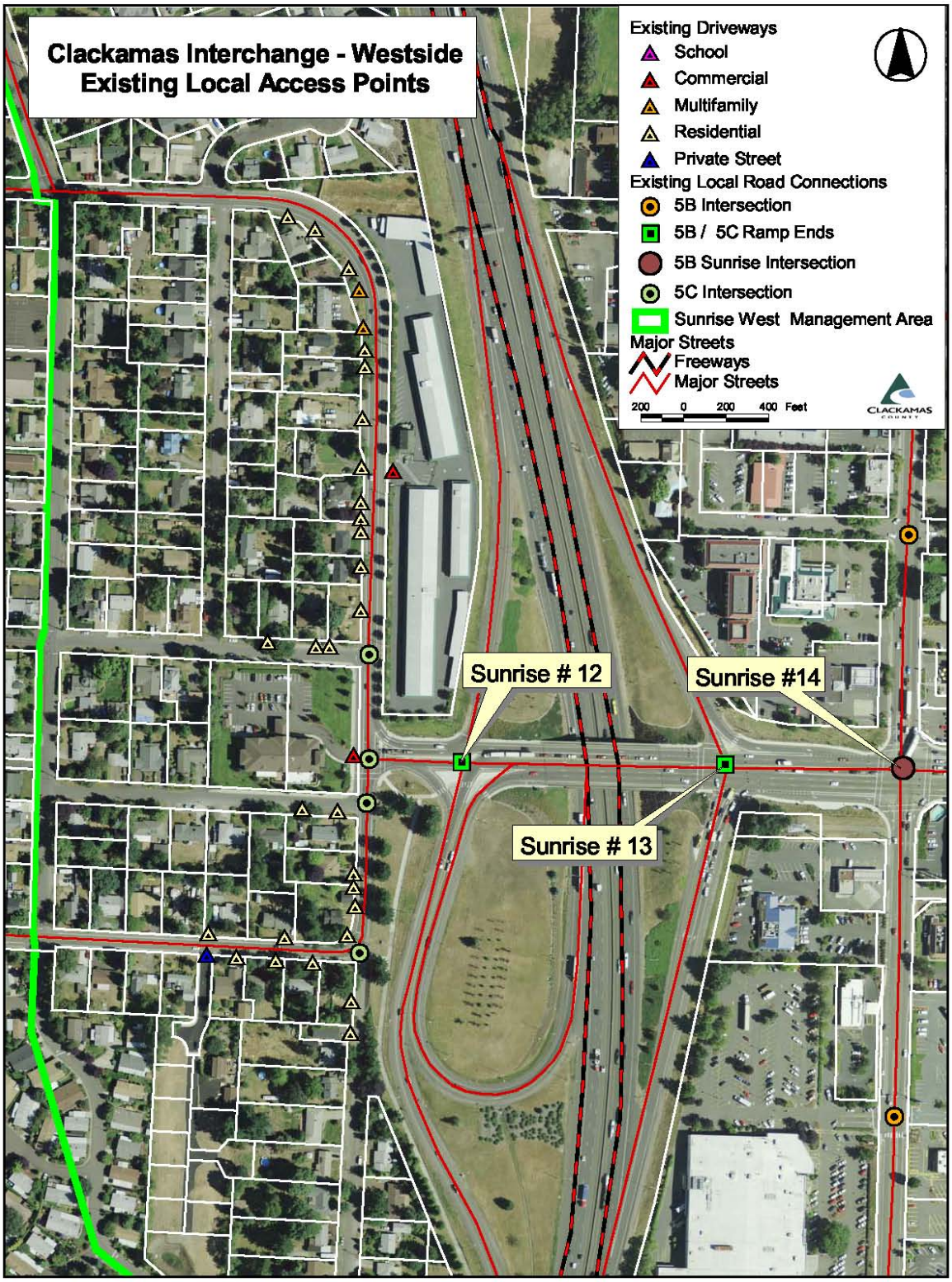


Figure 8 Clackamas Interchange Westside Area Local Approach Road Points

Table 13 Clackamas Interchange Westside Area Existing Local Approach Road Points – Driveways

ID Number	Address	Driveway Type	SDEIS Project Impacts
5c-10	15700 Se McKinley Avenue	Commercial	No Project Impacts
5c-8	15661 Se McKinley Avenue	Residential	No Project Impacts
5c-7	15651 Se McKinley Avenue	Residential	No Project Impacts
5c-6	15631 Se McKinley Avenue	Residential	No Project Impacts
5c-5	15561 Se McKinley Avenue	Multifamily	No Project Impacts
5c-4	15561 Se McKinley Avenue	Multifamily	No Project Impacts
5c-3	15555 Se McKinley Avenue	Residential	No Project Impacts
5c-2	8686 Se Clackamas Road	Residential	No Project Impacts
5c-1	8686 Se Clackamas Road	Residential	No Project Impacts
5c-9	15745 Se McKinley Avenue	Residential	No Project Impacts
5c-11	15785 Se McKinley Avenue	Residential	No Project Impacts
5c-12	15785 Se McKinley Avenue	Residential	No Project Impacts
5c-13	15805 Se McKinley Avenue	Residential	No Project Impacts
5c-14	15815 Se McKinley Avenue	Residential	No Project Impacts
5c-15	8725 Se Hood Street	Residential	No Project Impacts
5c-16	8725 Se Hood Street	Residential	No Project Impacts
5c-17	8705 Se Hood Street	Residential	No Project Impacts
5c-19	15929 Se McKinley Avenue	Commercial	Closed - Row Purchase
5c-21	8734 Se Jefferson Street	Residential	No Project Impacts
5c-20	8734 Se Jefferson Street	Residential	No Project Impacts
5c-22	16035 Se McKinley Street	Residential	No Project Impacts
5c-18	8683 Se Hood Street	Residential	No Project Impacts
5c-23	8785 Se Roots Road	Residential	No Project Impacts
5c-24	8785 Se Roots Road	Residential	No Project Impacts
5c-25	8785 Se Roots Road	Residential	No Project Impacts
5c-29	8695 Se Roots Road	Residential	No Project Impacts
5c-31	8738 Se Roots Road	Residential	No Project Impacts
5c-32	Blooming Lane	Private Street	No Project Impacts
5c-33	8645 Se Roots Road	Residential	No Project Impacts
5c-28	8788 Se Roots Road	Residential	No Project Impacts
5c-26	8790 Se Roots Road	Residential	No Project Impacts
5c-27	16123 Se McKinley Avenue	Residential	No Project Impacts
5c-30	8650 Se Roots Road	Residential	No Project Impacts

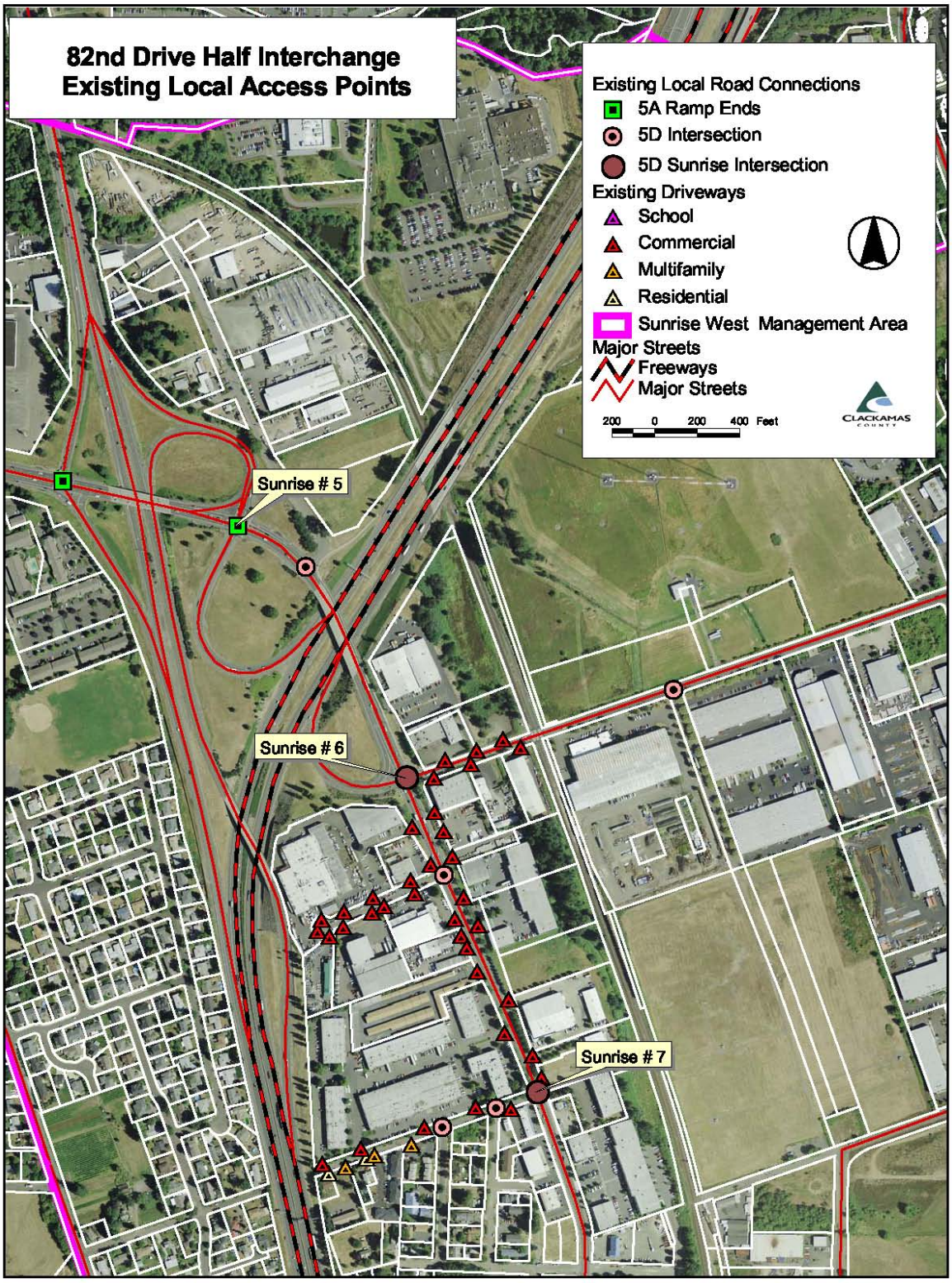


Figure 9 OR 213 N (82nd Avenue) Half Interchange with I-205 Existing Local Approach Road Points

Table 14 OR 213 N (82nd Avenue) Half Interchange with I-205 Existing Local Approach Road Points – Driveways

ID Number	Address	Driveway Type	SDEIS Project Impacts
5D-3	14242 SE 82nd Drive	commercial	Closed - ROW Purchase
5D-2	14242 SE 82nd Drive	commercial	Closed - ROW Purchase
5D-1	9180 SE Lawnfield Road	commercial	Closed - ROW Purchase
5D-4	9160 SE Lawnfield Road	commercial	Closed - ROW Purchase
5D-5	9001 SE Lawnfield Road	commercial	Closed - ROW Purchase
5D-9	8811 SE Herbert Court	commercial	Closed - ROW Purchase
5D-11	8921 SE Herbert Court	commercial	Closed - ROW Purchase
5D-10	14570 SE 82nd Drive	commercial	Closed - ROW Purchase
5D-8	14600 SE 82nd Drive	commercial	Closed - ROW Purchase
5D-15	8811 SE Herbert Court	commercial	Closed - ROW Purchase
5D-16	8830 SE Herbert Court	commercial	No Project Impacts
5D-14	14625 SE 82nd Drive	commercial	No Project Impacts
5D-13	14625 SE 82nd Drive	commercial	No Project Impacts
5D-23	14625 SE 82nd Drive	commercial	Closed - ROW Purchase
5D-22	14646 SE 82nd Drive	commercial	Closed - ROW Purchase
5D-24	14692 SE 82nd Drive	commercial	Closed - ROW Purchase
5D-7	14600 SE 82nd Drive	commercial	Closed - ROW Purchase
5D-6	14600 SE 82nd Drive	commercial	Closed - ROW Purchase
5D-19	8810 SE Herbert Court	commercial	Closed - ROW Purchase
5D-21	8811 SE Herbert Court	commercial	Closed - ROW Purchase
5D-20	8811 SE Herbert Court	commercial	Closed - ROW Purchase
5D-18	8811 SE Herbert Court	commercial	Closed - ROW Purchase
5D-17	8830 SE Herbert Court	commercial	No Project Impacts
5D-12	8921 SE Herbert Court	commercial	Closed - ROW Purchase
5D-25	14721 SE 82nd Drive	commercial	No Project Impacts
5D-26	14721 SE 82nd Drive	commercial	No Project Impacts
5D-27	14735 SE 82nd Drive	commercial	No Project Impacts
5D-28	14830 SE 82nd Drive	commercial	No Project Impacts
5D-33	9039 SE Jannsen Road	commercial	No Project Impacts
5D-31	14920 SE 82nd Drive	commercial	No Project Impacts
5D-30	14830 SE 82nd Drive	commercial	No Project Impacts
5D-29	9039 SE Jannsen Road	commercial	No Project Impacts
5D-40	8810 SE Jannsen Road	residential	No Project Impacts
5D-39	8856 SE Jannsen Road	multifamily	No Project Impacts
5D-38	8880 SE Jannsen Road	residential	No Project Impacts
5D-36	8882 SE Jannsen Road	multifamily	No Project Impacts
5D-35	8930 SE Jannsen Road	multifamily	No Project Impacts
5D-32	14933 SE 82nd Drive	commercial	No Project Impacts
5D-37	9039 SE Jannsen Road	commercial	No Project Impacts
5D-41	9039 SE Jannsen Road	commercial	No Project Impacts
5D-34	9039 SE Jannsen Road	commercial	No Project Impacts

Future Approach Roads Changes with the Sunrise Project

The construction of the Sunrise Project will create a revised local circulation system in and around the Sunrise West Interchanges Interchange Management Area that is based on the state and county road facilities included in the Preferred Alternative.

The future approach road are inventoried in Figures 10, 11, 12, 13 and 14 and in Tables 15, 16, 17, 18, 19, 20, 21, 22, and 23.

New Land Development and Access to the Local Circulation System

Within the Interchange Management Area there is a limited amount of developable land. When a new development is proposed on these lands, the access to the local circulation system will be analyzed by the jurisdiction with land use authority. The local jurisdictions will apply their access standards, as previously discussed, in the decision making process and determine whether to grant new developments access to the local circulation system. No new direct access will be permitted to the expressway. Proposals for new access to the other portions of the state system will be evaluated subject to the provisions of Oregon Administrative Rule 734-051-0125.

Access Management Issues

A number of existing access points in the Sunrise West Interchanges Interchange Management Area do not meet the ODOT Access Management standards set forth in OAR 734 Division 51. The process of building the Sunrise Project improvements will remove a substantial number of these problematic access points and replace them with access points that either meet the ODOT standard or are closer to the ODOT standards. The key to solving these problems is the construction of the built alternatives. The timing of these improvements is uncertain.

The implementation of access management improvements based on the Sunrise Project should be delayed until such time as project right-of-way is purchased and project construction is scheduled. Access management improvement (included in this list of improvements) should be undertaken as part of a development project.

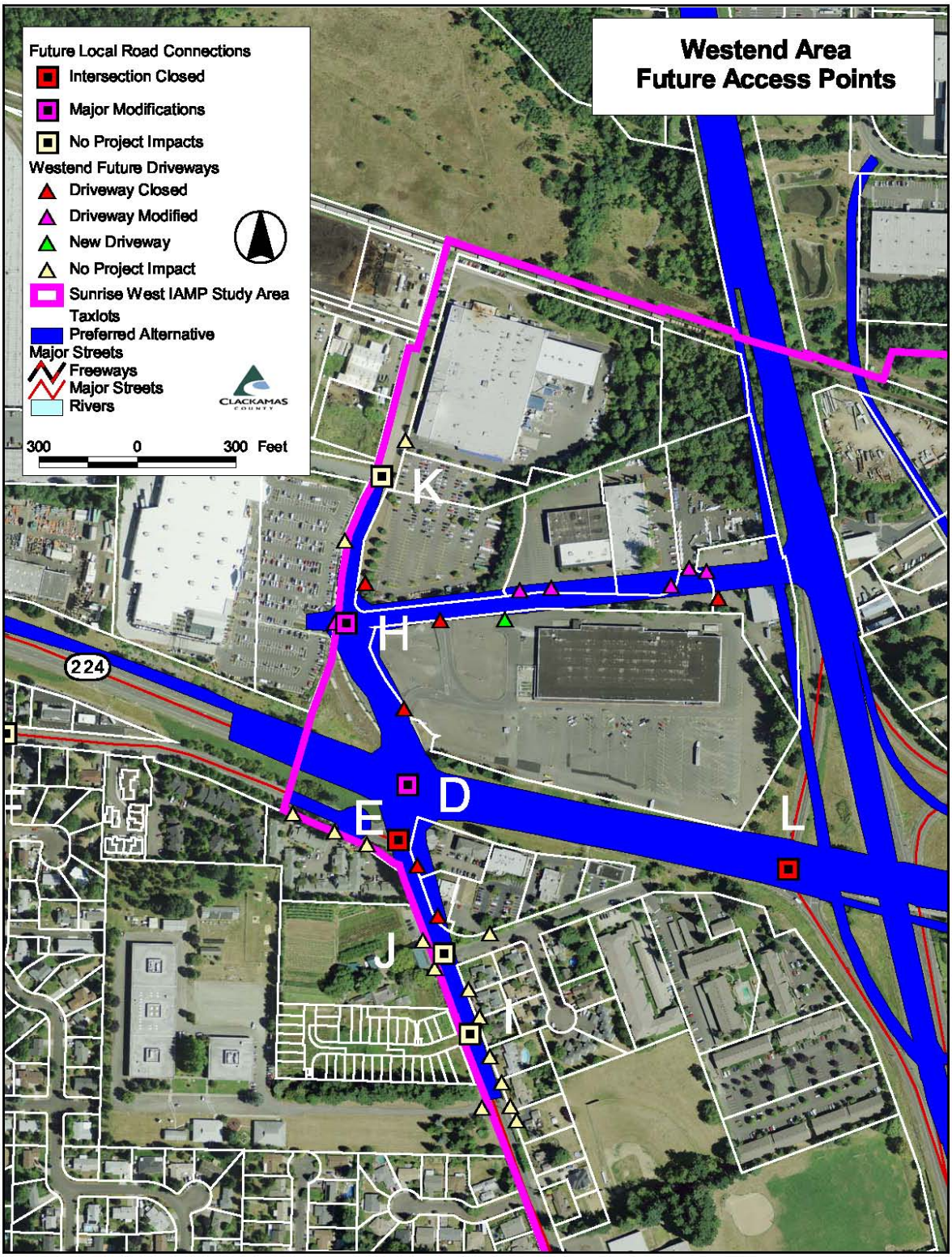


Figure 10 Future Local Approach Road Points – West End Area

Table 15 West End Area Future Approach Road Points -- Driveways

ID Number	ADDRESS	Land Use Type	FEIS Access Impacts
29	7700 SE Lake Road	Multifamily Driveway	No Project Impact
30	7700 SE Lake Road	Multifamily Driveway	No Project Impact
31	7700 SE Lake Road	Multifamily Driveway	No Project Impact
32	14000 SE Johnson Road	Commercial Driveway	Driveway Closed
33	7800 Lake Road	Commercial Driveway	Driveway Closed
34	7831 SE Lake Road	Commercial Driveway	No Project Impact
35	7924 SE Lake Road	Commercial Driveway	No Project Impact
36	7924 SE Lake Road	Commercial Driveway	No Project Impact
37	14090 SE Johnson Road	Residential Driveway	No Project Impact
38	14100 SE Johnson Road	Residential Driveway	No Project Impact
39	14180 SE Johnson Road	Residential Driveway	No Project Impact
40	14288 SE Johnson Road	Residential Driveway	No Project Impact
41	14288 SE Johnson Road	Residential Driveway	No Project Impact
42	14302 SE Johnson Road	Residential Driveway	No Project Impact
43	14211 SE Johnson Road	School Driveway	No Project Impact
50	13631 SE Johnson Road	Commercial Driveway	No Project Impact
51	13631 SE Johnson Road	Commercial Driveway	Driveway Modified by Project Construction
52	13350 SE Johnson Road	Commercial Driveway	No Project Impact
53	13350 SE Johnson Road	Commercial Driveway	Driveway Closed
54	13750 SE Johnson Road	Commercial Driveway	Driveway Closed by Project Construction
55	13750 SE Johnson Road	Commercial Driveway	Driveway Closed by Project Construction
56	8085 SE Deer Creek Lane	Commercial Driveway	Driveway Modified by Project Construction
57	8085 SE Deer Creek Lane	Commercial Driveway	Driveway Modified by Project Construction
58	8155 SE Deer Creek Lane	Commercial Driveway	Driveway Modified by Project Construction
59	8225 SE Deer Creek Lane	Commercial Driveway	Driveway Modified by Project Construction
60	8277 SE Deer Creek Lane	Commercial Driveway	Driveway Modified by Project Construction
61	8277 SE Deer Creek Lane	Commercial Driveway	Driveway Closed by Project Construction
N/A	Replaces # 54 and 55	Commercial Driveway	Replaces # 54 and 55

Table 16 West End Area Future Approach Road Points -- Intersections

ID Number	Approach Road Type	Approach Road Location	Impact of Sunrise Project
A	Existing Local Street	Webster Road and Lake Road	No Project Impacts
B	Existing Local Street	Milwaukie Expressway (OR 224) and Webster Road	Minor Modification of Existing Intersection
C	Existing Local Street	Milwaukie Expressway (OR 224) and Pheasant Court	Minor Modification of Existing Intersection
D	Existing Local Street	Milwaukie Expressway (OR 224) and Johnson Road	Major Modification of Existing Intersection
E	Existing Local Street	Johnson Road and Lake Road	Intersection Closed by Project Construction
F	Existing Local Street	Tiara Drive and Lake Road	No Project Impacts
G	Existing Local Street	Matilda Drive and Lake Road	No Project Impacts
H	Existing Local Street	Johnson Road and Deer Creek Lane	Major Modification of Existing Intersection
I	Existing Local Street	Johnson Road and Sporri Lane	No Project Impacts
J	Existing Local Street	Johnson Road and Lake Road	No Project Impacts
K	Existing Local Street	Johnson Road and Private Drive	No Project Impacts
L	Existing State Facility	OR 213 N (82nd Ave) SB Off to Milwaukie Expressway (OR 224)	Intersection Closed by Project Construction
AI	Existing Local Street	Pheasant Court and Frontage Road	No Project Impacts

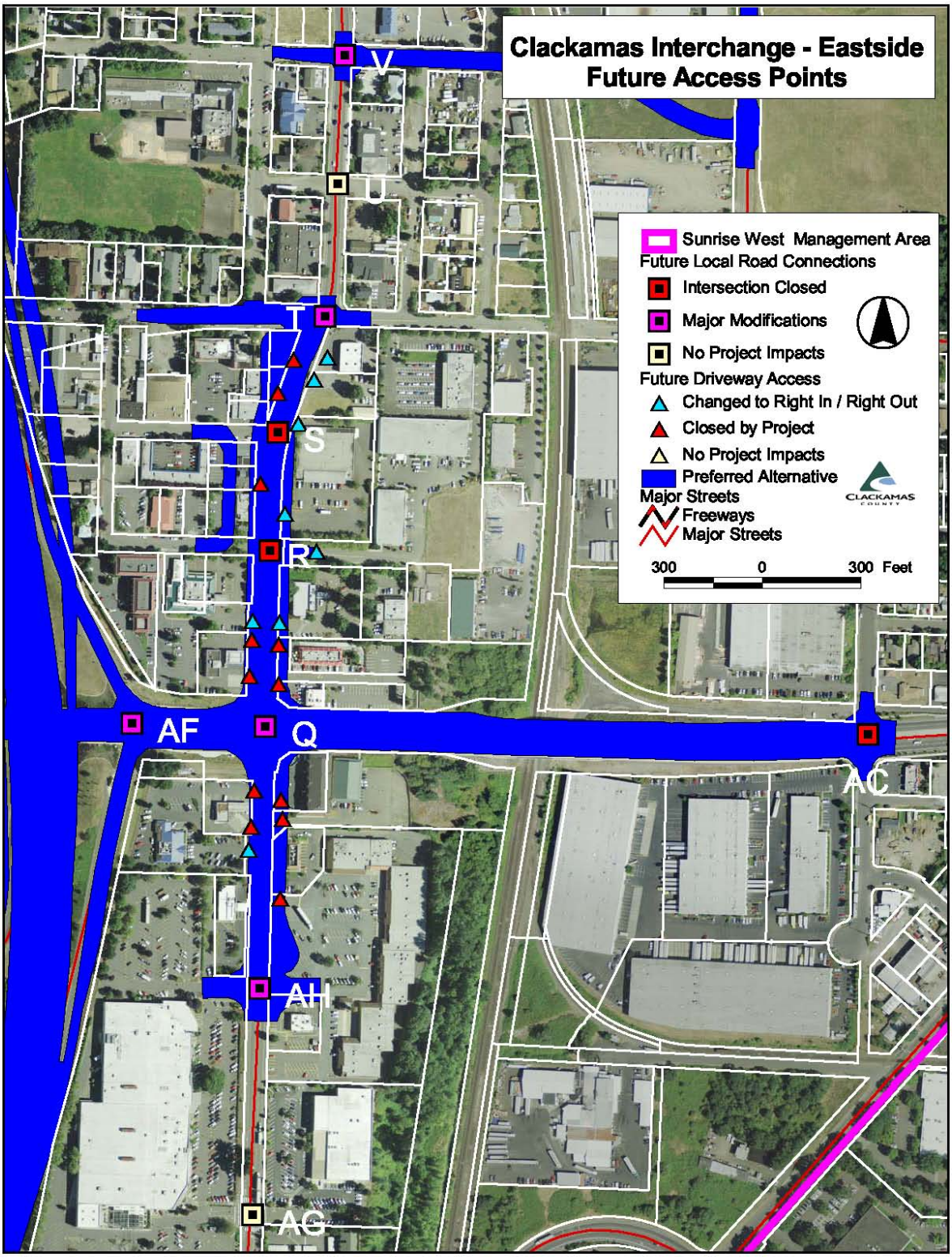


Figure 11 Future Local Approach Road Points – Clackamas Interchange – Eastside Area

Table 17 Future Approach Road Points Clackamas Interchange – Eastside Area -- Driveways

ID Number	ADDRESS	Land Use Type	FEIS Access Impacts
11	15525 SE 82nd Drive	Commercial Driveway	Driveway Closed by Project
12	15536 SE 82nd Drive	Commercial Driveway	Driveway Modified to Right In / Right Out Access Only
13	15630 SE 82nd Drive	Commercial Driveway	Driveway Modified to Right In / Right Out Access Only
14	15571 SE 82nd Drive	Commercial Driveway	Driveway Closed by Project
15	15700 SE 82nd Drive	Commercial Driveway	Changed to Right In / Right Out
16	15675 SE 82nd Drive	Commercial Driveway	Driveway Closed by Project
17	15700 SE 82nd Drive	Commercial Driveway	Driveway Modified to Right In / Right Out Access Only
18	Alansa Drive	Commercial Driveway	Driveway Modified to Right In / Right Out Access Only
19	15851 SE 82nd Drive	Commercial Driveway	Driveway Modified to Right In / Right Out Access Only
20	15950 SE 82nd Drive	Commercial Driveway	Driveway Modified to Right In / Right Out Access Only
21	15901 SE 82nd Drive	Commercial Driveway	Driveway Closed by Project
22	15960 SE 82nd Drive	Commercial Driveway	Driveway Closed by Project
23	15901 SE 82nd Drive	Commercial Driveway	Driveway Closed by Project
24	15970 SE 82nd Drive	Commercial Driveway	Driveway Closed by Project
25	16002 SE 82nd Drive	Commercial Driveway	Driveway Closed by Project
26	16010 SE 82nd Drive	Commercial Driveway	Driveway Closed by Project
27	16016 SE 82nd Drive	Commercial Driveway	Driveway Closed by Project
28	16002 SE 82nd Drive	Commercial Driveway	Driveway Closed by Project
29	16087 SE 82nd Drive	Commercial Driveway	Driveway Modified to Right In / Right Out Access Only
30	16050 SE 82nd Drive	Commercial Driveway	Driveway Closed by Project

Table 18 Future Approach Road Points Intersections Clackamas East side – Intersections

ID Number	Approach Road Type	Approach Road Location	Impact of Sunrise Project
Q	Existing Local Street	82nd Drive and OR 212/224	Major Modification of Existing Intersection
R	Existing Local Street	82nd Drive and Adams Street / Alansa Drive	Intersection Closed by Project Construction
S	Existing Local Street	82nd Drive and St Helens Street	Intersection Closed by Project Construction
T	Existing Local Street	82nd Drive and Clackamas Road	Major Modification of Existing Intersection
U	Existing Local Street	82nd Drive and Church Street	No Project Impacts
V	Existing Local Street	82nd Drive and Tolbert Street	Major Modification of Existing Intersection
AC	Existing Local Street	OR 212 / 224 and 98th Avenue	Intersection Closed by Project Construction
AF	Existing Freeway Off / On Ramp Ends	Clackamas Interchange Ramp Ends	Major Modification of Existing Interchange Ramp Ends
AG	Existing Local Street	Fred Meyer South Entrance Intersection	No Project Impacts
AH	Existing Local Street	Fred Meyer North Entrance Intersection	Major Modification of Existing Intersection

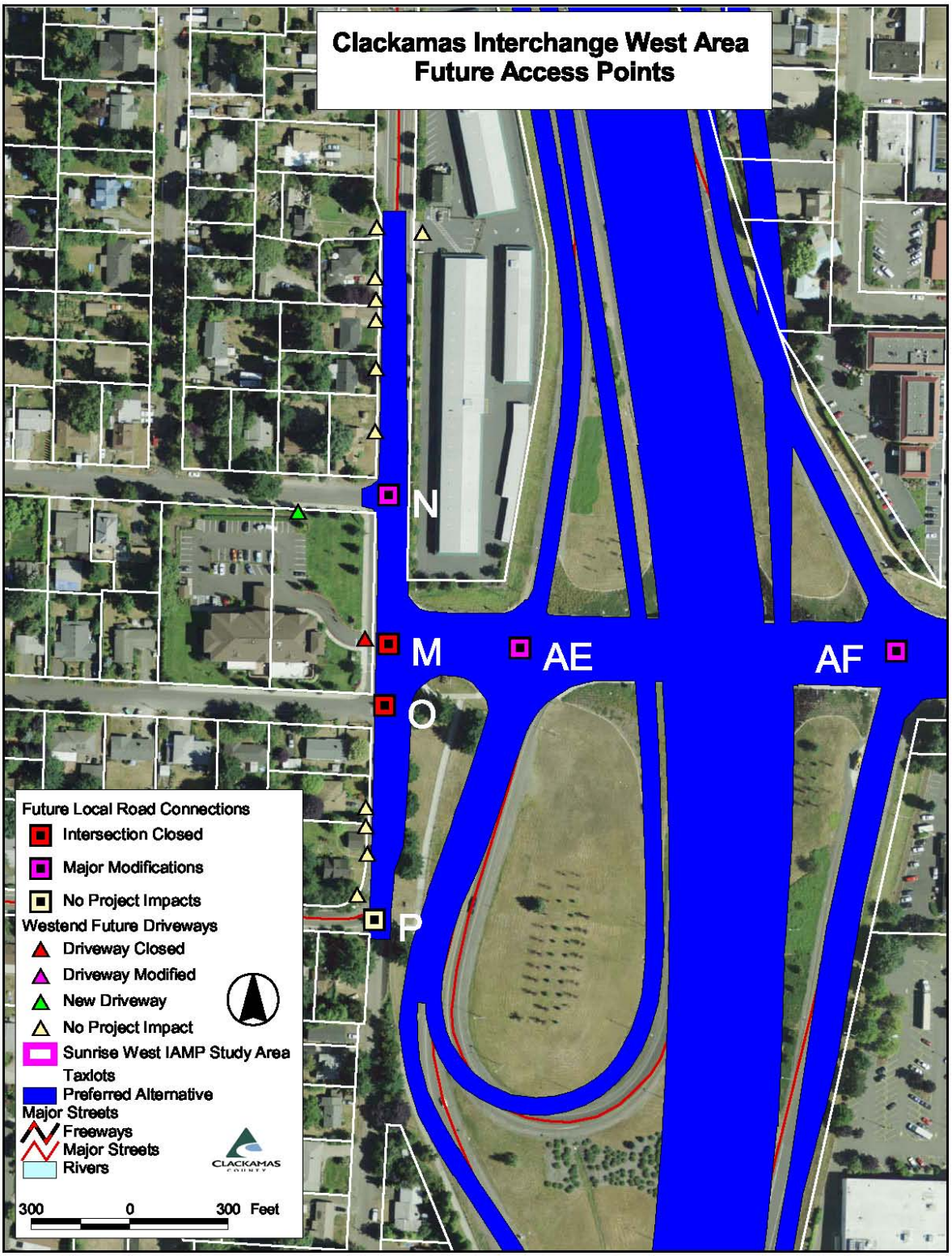


Figure 12 Future Local Approach Road Points – Clackamas Interchange – Westside Area

Table 19 Future Approach Road Points Clackamas Interchange – Westside Area -- Driveways

ID Number	ADDRESS	Land Use Type	FEIS Access Impacts
9	15745 SE McKinley Avenue	Residential Driveway	No Project Impacts
10	15700 SE McKinley Avenue	Commercial Driveway	No Project Impacts
11	15785 SE McKinley Avenue	Residential Driveway	No Project Impacts
12	15785 SE McKinley Avenue	Residential Driveway	No Project Impacts
13	15805 SE McKinley Avenue	Residential Driveway	No Project Impacts
14	15815 SE McKinley Avenue	Residential Driveway	No Project Impacts
15	8725 SE Hood Street	Residential Driveway	No Project Impacts
19	15929 SE McKinley Avenue	Commercial Driveway	Closed - ROW Purchase
N/A	15929 SE McKinley Avenue	Commercial Driveway	New Access - Replaces # 19
22	16035 SE McKinley Street	Residential Driveway	No Project Impacts
23	8785 SE Roots Road	Residential Driveway	No Project Impacts
24	8785 SE Roots Road	Residential Driveway	No Project Impacts
25	8785 SE Roots Road	Residential Driveway	No Project Impacts

Table 20 Future Approach Road Points Intersections Clackamas Westside – Intersections

ID Number	Approach Road Type	Approach Road Location	Impact of Sunrise Project
M	Existing Local Street	OR 212/224 and McKinley Road	Major Modification of Existing Intersection
N	Existing Local Street	McKinley Road and Hood Street	Major Modification of Existing Intersection
O	Existing Local Street	McKinley Road and Jefferson Street	Intersection Closed by Project Construction
P	Existing Local Street	McKinley Road and Roots Road	No Project Impacts
AE	Existing Freeway Off / On Ramp Ends	Clackamas Interchange Ramp Ends	Major Modification of Existing Intersection

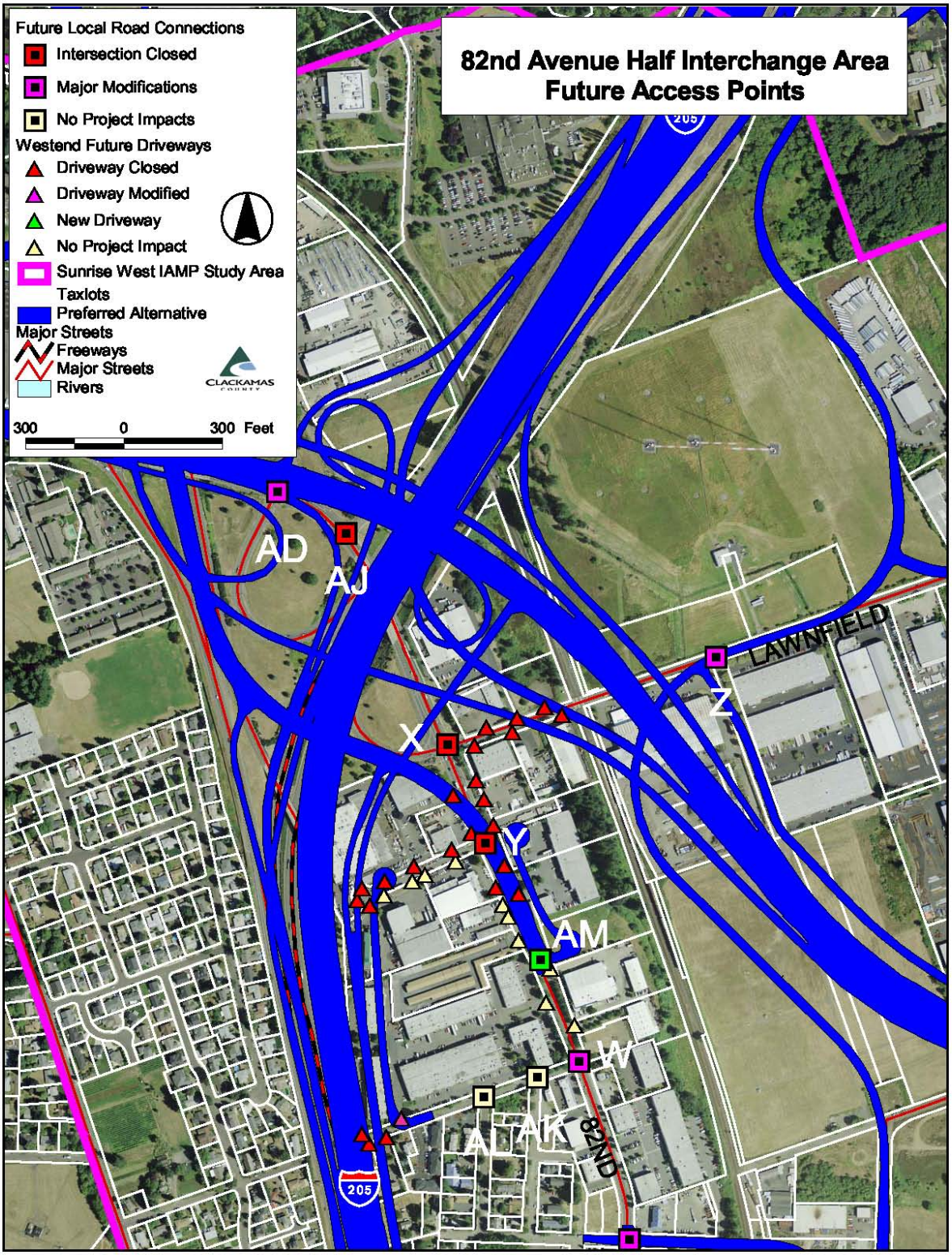


Figure 13 Future Local Approach Road Points – OR 213 N (82nd Avenue) Half Interchange

Table 21 Future Approach Road Points OR 213 N (82nd Avenue) Half Interchange-- Driveways

ID Number	ADDRESS	Land Use Type	FEIS Access Impacts
1	9180 SE Lawnfield Road	Commercial Driveway	Driveway Closed by Project Construction
2	14242 SE 82nd Drive	Commercial Driveway	Driveway Closed by Project Construction
3	14242 SE 82nd Drive	Commercial Driveway	Driveway Closed by Project Construction
4	9160 SE Lawnfield Road	Commercial Driveway	Driveway Closed by Project Construction
5	9001 SE Lawnfield Road	Commercial Driveway	Driveway Closed by Project Construction
6	14600 SE 82nd Drive	Commercial Driveway	Driveway Closed by Project Construction
7	14600 SE 82nd Drive	Commercial Driveway	Driveway Closed by Project Construction
8	14600 SE 82nd Drive	Commercial Driveway	Driveway Closed by Project Construction
9	8811 SE Herbert Court	Commercial Driveway	Driveway Closed by Project Construction
10	14570 SE 82nd Drive	Commercial Driveway	Driveway Closed by Project Construction
11	8921 SE Herbert Court	Commercial Driveway	Driveway Closed by Project Construction
12	8921 SE Herbert Court	Commercial Driveway	Driveway Closed by Project Construction
13	14625 SE 82nd Drive	Commercial Driveway	No Project Impacts
14	14625 SE 82nd Drive	Commercial Driveway	No Project Impacts
15	8811 SE Herbert Court	Commercial Driveway	Driveway Closed by Project Construction
16	8830 SE Herbert Court	Commercial Driveway	No Project Impacts
17	8830 SE Herbert Court	Commercial Driveway	No Project Impacts
18	8811 SE Herbert Court	Commercial Driveway	Driveway Closed by Project Construction
19	8810 SE Herbert Court	Commercial Driveway	Driveway Closed by Project Construction
20	8811 SE Herbert Court	Commercial Driveway	Driveway Closed by Project Construction
21	8811 SE Herbert Court	Commercial Driveway	Driveway Closed by Project Construction
22	14646 SE 82nd Drive	Commercial Driveway	Driveway Closed by Project Construction
23	14625 SE 82nd Drive	Commercial Driveway	Driveway Closed by Project Construction
24	14692 SE 82nd Drive	Commercial Driveway	Driveway Closed by Project Construction
25	14721 SE 82nd Drive	Commercial Driveway	No Project Impacts
26	14721 SE 82nd Drive	Commercial Driveway	No Project Impacts
27	14735 SE 82nd Drive	Commercial Driveway	No Project Impacts
28	14830 SE 82nd Drive	Commercial Driveway	No Project Impacts
29	9039 SE Jannsen Road	Commercial Driveway	No Project Impacts
30	14830 SE 82nd Drive	Commercial Driveway	No Project Impacts
37	9039 SE Jannsen Road	Commercial Driveway	Driveway Converted to Local Street
39	8856 SE Jannsen Road	Multifamily Driveway	Driveway Closed by Project Construction
40	8810 SE Jannsen Road	Residential Driveway	Driveway Closed by Project Construction
41	9039 SE Jannsen Road	Commercial Driveway	Driveway Closed by Project Construction

Table 22 Future Approach Road Points OR 213 N (82nd Avenue) Half Interchange -- Intersections

ID Number	Approach Road Type	Approach Road Location	Impact of Sunrise Project
W	Existing Local Street	82nd Drive and Jannsen Road	Major Modification of Existing Intersection
X	Existing State Facility	OR 212 N (82nd Avenue) and Lawnfield Road and I-205 NB On Ramp	Intersection Closed by Project Construction
Y	Existing Local Street	82nd Drive and Herbert Court	Intersection Closed by Project Construction
Z	Existing Local Street	Lawnfield Road and Industrial Way	Major Modification of Existing Intersection
AD	Existing Freeway Off Ramp End	I-205 SB Off to Milwaukie Expressway (OR 224)	Major Modification of Existing Intersection
AJ	Existing Local Street	Milwaukie Expressway (OR 224) and Ambler Road	Intersection Closed by Project Construction
AK	Existing Local Street	91st Avenue and Jannsen Road	No Project Impacts
AL	Existing Local Street	90th Avenue and Jannsen Road	No Project Impacts
AM	New Local Road Intersection	82nd Drive and New Frontage Road, north of Jannsen Road	New Intersection create by Project

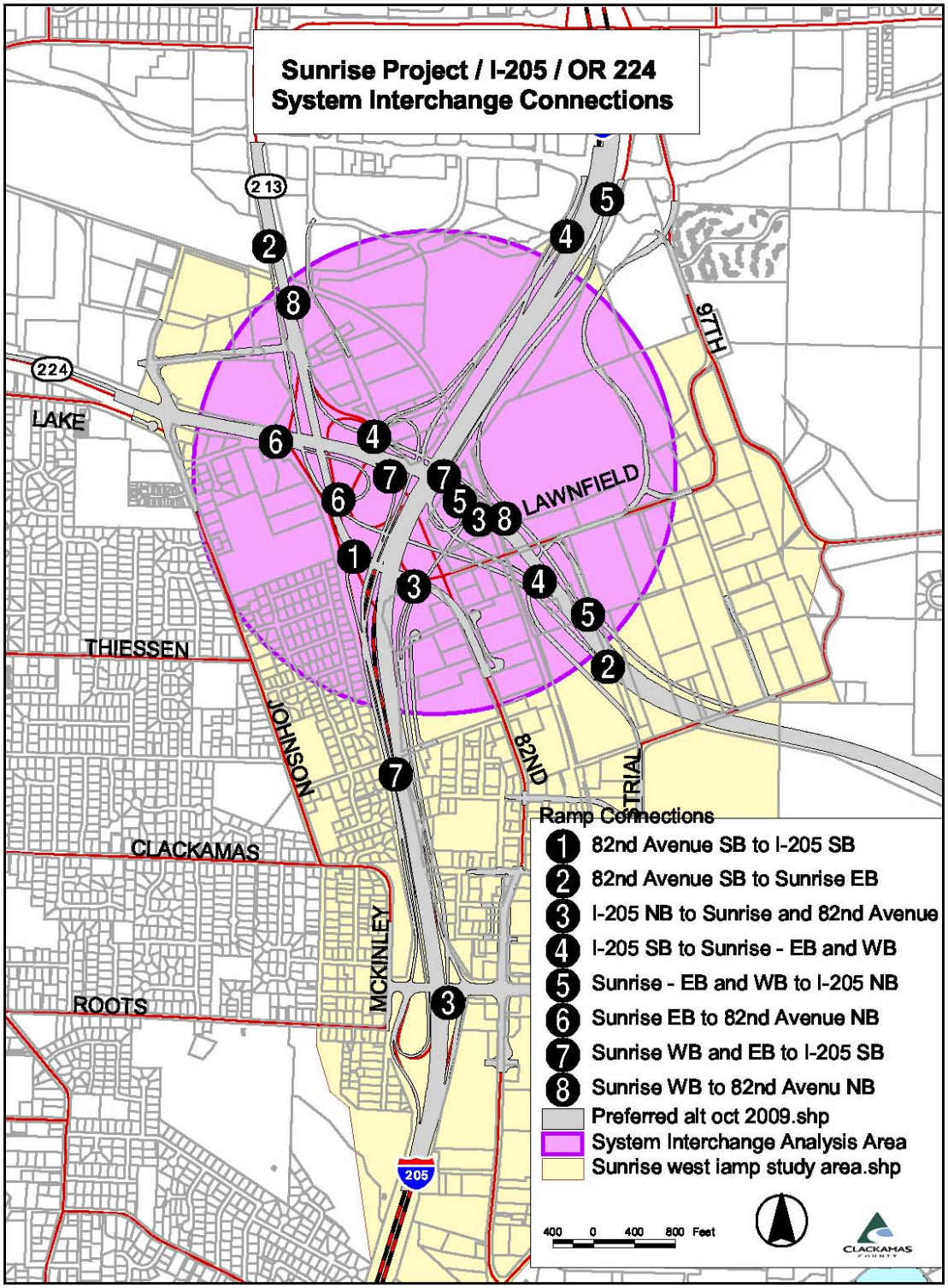


Figure 14 Future System to System Interchange Connections – Sunrise/ I-205/ OR 224/ OR 213 N

Table 23 Future System to System Interchange Connections – Sunrise/ I-205/ OR 224/ OR 213 N

ID	Connect
1	82nd Avenue SB to I-205 SB
2	82nd Avenue SB to Sunrise EB
2	82nd Avenue SB to Sunrise EB
3	I-205 NB to Sunrise and 82nd Avenue
3	I-205 NB to Sunrise and 82nd Avenue
3	I-205 NB to Sunrise and 82nd Avenue
4	I-205 SB to Sunrise - EB and WB
4	I-205 SB to Sunrise - EB and WB
4	I-205 SB to Sunrise - EB and WB
5	Sunrise - EB and WB to I-205 NB
5	Sunrise - EB and WB to I-205 NB
5	Sunrise - EB and WB to I-205 NB
6	Sunrise EB to 82nd Avenue NB
6	Sunrise EB to 82nd Avenue NB
7	Sunrise WB and EB to I-205 SB
7	Sunrise WB and EB to I-205 SB
7	Sunrise WB and EB to I-205 SB
8	Sunrise WB to 82nd Avenue NB
8	Sunrise WB to 82nd Avenue NB

Local Government Access Spacing Standards.
Local government access spacing standards are generally less restrictive that the ODOT standards set out in Oregon Administrative Rule 734-051-0125.

Clackamas County Access Spacing Standards

County access spacing standards are found in Section 220 of the County Road standards and are shown in Table 24 as follows:

Table 24 County Road Standards Minimum Intersection Access Spacing

Functional Classification of Existing Primary Roadway	Minimum Full Spacing of Intersecting Roadways				Minimum Restricted Spacing of Intersecting Roadways*			
	Major & Minor Arterial	Collector	Connector	Local & Private Roadways	Major & Minor Arterial	Collector	Connector	Local & Private Roadways
Major Arterial	1000	1000	500	250	N/A	N/A	300	300
Minor Arterial	1000	500	250	250	N/A	N/A	300	150
Collector	N/A	150	100	100	N/A	N/A	N/A	N/A
Connector	N/A	N/A	100	100	N/A	N/A	N/A	N/A
Local & Private Roadways	N/A	N/A	100	100	N/A	N/A	N/A	N/A

Notes: Does not apply to driveways.

Alternative spacing may be allowed as a modification per Section 170.

*Access movements may be restricted as necessary to preserve function of major roadway

County Driveway Access Standards

County driveway access standards are found in the County Road Standards and generally apply as follows:

- Driveway access to arterial roadways is restricted. Full access is generally prohibited unless it is demonstrated that no other alternative is feasible
- Driveway access to collector roadways is less restricted than on arterial roadways. Full access is restricted in certain cases unless it is demonstrated that no other alternative is feasible. Commercial, industrial, multifamily and institutional uses may have exclusive driveway access to a collector with a minimum intersection spacing of 150 feet.
- Driveway access on connector road should be provided from streets with a lower functional classification. Access for proposed single family residential driveways is allowed. No driveway shall be allowed within 25 feet of the right-of-way lines at an intersection. Commercial, industrial and institutional developments proposing access to roadways with a local road functional classification that serve existing residential neighborhoods located within the UGB are discouraged and any anticipated adverse impact upon the livability of these neighborhoods shall be quantified and mitigated proportionately to their impacts.

Happy Valley Access Spacing Standards

The City of Happy Valley has recently annexed a lot on the eastern edge of the Sunrise Interchanges Management Area. Happy Valley access spacing standards are found in the Happy Valley Transportation System Plan and are shown in Table 25 as follows:

Several access management strategies were identified to improve local access and mobility in Happy Valley:

- Develop specific access management plans for major and minor arterial streets in Happy Valley to maximize the capacity of the existing facilities and protect their functional integrity.
- Work with land use development applications to consolidate driveways where feasible.
- Construct raised medians to provide for right-in/right-out driveways as appropriate.
- New development and roadway projects located on City street facilities should meet the recommended access spacing standards summarized in Table 25. Access points include public streets, private streets, and private commercial or residential driveways. Any deviation to these spacing standards would require an access management plan to be approved by the City engineer. The maximum access spacing listed in this table is consistent with Metro.

Table 25 Happy Valley Access Spacing Standards for City Street Facilities (Table 8-2 in TSP)

STREET FACILITY	MAXIMUM ACCESS SPACING	MINIMUM ACCESS SPACING WITH FULL ACCESS	MINIMUM ACCESS SPACING WITH LIMITED ACCESS*
Major Arterial		1,000 feet	500 feet
Minor Arterial		600 feet	300 feet
Collector	530 feet	400 feet	200 feet
Neighborhood	530 feet	-	-
Local	530 feet	-	-

Note: Intersection and driveway spacing measured from centerline to centerline.

***Limited Access – Vehicles are restricted to right-in/right-out turn movements. In some cases, left-in turn movements may be permitted.**

Existing Transportation System (SDEIS)

Existing Transportation Facilities

Roadways are designated with specific "functional classifications" to indicate the mobility and accessibility functions that they serve. The functional classification further signifies the design for existing or anticipated traffic volumes, speeds and multi-modal uses for that roadway. Clackamas County employs a classification system to include principal, major and minor arterials (supporting a range of mobility and less access), and collector, connector and local roads (providing increasing focus on access over mobility). In addition, ODOT applies its functional classification to the state highway system (1999 Oregon Highway Plan, updated 2006).

The functional classifications for the existing road system are listed below and shown on Figure 15.

Table 26 – Functional Classifications for the Existing Road System

HIGHWAY / ROAD	FUNCTIONAL CLASS
I-205	Interstate Highway – NHS (National Highway System)
OR 224 west of I-205	NHS / Statewide Highway (State); Principal Arterial (County)
OR 212/224	NHS / Statewide Highway (State); Major Arterial (County)
OR 213 (SE 82nd Ave):	District Highway (State); Major Arterial (County)
Johnson Road	Minor Arterial
SE 82nd Drive	Minor Arterial
Evelyn Street	Minor Arterial
Jennifer Street	Minor Arterial
McKinley Avenue	Minor Arterial
Clackamas Road	Collector / Minor Arterial / Local Road
Lawnfield Road	Collector / Minor Arterial
Jannsen Road	Local Road
Tolbert Road	Local Road
Herbert Court	Local Road

Interchange Configurations and Operations Analyses

The basic configurations in the existing system are as follows:

- The interchange of the Milwaukie Expressway with SE 82nd Avenue and with I-205 is configured more as partial interchanges.
  - The Milwaukie Expressway is a 4-lane overpass across SE 82nd Avenue.
  - The signalized intersection on the west side has the southbound exit from 82nd Avenue and the southbound on-ramp leading to I-205. This metered on-ramp merges into the southerly segment of SE 82nd Avenue which then merges onto southbound I-205.
  - The signalized intersection on the east side of the overpass has the cloverleaf, southbound off-ramp from I-205 which intersects the south side of the Expressway.
  - The north leg of this intersection, a two-way divided roadway, has both the cloverleaf, northbound off-ramp from SE 82nd Avenue to the Expressway (carrying traffic which already exited from northbound I-205) and the northbound connection to SE 82nd Avenue.
  - The Milwaukie Expressway continues south on a structure across I-205, becoming SE 82nd Drive. The first signalized intersection beyond the I-205 overpass is at Lawnfield Road (the east leg) and the northbound on-ramp to I-205 (the west leg).
- SE 82nd Drive continues through the community of Clackamas and intersects OR 212/224 approximately 0.8 mile south of Lawnfield Road.
- Approximately 480 feet west of the SE 82nd Drive/OR 212-224 intersection are the I-205 northbound on- and off-ramps at the Clackamas Interchange.

Traffic Control

The existing network does not have medians or turn restrictions.

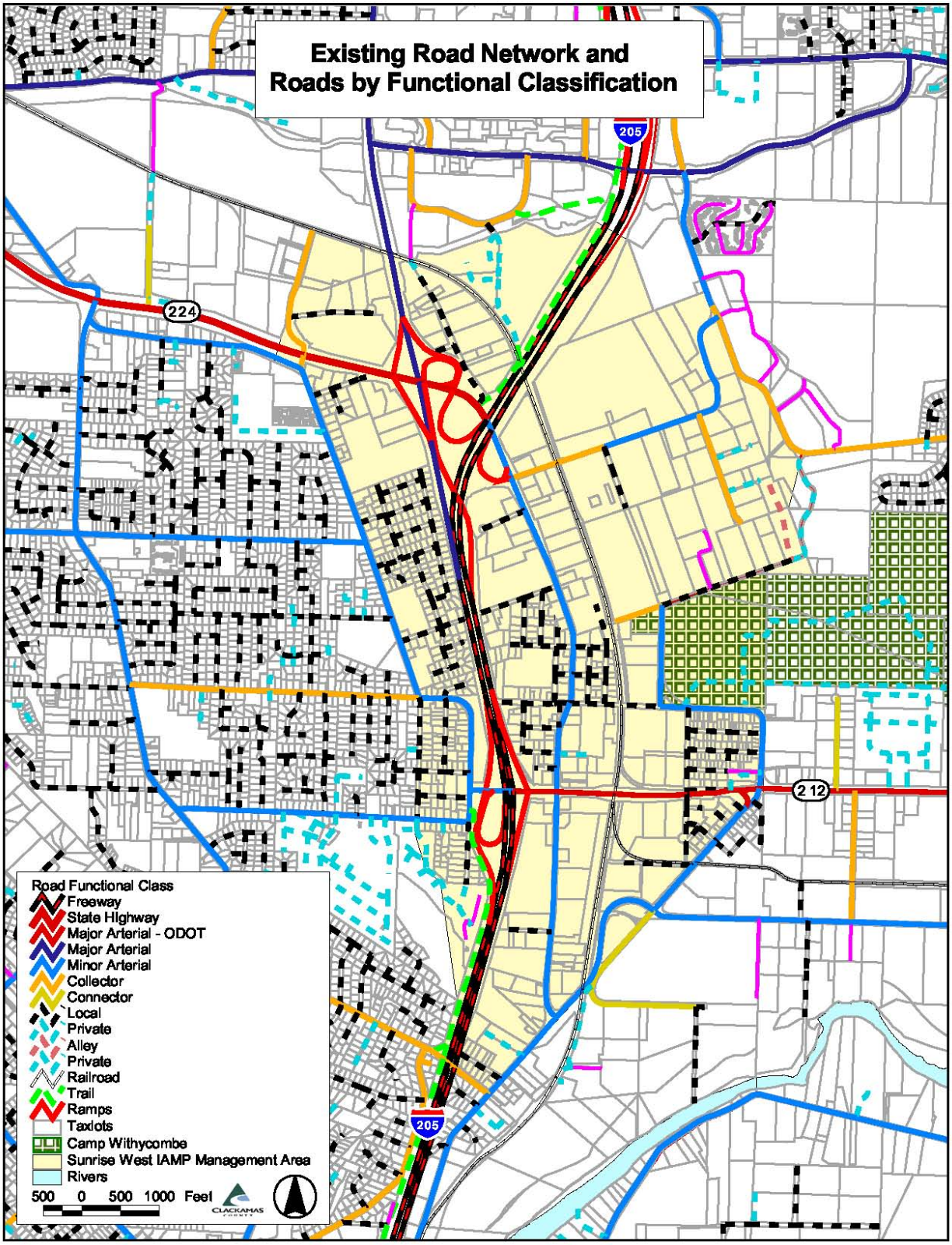


FIGURE 15 SUNRISE WEST EXISTING CONDITIONS 2004

Existing Traffic Volumes and System Operations

Existing transportation system performance was assessed for year 2005 based on available 2004 traffic data.

Road Jurisdiction, Average Daily Traffic (ADT), and Truck Usage

In the Management Area, the state of Oregon and Clackamas County maintain the public road network. Figure 16 shows the area's road network and jurisdictions' ownerships. Also on this Figure, as well as summarized in Table 27, are the Average Daily Traffic (ADT) volumes and percentage of heavy truck traffic.

TABLE 27 EXISTING CONDITIONS – 2004 Average Daily Traffic and Percentage Heavy Trucks

Direction	OR 224 west of Johnson Rd.	OR 212/224 east of 106th	Jennifer St. east of 106th Ave
Eastbound	17,000 (5.% trucks)	18,800 (7.5% trucks)	5,400 (6.7% trucks)
Westbound	18,100 (3.7% trucks)	19.200 (6.4% trucks)	4,500 (8.7% trucks)
TOTAL VEHICLES	35,100 (4.3% trucks)	38,000 (6.9% trucks)	9,900 (7.5% trucks)

Direction	82nd Dr between I-205 and the 82nd Ave southbound ramps	I-205 north of the Clackamas interchange	I-205 south of the Clackamas interchange
Northbound	15,400 (4.5% trucks)	70,600 (5.4% trucks)	59,900 (4.6% trucks)
Southbound	9,200 (2.1% trucks)	76,800 (4.7% trucks)	68,200 (5.0% trucks)
TOTAL VEHICLES	24,600 (3.6% trucks)	147,400 (5% trucks)	128,100 (4.8% trucks)

FIGURE 16 SUNRISE WEST EXISTING CONDITIONS 2004

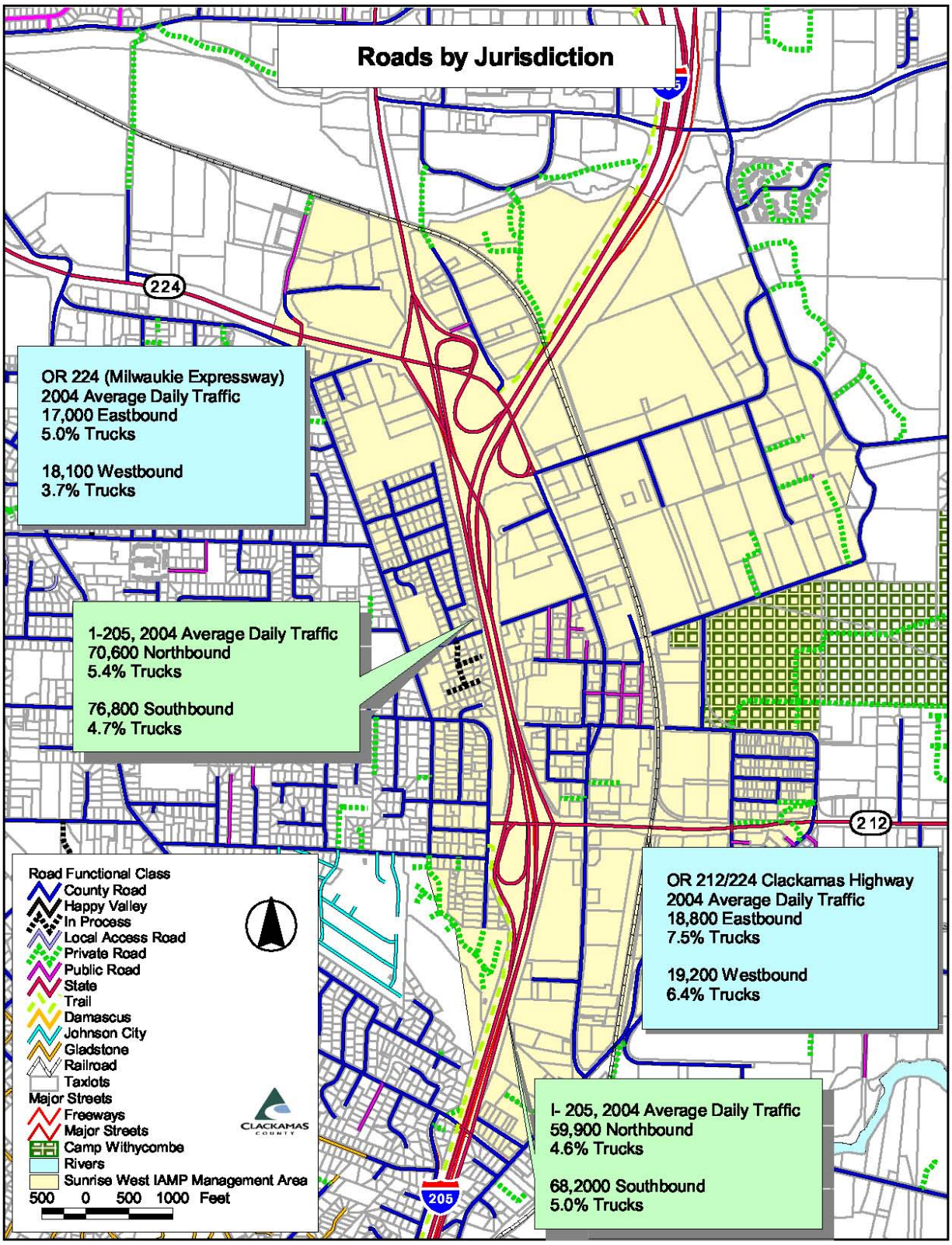


Figure 17 and Figure 18 show congested road segments on the existing system, arterial LOS and intersection LOS during the AM and PM peak hours respectively.

Analysis showed that during the AM peak period the following conditions exist:

- The westbound lanes of OR 212/224 are congested from 82nd Drive to about SE 106th Avenue.
- This section of OR 212 / 224 has an LOS of F.
- Eastbound congestion on OR 212/224 is found on its overpass across I-205, from the southbound ramps to SE 82nd Drive.
- This section of OR 212 / 224 has an LOS of F.

Analysis showed that during the PM peak period the following conditions exist:

- Congestion for the PM peak period exists on the same road sections as during the AM peak period.
- The I-205 southbound off-ramp to OR 212/224 and southbound SE 82nd Drive (Jannsen Road to OR 212/224) are congested.
- These road segments have LOS F for the PM hours.
- Additional congestion during the PM peak hours includes:
    - Northbound 82nd Drive (Jannsen Road to the northbound ramp onto 82nd Avenue) with LOS E, and
    - Eastbound Milwaukie Expressway (Webster Road east to the Lawnfield/I-205 ramp intersection) with LOS D.

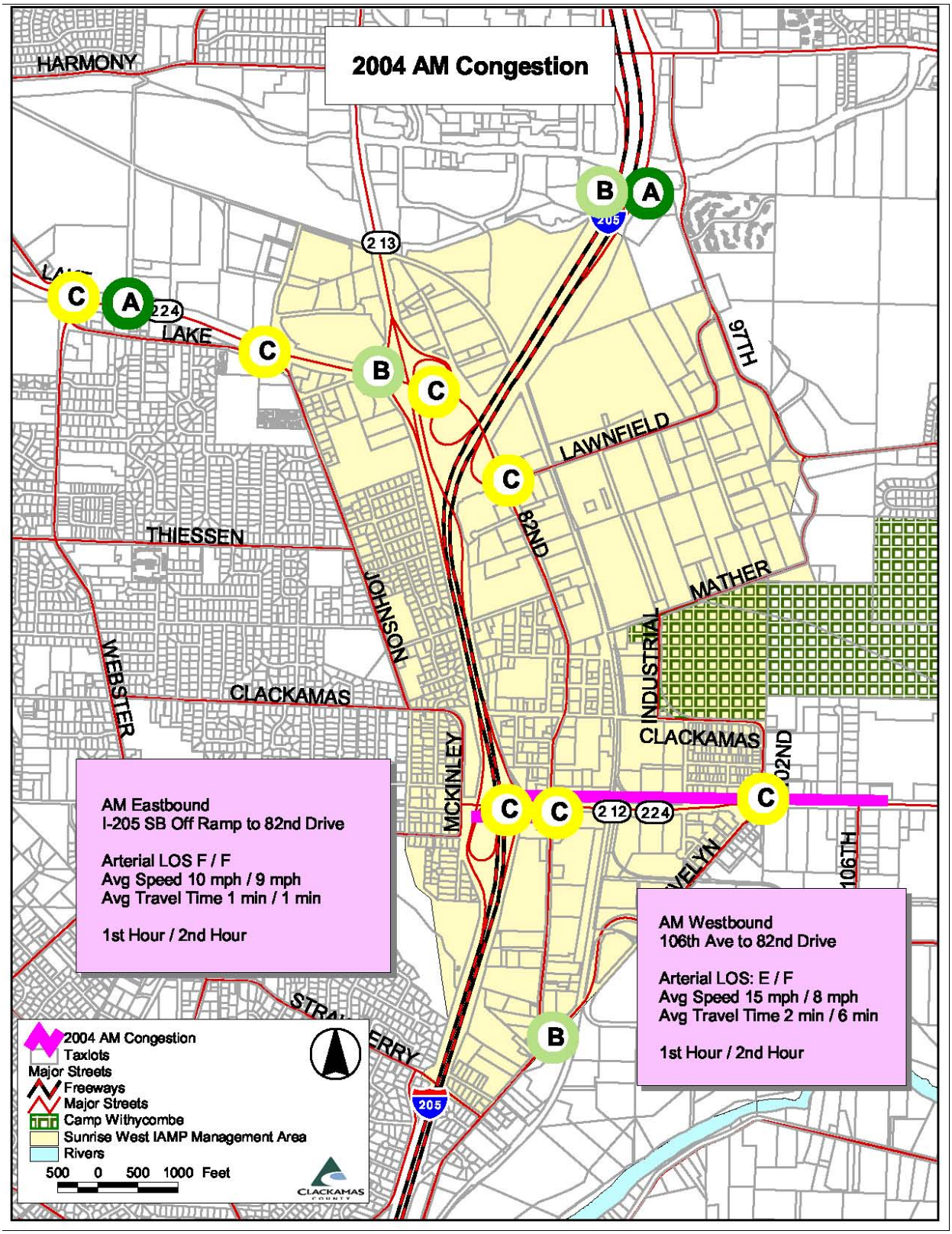


FIGURE 17 EXISTING 2004 AM CONGESTION

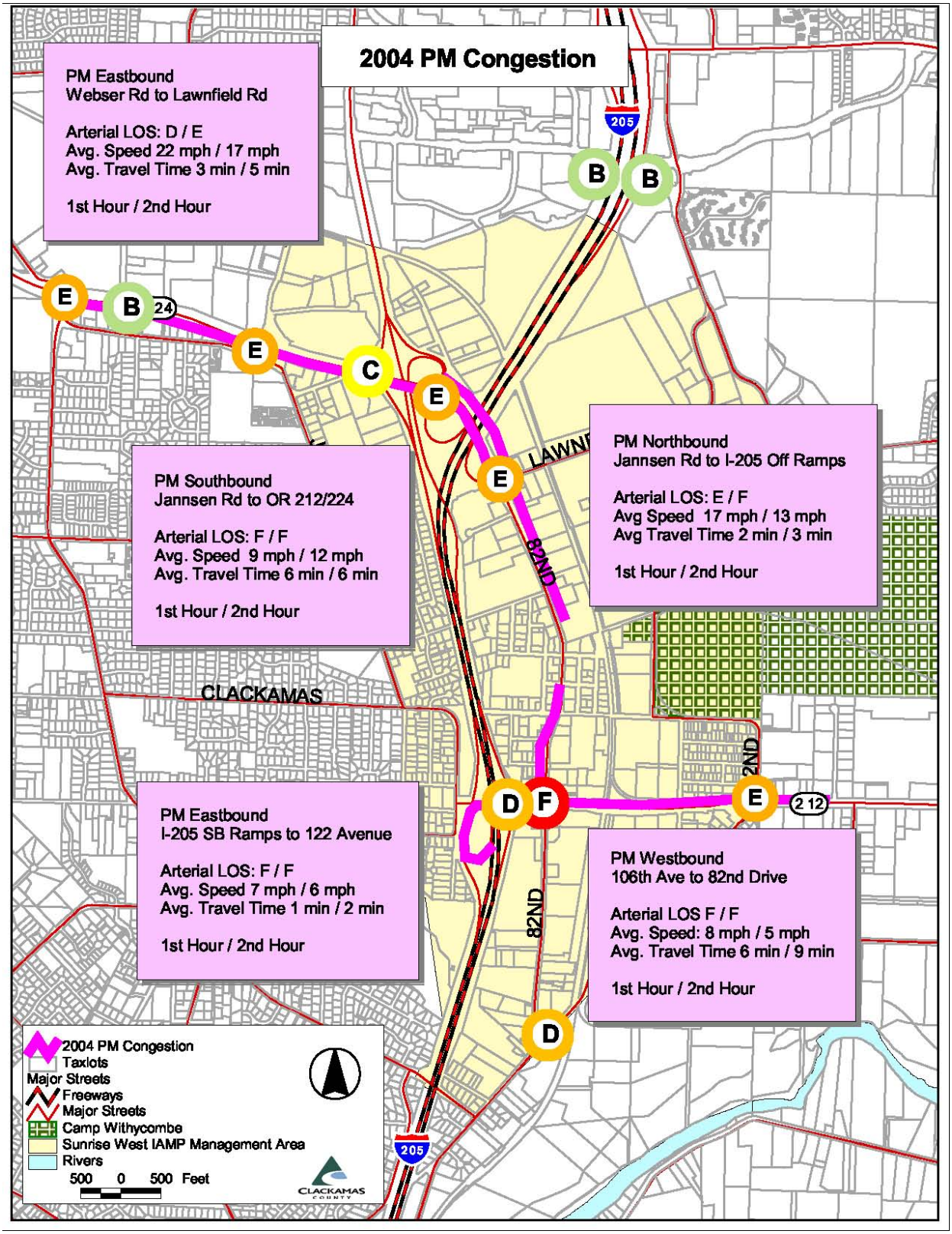


FIGURE 18 EXISTING 2004 PM PEAK HOURS CONGESTION

Crash Locations and Types

The Sunrise West IAMP area included four of the seven sub-corridors that were used to analyze safety in the Sunrise Corridor.

The relevant corridors are as follows:

- OR 224 (Milwaukie Expressway), Webster Road to SE 82nd Avenue/I-205
- I-205, Sunnyside Road to Strawberry Lane (includes the two interchanges)
- SE 82nd Drive, Lawnfield Road to OR 212/224 (Clackamas Highway)
- Clackamas Highway, I-205 to Fred Meyer Distribution Center

The analysis included a review of Planning Research Corporation crash listings (1998 to 2002) provided by ODOT - Safety Priority Index System (SPIS) data. Clackamas County SPIS data, and calculated crash rates show a higher crash rates in the Sunrise West IAMP at the following locations:

- SPIS Crash rate was 0.82 at OR 224/Johnson Road (top 10% SPIS Score Location (ODOT))
- SPIS Crash rate was 1.49 at SE 82nd Drive/OR 212/224
- SPIS Crash rate was 0.76 at Evelyn Street/OR 212/224 (top 10% SPIS Score Location (ODOT))
- The other intersections in the Management Area had crash rates less than 0.90, so no further analysis was performed.

According to the Sunrise SDEIS -

"Rear end crashes were the most common crash type, with the majority of them occurring along Clackamas Highway. Just over 100 of the 160 crashes resulted in property damage only; the remaining 58 crashes resulted in injuries. This is a typical indication of a high-volume, congest, signalized intersection."

Effect of Traffic Operations on the Facilities System

The Sunrise SDEIS noted the following effects of congestion on traffic operations.

"Unacceptable levels of congestion and delays on the OR 212/224 corridor adversely affect function of the transportation system, particularly on key roadways in and near the project area, such as the Milwaukie Expressway, OR 212/224 and SE 82nd Drive." (pg. 3, SDEIS)

"Northbound and southbound traffic on I-205 between SE 82nd Avenue and OR 212/224 must slow down in order to "weave" across lanes to reach the right exit lane, thereby bunching up traffic and creating long queues in all travel lanes when minor incidents happen. By 2015, this section of I-205 will exceed its design capacity, and the length, duration, and frequency of these stop-and-go movements will continue to grow if no action is taken."

"The 2030 transportation analysis performed for the Sunrise Project reveals that congestion would increase substantially with westbound traffic at I-205 lining up on OR 212/224 as far east as Carver Bridge. Traffic westbound on Milwaukie Expressway would likely back up on 82nd Drive to OR 212/224. The duration of typical weekday congestion would grow from about four hours currently up to nine hours – five hours in the morning and four in the afternoon."

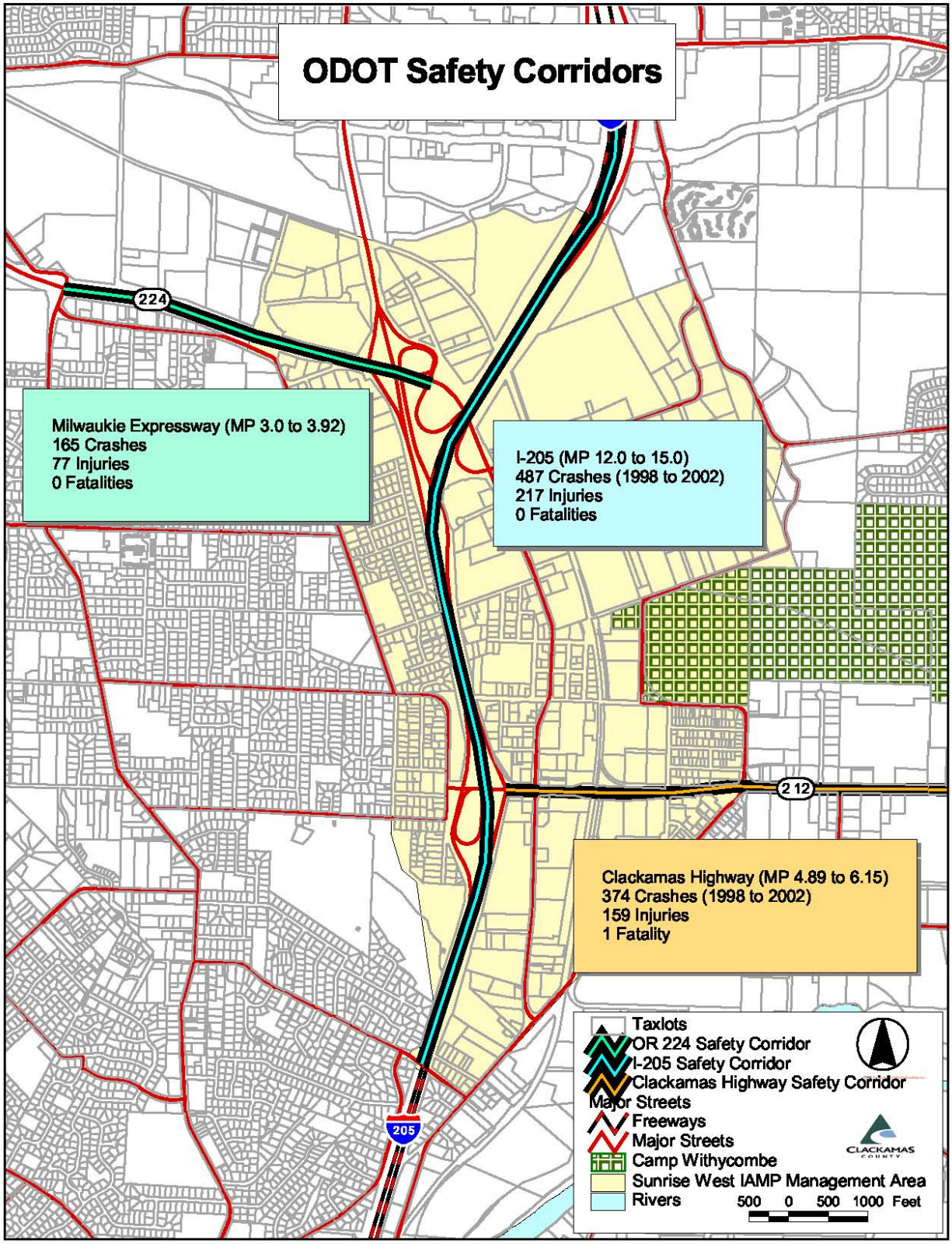


FIGURE 19 ODOT SAFETY CORRIDORS

Current Transit Services

Bus Route 29. Route 29 provides access between the Transit Centers in Milwaukie and at the Clackamas Town Center via SE 82nd Avenue and a segment of the Milwaukie Expressway to Johnson Road. Route 29 has service only on weekdays, operating on 60-minute headways during morning and evening time periods and 75-minute headways during the midday.

Bus Route 31. Route 31 traverses the Milwaukie Expressway and OR 212/224 through this IAMP area, connecting downtown Portland with the City of Estacada via the Clackamas Town Center. From the CTC, the route heads south on SE 82nd Ave. and I-205. It travels through the Clackamas Interchange and to/from OR 212/224. Limited and Express service is provided to Estacada, with 15- to 30-minute headways from the Town Center on weekdays. Weekend service has 30- to 60-minute headways, though no service to Estacada on Sundays.

Bus Route 79. Route 79 provides access between the Transit Centers at the Clackamas Town Center and in Oregon City via SE 82nd Drive and through the 82nd Drive/OR 212-224 intersection. Route 79 is a regional bus route with weekday and weekend service. It operates on 30- to 35-minute headways.

Bus Route 152. Route 152 travels between the Transit Centers at the Clackamas Town Center and in Milwaukie. The route runs along SE 82nd Avenue, the Milwaukie Expressway interchange, and a short segment of SE Johnson Road to SE Lake Road. It operates on 30- to 75-minute headways during the week day, peak commute hours.

Bike and Pedestrian Networks

Figure 20 shows existing bike lanes in the Sunrise West IAMP area. At the Milwaukie Expressway/ SE 82nd Avenue interchange with I-205, bike lanes are found on the I-205 multi-use path and then connect with bikes lanes on SE 82nd Drive. Going south, the bike lanes connect with bike lanes on OR 212/224 (heading east from the Management Area) and to the continuation of the I-205 multi-use path south from the I-205/OR 212-224 interchange.

In the southerly end of the Management Area, bike lanes are found on Jennifer Street, Evelyn Street and SE 82nd Drive south of Evelyn Street. On the west side of I-205, bike lanes are found on McKinley Avenue (just west of the I-205/OR 212-224 interchange), Roots Road and Johnson Road. Table 28 describes the conditions of these bicycle facilities.

Table 28 Condition of Existing Bicycle Facilities

Route	Riding Condition	Comments
I-205	Good	Full separation from traffic except at intersections. Some noise, riders buffered by wind from traffic.
SE 82nd Drive	Poor	Narrow lanes, large amounts of road debris, inattentive drivers. The lack of bicycle lanes south of Clackamas Highway (OR 212/224) requires bicyclists to merge into traffic at a dangerous intersection while continuing south.
OR 212/224	Fair	High percentage of truck traffic, road debris, high traffic speeds.
Jennifer Street / Evelyn Street	Poor	Discontinuous bike lanes, narrow travel lanes, debris. Though identified by Metro as a low or medium traffic volume street, bike lanes the full extent of the road are needed for bicyclist safety. Traffic volumes and high percentage of heavy trucks make bicycling dangerous.
McKinley Avenue	Poor	Very difficult intersection with OR 212/224
Roots Road	Good	New bike lanes provide access to I-205 multi-use path
Johnson Road	Fair	

Map 1: Sunrise Corridor Unit 1

With the exception of the I-205 multi-use path and a few demand paths, all pedestrian facilities are sidewalks adjacent to the roadway. The existing pedestrian facilities in the Sunrise West IAMP area are described in Table 29.

Table 29 Condition of Existing Pedestrian Facilities

Route	Walking Condition	Comments
I-205, multi-use path north of 82nd Dr and south from OR 212/224	Good	Some volume issues, pedestrians buffeted by wind from nearby traffic.
McKinley Ave, Roots Rd to Clackamas Rd	Fair	Sidewalk in on one side only in places.
Roots Road, McKinley to Webster Rd.	Fair	Low traffic street, new sidewalks, slight discontinuity.
OR 212/224 – Clackamas Highway, I-205 to SE 135th Ave.	Fair	High % truck traffic, high speeds, loud noise, but mostly good separation. The overpass over the railroad tracks is poor, with no sidewalk on the north side from SE 82nd Drive to east of the bridge. The intersection just east of the overpass is unsignalized, so pedestrians traveling west must use the substandard north side, walk in the bike lane next to traffic, or attempt a dangerous crossing of Clackamas Highway at SE 98th Avenue.
SE 82nd Dr, I-205 to OR 212/224	Fair	Sidewalk uses experience loud, high traffic volume, unattractive environment
Jennifer Street, SE 114th to SE 135th	Poor	The sidewalk changes from side to side multiple times. Some of these switches occur at locations with no ramps from the sidewalk to the street, leaving elderly and disabled pedestrians severely disadvantaged. The sidewalk switch also occurs at unsignalized locations, forcing pedestrians to wait for a break in traffic before crossing. This is dangerous, given the amount of truck traffic present on the street. The sidewalk eventually ends on both sides of the road, forcing pedestrians into the roadway.
Johnson Road, Lake Road to Clackamas Rd		NEED ASSESSMENT
Source: Alta Planning + Design – Bicycle and Pedestrian Analysis.		

Traffic counts at key intersections revealed varying levels of bicycle and pedestrian use in the corridor (Table 30). The traffic counts were collected during the first 2 weeks of May 2004 on various weekday mornings and afternoons. Peak (3-hour) bicycle and pedestrian counts are considered to be 1/5th of the total number of daily bicyclists and pedestrians using the facility.

Table 30 Peak Bicycle and Pedestrian Counts at Selected Intersections

Intersection	Peak Count (6:00-9:00 a.m.)		Peak Count (3:30-4:30 p.m.)	
	Bicycles	Pedestrians	Bicycles	Pedestrians
Hwy. 212/224 at SE 82nd Drive	92	29	1	56
SE 82nd Drive at Jannsen Road	34	20	33	0
Jennifer Street at SE 82nd Avenue	3	4	18	10
Jennifer Street at Evelyn Street	4	2	5	5
Source: Quality Counts, May 11-14, 2004.				

These counts compare favorably to bicycle counts from intersections around Portland gathered during the peak PM travel time in 1999.

Sunrise Project SDEIS Alternatives

SDEIS Alternative 1: Year 2030 No-Build

Alternative 1 - Transportation Facilities

The 2030 No Build Alternative assumes the same road network that forms the Existing system plus the addition of programmed facilities. The recently completed and planned improvements near the Sunrise West IAMP area include the following projects:

- Clackamas Highway, I-205 southbound off-ramp to SE 102nd – widen eastbound to three lanes. Recently Completed
- SE 82nd Drive, OR 212/224 to Lawnfield Road – widen to 5 lanes. (RTP Financially Constrained Project #5106)
- SE 102nd Avenue/Industrial Way improvements, Highway 212/224 to Mather Road. (Project funded by Clackamas County urban renewal agency)
- Sunnybrook Boulevard Extension west, SE 82nd Avenue to Harmony Road – new road connection. (Clackamas County CIP project #35)
- OR 212/224, Clackamas Highway, SE 102nd Avenue to I-205 northbound on-ramp – widen westbound direction to 3 lanes.

Figure 21 shows the Sunrise Project Alternative 1 and Other Assumed Transportation Facilities.

Figure 22 shows the Sunrise Project Alternative 1 projected traffic (ADT) and percentage of trucks in 2030.

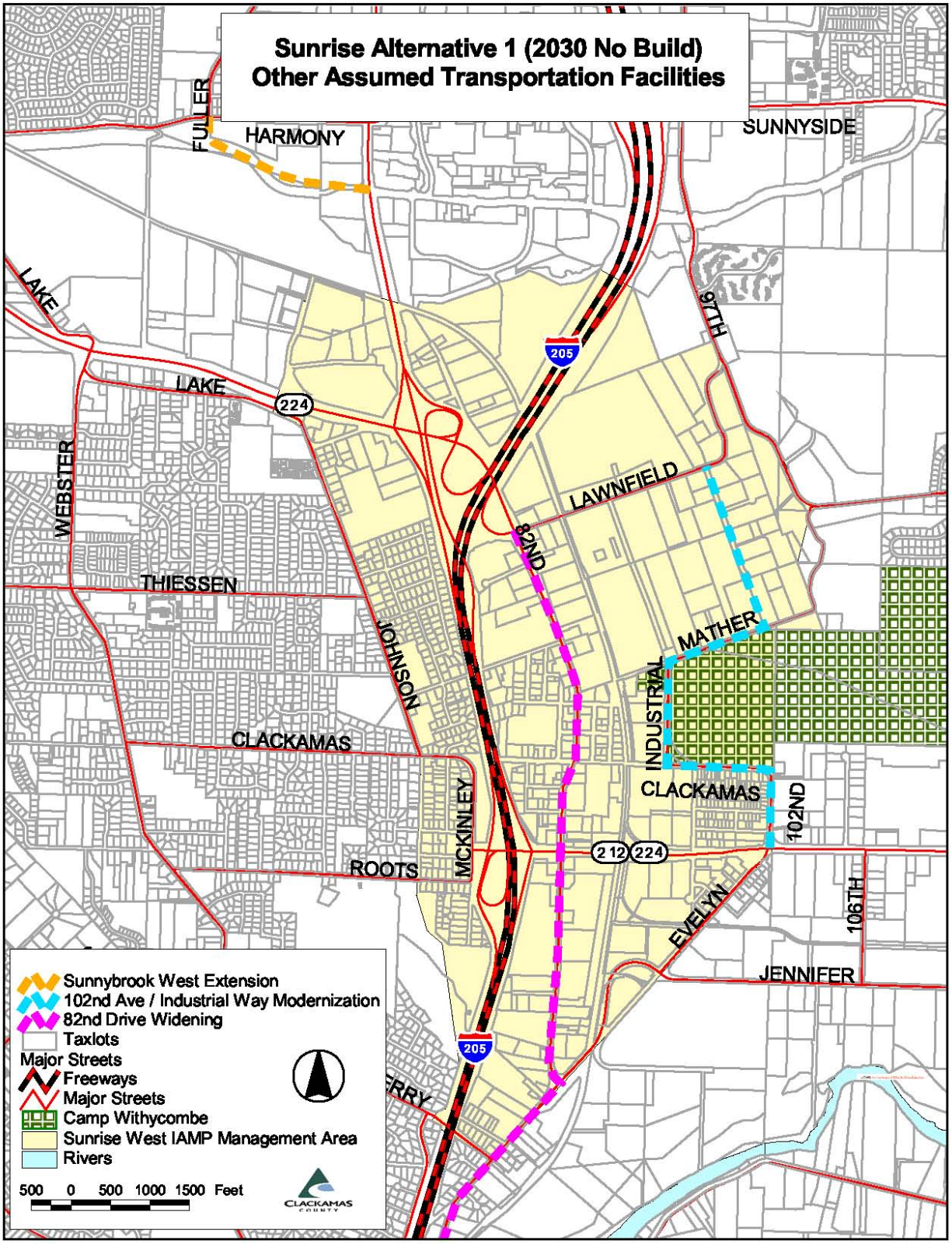


FIGURE 21 SDEIS ALTERNATIVE 1 (2030 NO BUILD)

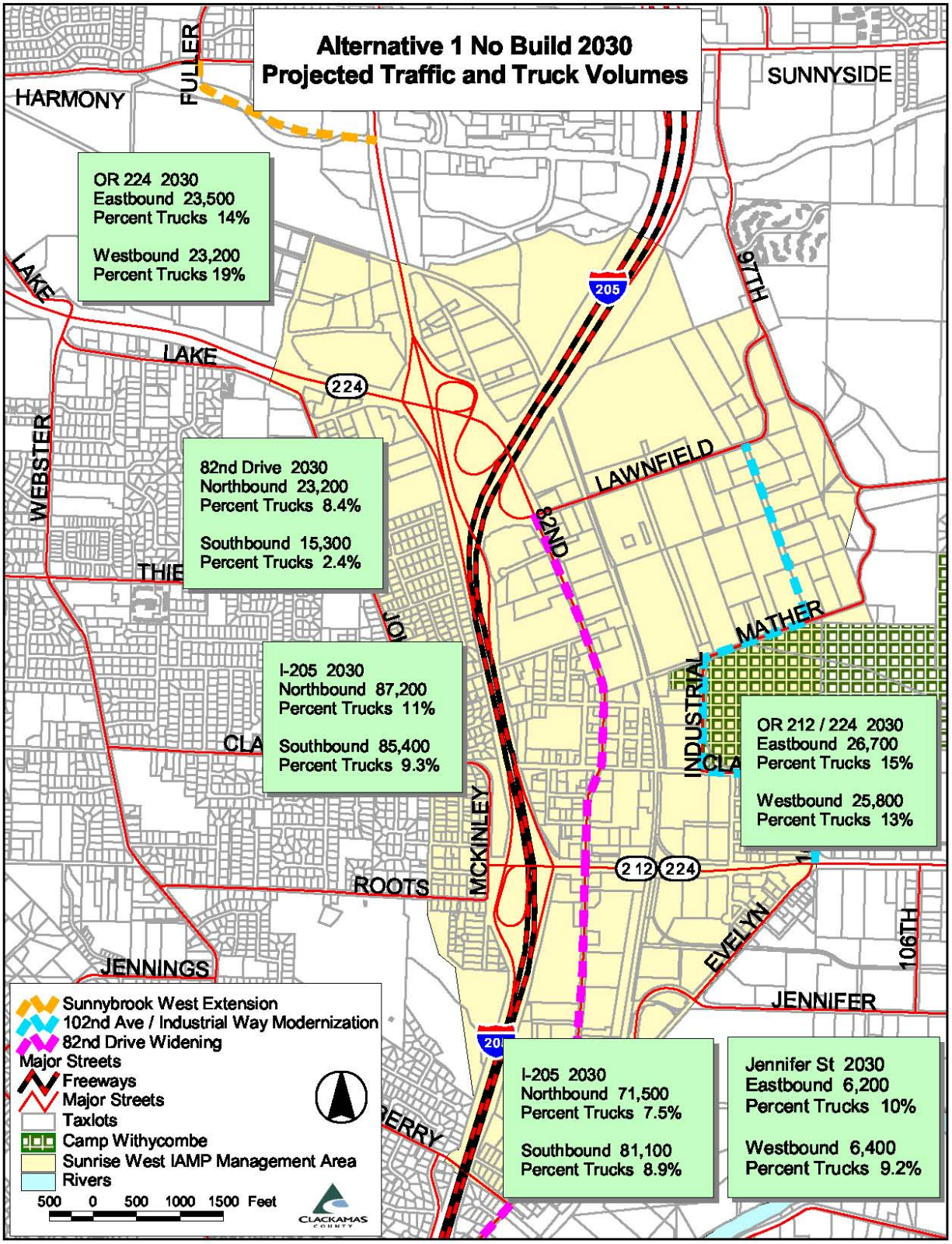


FIGURE 22 SDEIS ALTERNATIVE 1 PROJECTED TRAFFIC AND TRUCK VOLUMES

Alternative 1 - Traffic Forecast and System Operations

Arterial Traffic Forecast and Level of Service

The regional Metro traffic model was calibrated to year 2005 conditions and then used to forecast year 2030 conditions. Forecasts of the arterial traffic volume and percentage of heavy truck traffic for the No Build network are listed in Table 31. The table also includes the percentage increase in traffic from Existing Conditions to the year 2030 No Build alternative.

Figure 23 and Figure 24 show congestion influence areas, arterial LOS, and intersection LOS for the AM Peak and PM Peak periods respectively under the No Build alternative.

TABLE 31 SDEIS ALTERNATIVE 1 – NO BUILD, YEAR 2030 ADT TRAFFIC FORECAST

Direction	OR 224 west of Johnson Rd.	OR 212/224 east of 106th	Jennifer St. east of 106th Ave
Eastbound	23,500 (14% trucks)	26,700 (15% trucks)	6,200 (10% trucks)
Westbound	23,200 (19% trucks)	25,800 (13% trucks)	6,400 (9.2% trucks)
TOTAL	46,700 (16% trucks)	52,500 (14% trucks)	12,600 (9.8% trucks)
% Change in Volume from Existing	+ 33%	+38%	+ 27%

Direction	82nd Dr between I-205 and the 82nd Ave southbound ramps	I-205 north of the Clackamas interchange	I-205 south of the Clackamas interchange
Northbound	23,200 (8.4% trucks	87,200 (11% trucks)	71,500 (7.5% trucks)
Southbound	15,300 (2.4% trucks)	85,400 (9.3% trucks)	81,100 (10% trucks)
TOTAL	38,500 (6% trucks)	172,600 (10% trucks)	152,600 (8.9% trucks)
% Change in Volume from Existing	+ 57%	+ 17%	+ 19%

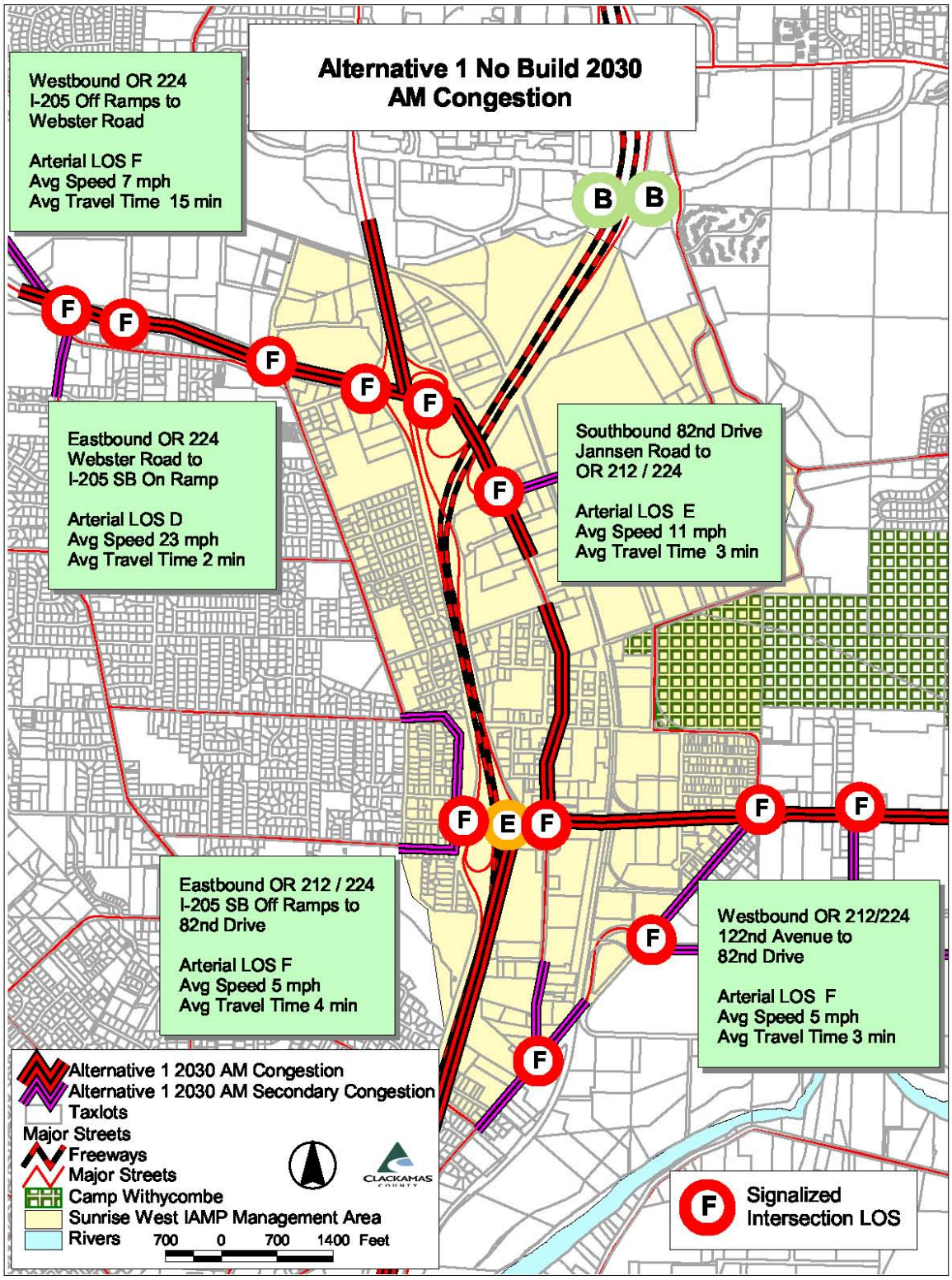
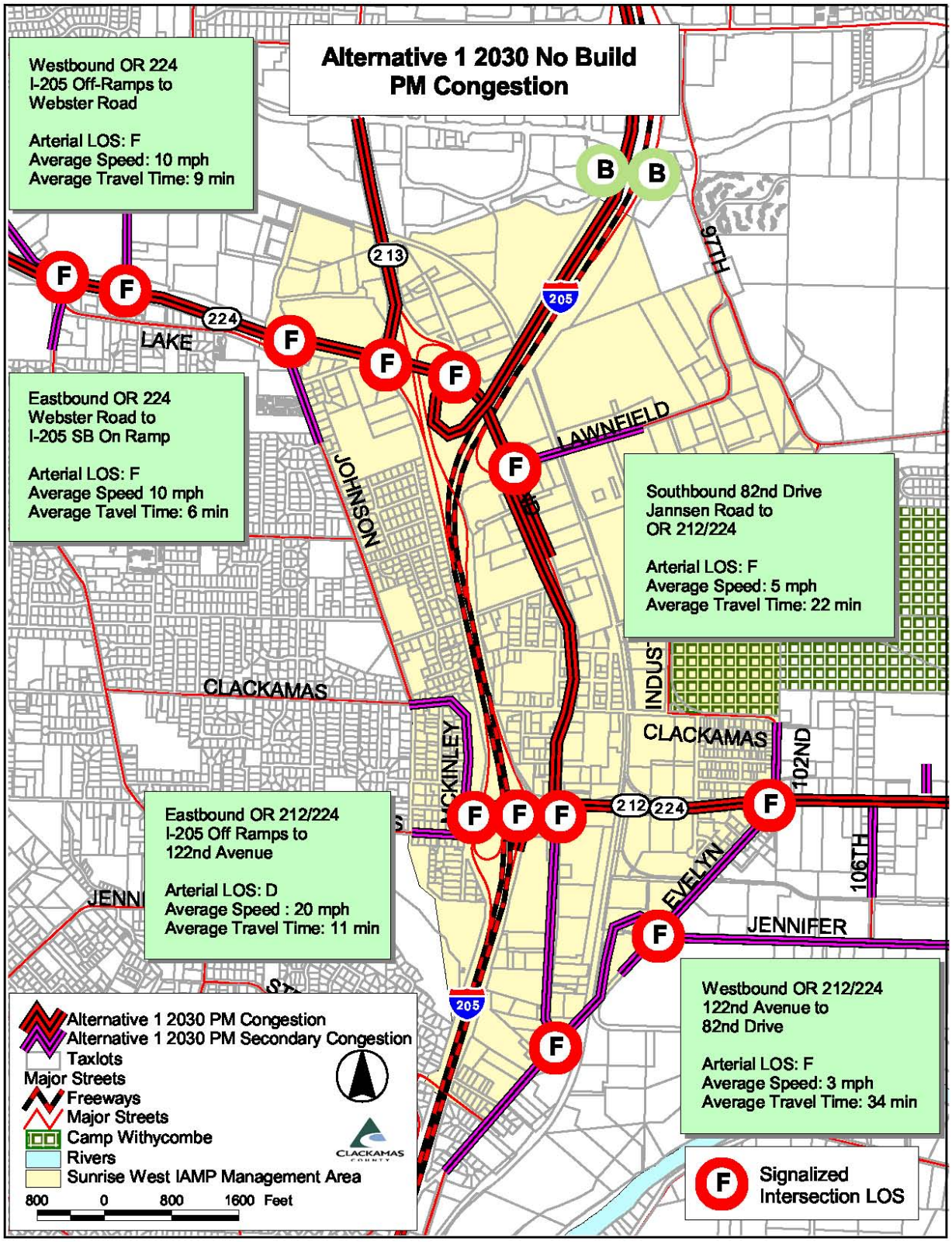


FIGURE 23 SDEIS ALTERNATIVE 1, NO BUILD 2030 AM CONGESTION

FIGURE 24 SDEIS ALTERNATIVE 1, NO BUILD 2030 PM CONGESTION



Alternative 1 – Intersection Level of Service and Operations

The No Build alternative assumes the same intersection configurations as Existing conditions with the addition of the planned improvements listed previously. (See Figure 11.)

Refer to Summary Table 35 for details about intersection operations, including lane delay, lane queue, and intersection LOS and V/C ratios.

Alternative 1 - Access Densities and Types

No change from Existing Conditions

Alternative 1 - Traffic Control

No medians or turn restrictions are planned in the No Build Alternative.

Alternative 1 - Effect of Traffic Operations on the Facilities System

Traffic operations would be significantly degraded under the No Build alternative because it would provide the least east-west capacity and not address safety problems intensified by increased congestion along OR 212/224 or SE 82nd Avenue and SE 82nd Drive. The increased congestion also would deteriorate freight movement and contribute the least support for regional emergency management plans.

Even though all local roadway connections would be maintained, local circulation and access would not improve. The intersections with the state highways would incur more delay than with either Build alternative.

Except for one intersection, the intersections in the Sunrise West IAMP area all would have LOS F during both the AM and PM peak hours. (The exception is the I-205 northbound ramps at OR 212/224 which had LOS E during the morning period.) These intersection failures contribute to congestion and increased travel delays.

Alternative 1 - Transit

Transit improvements included under the No Build alternative are limited to those identified in Metro's RTP and include primarily modest increases in service hours in the IAMP Management Area.

Alternative 1 - Bike and Pedestrian

As noted in the SDEIS:

"*The bicycle and pedestrian systems under the No Build Alternative would maintain the existing roadway system" plus the addition of any "committed improvements scheduled in ODOT's 6-year Statewide Transportation Improvement Program (STIP) and Metro's Financially Constrained Projects listed in the RTP."*

SDEIS Alternative 2: Year 2030 Build with Midpoint Interchange at SE 122nd

Transportation Facilities

In addition to the having the programmed improvements described under "Alternative 1, Transportation Facilities," Alternative 2 would provide a continuous, six-lane, limited access expressway from I-205 on the west to Rock Creek Junction on the east, and a midpoint interchange near SE 122nd Avenue to link the new Expressway and OR 212/224. See Figure 25.

The existing Milwaukie Expressway/SE 82nd Avenue/I-205 interchange would be replaced with the Sunrise West interchange as the western end of the Sunrise Corridor expressway. SE 82nd Avenue at the north end of the Management Area would again directly connect to SE 82nd Drive to improve local traffic flows between the Clackamas Town Center area and the Clackamas – OR 212/224 area.

I-205/Milwaukie Expressway / SE 82nd Avenue Interchange Reconfiguration:

Travel demand forecasts for year 2030 indicate that most users of the Sunrise Expressway travel to/from northerly locations via the Milwaukie Expressway, SE 82nd Avenue, and I-205. The existing I-205/Milwaukie Expressway interchange would be reconfigured to accommodate these dominant travel patterns through mainline lanes or dedicated interchange ramps. Lower volume, southerly Sunrise travel patterns to/from I-205 would be accommodated via signalized ramp terminals.

Currently, high volumes of traffic must cross paths (weave) to enter and exit I-205 between the Clackamas Highway and Milwaukie Expressway interchanges. With the Build Alternatives, some movements would be rerouted and others would be separated and served by dedicated lanes/ramps to enhance capacity and safety. These changes are discussed in greater detail in the Sunrise expressway Design Technical Report.

Design Options

Design options within each of the Build Alternatives are being considered for local access options in the I-205/Lawnfield area. Also, the potential for tolling as a congestion management technique is being evaluated under a parallel study under the SDEIS. See Figure 26

I-205/Lawnfield Area:

Two design options are under consideration to serve local access in the Lawnfield industrial area. The first option would connect the Lawnfield area to I-205 via SE 97th Avenue and the Sunnybrook interchange. The second option would create a direct connection to SE 82nd Drive at Tolbert Street from the extended SE Lawnfield Road (existing SE Industrial Way) on a new overpass across the railroad tracks. The proposed Lawnfield access alternatives, as well as the design option access, are depicted in Figure 26.

FIGURE 25 ALTERNATIVE 2 AND 3 LANE CONFIGURATION

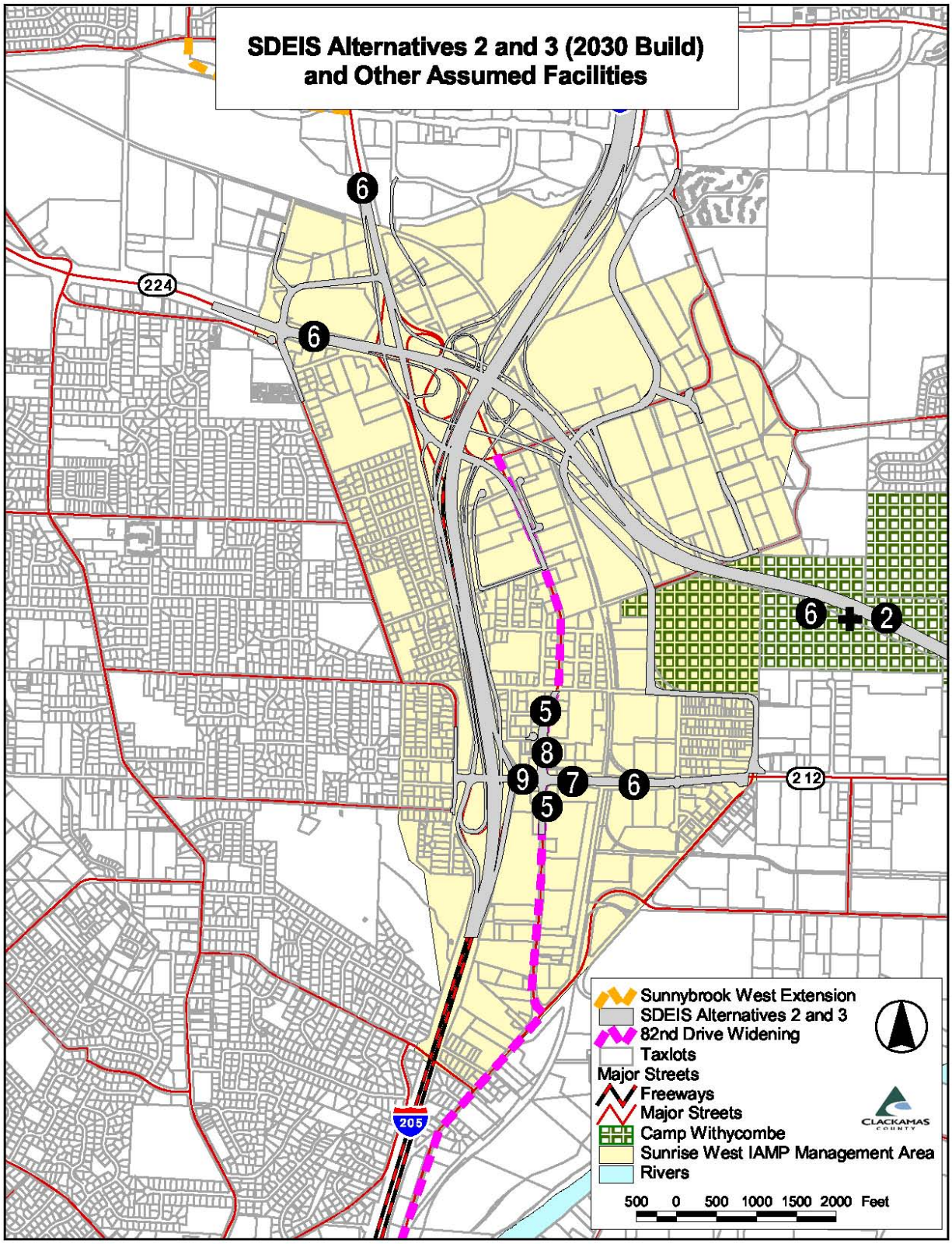
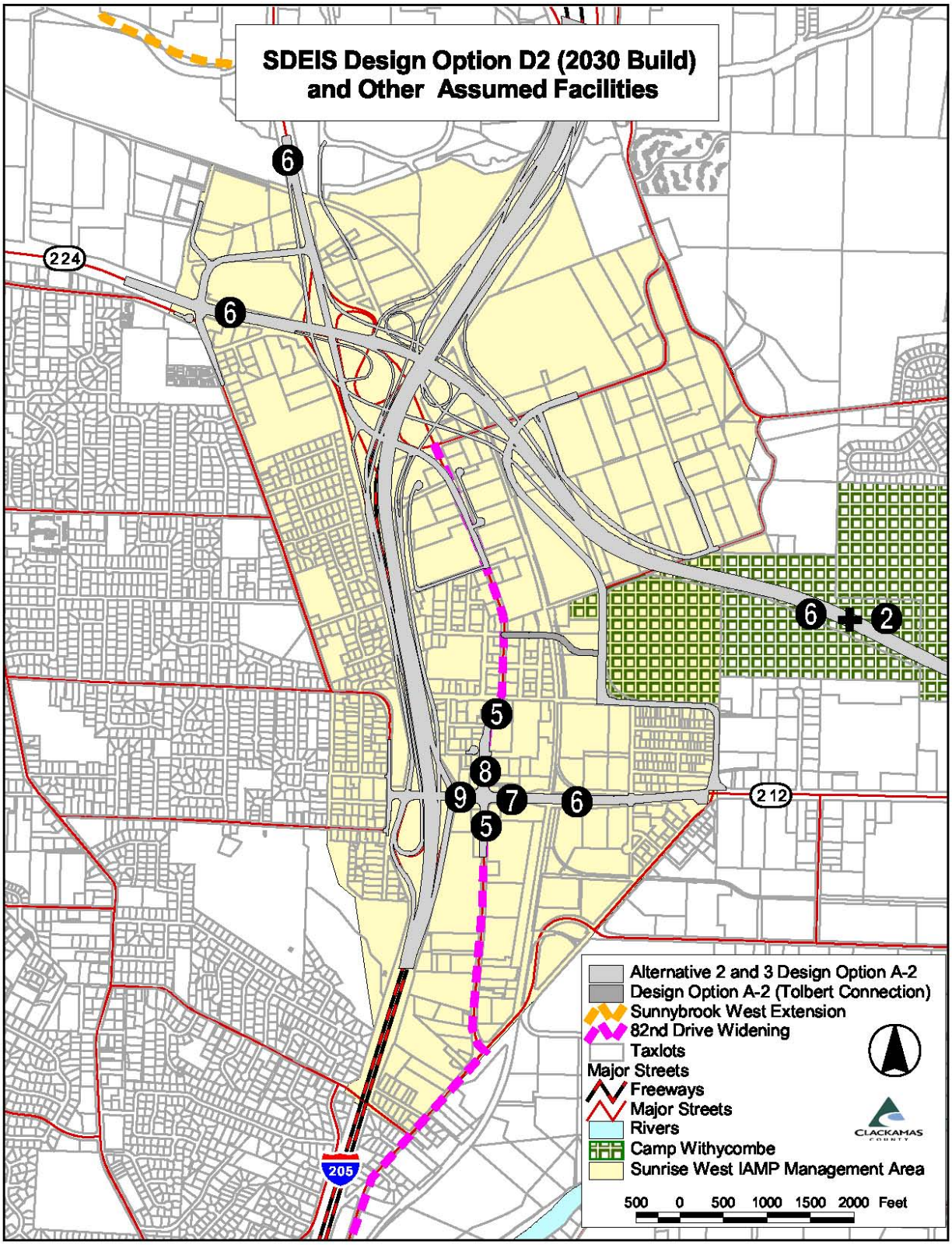


FIGURE 26 DESIGN OPTION A-2 LANE CONFIGURATION

Sunrise West Interchange and other Assumed Facilities



Arterial Traffic Forecast and Level of Service

Traffic forecasts for year 2030 were analyzed for the Alternative 2 road network. Traffic forecasts (ADT by direction for the AM and PM peak periods) and percentage heavy truck traffic are listed in Table 32 and shown on Figure 27.

TABLE 32 ALTERNATIVE 2 - YEAR 2030 ADT TRAFFIC FORECAST

Average Daily Traffic Forecast and Percentage Heavy Trucks

Direction	OR 224 west of Webster Rd.	OR 212/224 east of 106th	Jennifer St. east of 106th Ave	Sunrise east of 135th
Eastbound	22,200 (10% trucks)	18,900 (3.2% trucks)	3,000 (16% trucks)	49,700 (5.8% trucks)
Westbound	22,600 (11% trucks)	21,800 (9.6% trucks)	3,500 (13% trucks)	43,800 (5.8% trucks)
TOTAL	44,800 (11% trucks)	40,700 (6.6% trucks)	6,500 (15% trucks)	93,500 (5.8% trucks)

Direction	82nd Dr between I-205 and the 82nd Ave ramps	I-205 north of the Clackamas interchange	I-205 south of the Clackamas interchange
Northbound	10,800 (10% trucks)	66,400 (5.4% trucks)	82,100 (8.2% trucks)
Southbound	8,300 (9.3% trucks)	59,500 (6.8% trucks)	85,600 (7.6% trucks)
TOTAL	19.100 (9.8% trucks)	125,900 (6% trucks)	168,700 (7.9% trucks)

Analyses also indicate where congested road segments would occur and the level-of-service provided at individual intersections. Figure 28 and Figure 29 show the congestion influence areas, arterial LOS and intersection LOS for the AM and PM peak periods for Alternative 2.

Improvements during the PM hours (over the AM hours) were found for the following traffic movements: westbound on the Milwaukie Expressway between Webster Road and Johnson Road; westbound Sunrise ramp to northbound I-205; southbound I-205 off-ramp to the Expressway; and northbound I-205 south of the OR 212/224 interchange.

FIGURE 27 ALTERNATIVE 2 ADT FORECAST AND PERCENT HEAVY TRUCKS

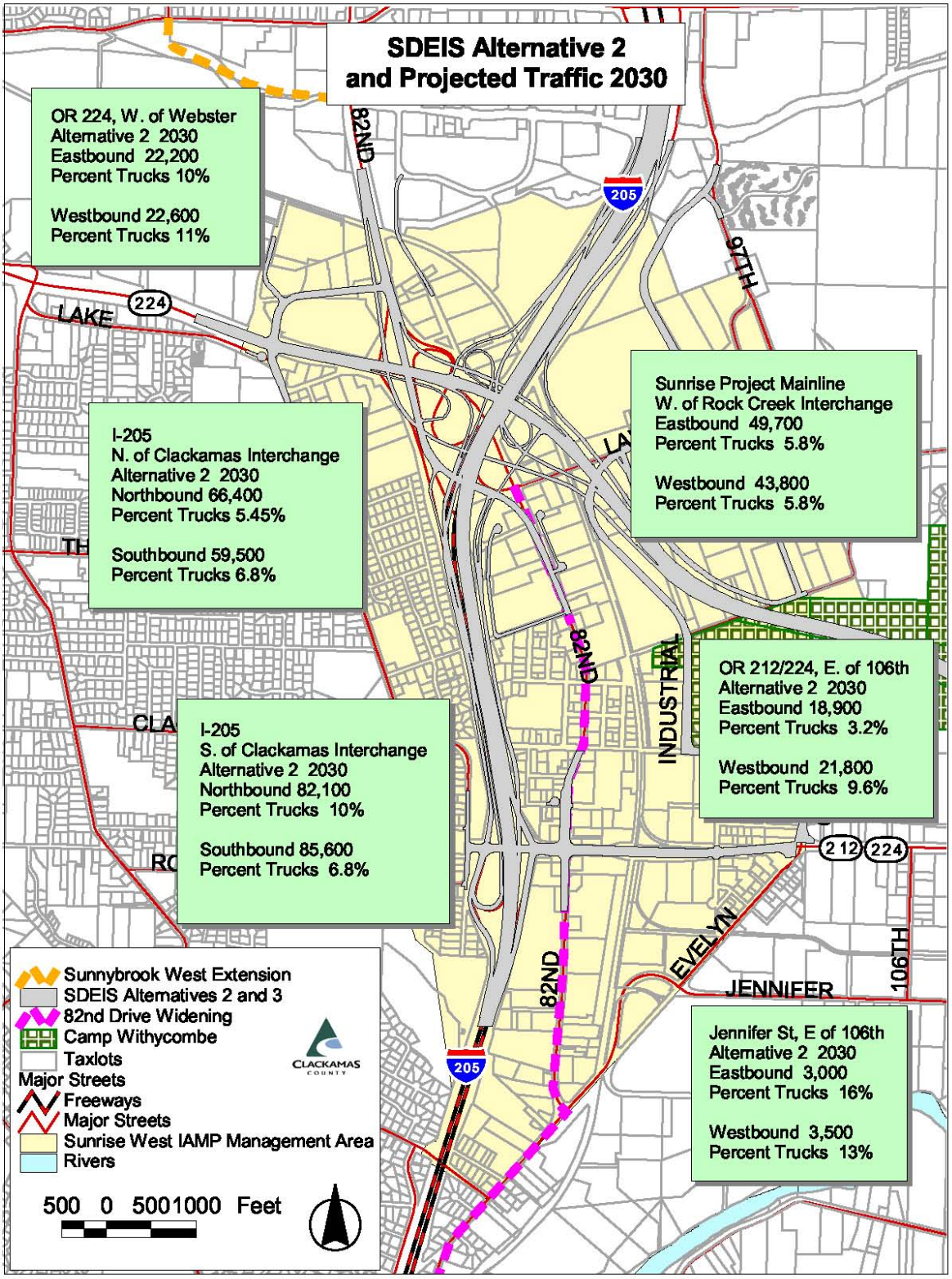
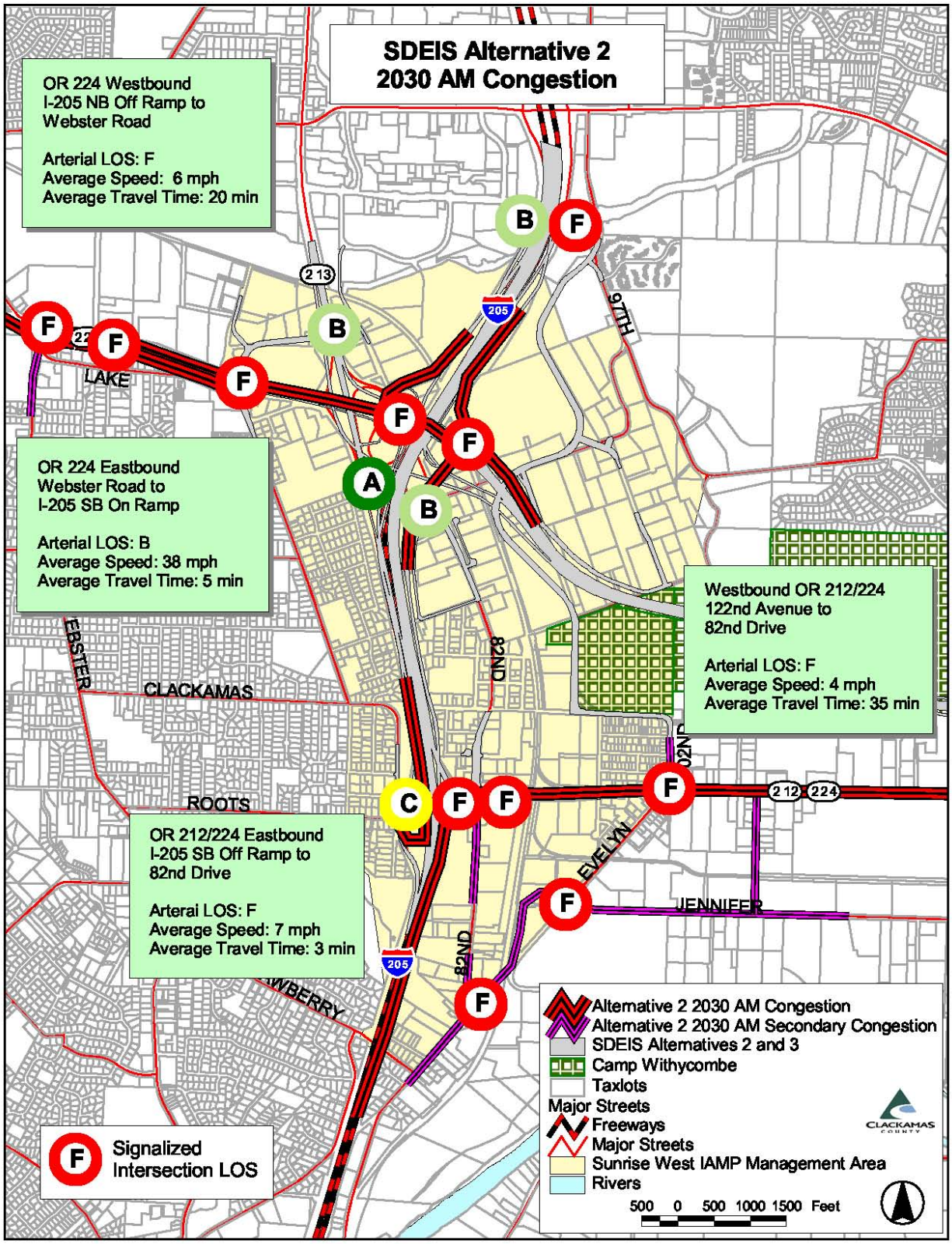


FIGURE 28 ALTERNATIVE 2, YEAR 2030 AM PEAK HOUR CONGESTION, INTERSECTION LOS



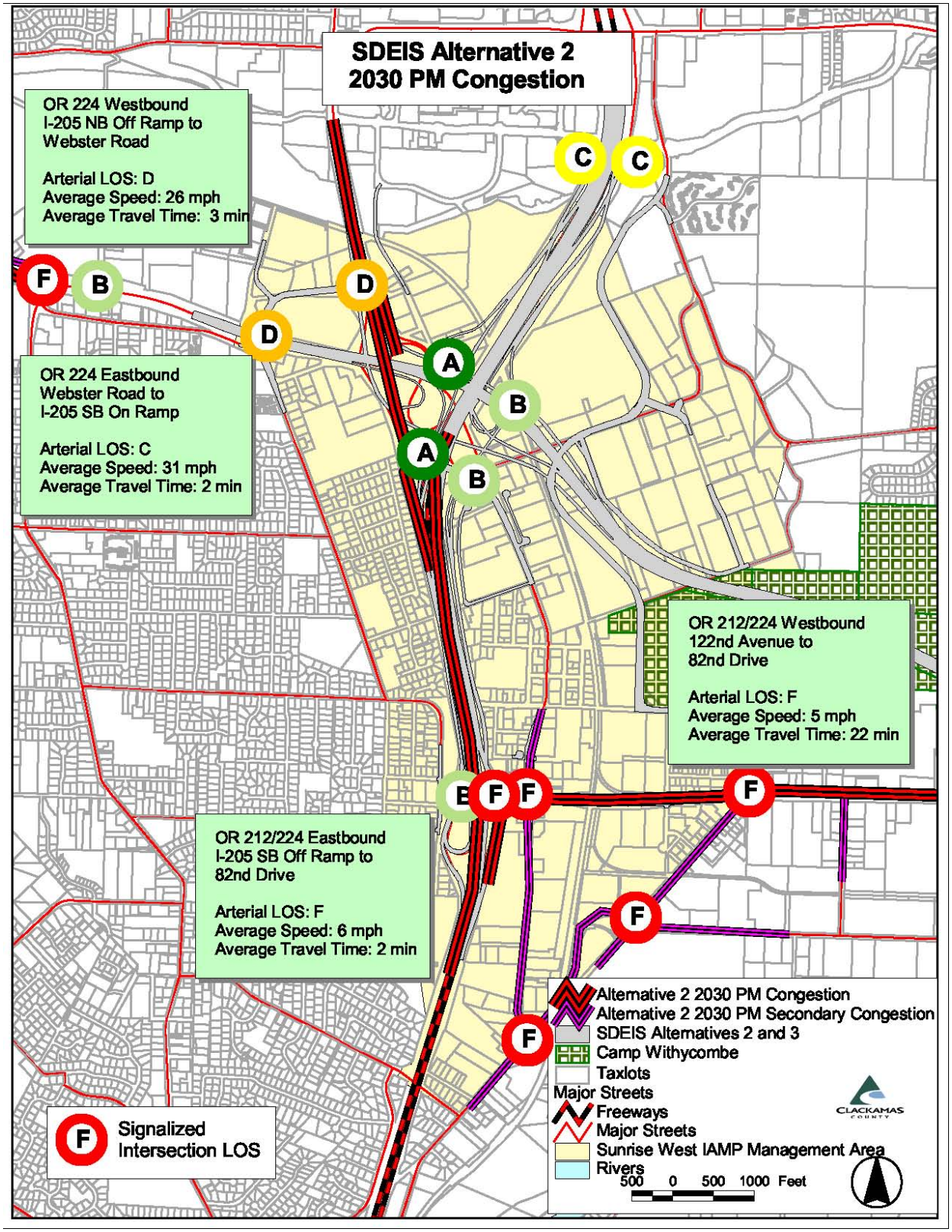


FIGURE 29 ALTERNATIVE 2, YEAR 2030 PM PEAK HOUR CONGESTION, INTERSECTION LOS

Alternative 2: Intersection Level of Service and Operations

As described above, the Build Alternative would replace the interchange of the Milwaukie Expressway, SE 82nd Avenue and I-205 with an elevated system interchange designed to allow more continuous traffic flow between the systems and reduce weave maneuvers. The Build Alternative (either Alternative 2 or Alternative 3) would replace 3 intersections with 5 intersections to handle traffic movements around the new system interchange.

Even with the increased capacity, intersection failures would occur at the Sunrise/I-205 southbound off-ramp and northbound off-ramp during the AM peak period under both Build alternatives. The PM peak period did not have congestion at these ramps. The Clackamas Interchange (I-205 / OR 212-224) would function somewhat better than under the No Build, but intersection failures were forecasted at the north ramps for one hour during both the AM and PM peak periods in Alternative 2.

Intersection LOS was improved over the No Build at the Clackamas Interchange south ramps (for both peak periods) as well as for the north ramps for one hour during each peak period.

Information about the intersections is summarized in Table 2 and detailed in Appendix 1.

Alternative 2: Traffic Control

There are several changes to local traffic control as part of SDEIS Alternative 2. They include the following:

- 82nd Drive to the north and the south of OR 212 / 224 will have raised medians and substantial changes in local traffic access.
- Lake Road to the west of Johnson Road will be Cul-de-Saced.
- Jefferson Street and hotel access on McKinley Avenue will be closed and a new access will need to be established for the hotel on Hood Street.
- The Lawnfield Road at grade crossing of the Union Pacific Rail Road will be close and a new access will be constructed via Industrial Way and 102nd Avenue.
- OR 213 N (82nd Avenue) ramp connections to the Milwaukie Expressway will be closed and replace with a new arterial connection via Deer Creek Land and Johnson Road.

Alternative 2: Effect of Traffic Operations on the Facilities System

Alternative 2 would provide the most east-west travel capacity of the three future alternatives. With the midpoint interchange, this option would allow for the most efficient freight travel and have the least queuing. A substantial portion of regional through trips would use the Sunrise Expressway, reducing travel volumes on parallel roads and allowing the highway to better serve local travel needs in the industrial area.

Even with improved connections between the highway systems, congestion and intersection failures would occur with this build option at both interchanges. During the AM peak period, the Sunrise West interchange had congestion at the ramp for westbound Sunrise to northbound I-205, the northbound I-205 off-ramp to the Expressway, southbound I-205 ramp to the Expressway, and for

westbound traffic transitioning from the Sunrise to the Milwaukie Expressway (more congestion here in Alt 2 than in Alt 3). Southbound SE 82nd Avenue was congested through the southbound on-ramp to I-205.

Congestion at OR 212/224 for the morning commute hours occurred on I-205 northbound (south of the interchange) and on the northbound off-ramp to OR 212/224; I-205 southbound (north of the interchange)

and on the southbound off-ramp to OR 212/224; and, westbound traffic on OR 212/224 from SE 82nd Drive to past the Rock Creek Junction had heavy congestion.

PM peak periods had congestion on segments near the Sunrise West interchange. The segments included southbound SE 82nd Avenue, southbound on-ramp to I-205 and southbound I-205 to past the OR 212/224 interchange; and, Northbound SE 82nd Avenue on the approach to Deer Creek Lane.

Congestion at the OR 212/224 interchange during the PM peak hours included the I-205 northbound off-ramp to OR 212/224 and westbound traffic on OR 212/224 from SE 82nd Drive to SE 135th Avenue.

Although congestion continues along some road segments during the peak commute hours, Alternative 2 would contain this peak period congestion to nearly existing levels.

Alternative 2: Bike and Pedestrian

The build alternative would provide a new multi-use path that parallels the proposed Sunrise Expressway until it connects to the existing on-street facilities at SE 122nd Avenue.

SDEIS Alternative 3: Year 2030 Build with No Midpoint Interchange

Transportation Facilities

Alternative 3 would provide a continuous, six-lane, limited access expressway from Rock Creek Junction on the east to Sunrise West interchange at I-205 on the west as in Alternative 2, but Alternative 3 would not have a midpoint interchange near SE 122nd Avenue. Alternative 3 would have the same interchange configuration and design options for Lawnfield Road as in Alternative 2.

Arterial Forecast and Level of Service

Year 2030 traffic forecasts were analyzed for the Alternative 3 road network. Traffic forecasts (ADT by direction for the AM and PM peak periods), percentage heavy trucks, and percentage change in ADT between the Build alternatives are listed on Table 33 and shown on Figure 30.

TABLE 33 SDEIS ALTERNATIVE 3 – YEAR 2030 ADT TRAFFIC FORECAST AND PERCENT TRUCKS

Direction	OR 224 west of Webster Rd.	OR 212/224 east of 106th	Jennifer St. east of 106th Ave	Sunrise east of 135th
Eastbound	21,900 (13% trucks)	20,300 (8.2% trucks)	4,100 (17% trucks)	50,900 (5.9% trucks)
Westbound	22,100 (11% trucks)	22,600 (9.4% trucks)	4,450 (9.9% trucks)	44,800 (5% trucks)
TOTAL	44,000 (12% trucks)	42,900 (8.8% trucks)	8,550 (13% trucks)	95,700 (5.5% trucks)
% Change in Total Volume, Alt 2 to Alt 3	- 1.8%	+ 5.4%	+ 31.5%	+ 2.4%

Direction	82nd Dr between I-205, 82nd Ave ramps	I-205 north of the Clackamas interchange	I-205 south of the Clackamas interchange
Northbound	12,700 (11% trucks)	68,300 (6.8% trucks)	83,800 (9.2% trucks)
Southbound	10,200 (8.2% trucks)	58,200 (7.7% trucks)	86,000 (8.8% trucks)
TOTAL	22.800 (10% trucks)	126,500 (7.2% trucks)	169,800 (9% trucks)
% Change in Total Volume, Alt 2 to Alt 3	+ 19.4%	+ 0.5%	+ 0.6%

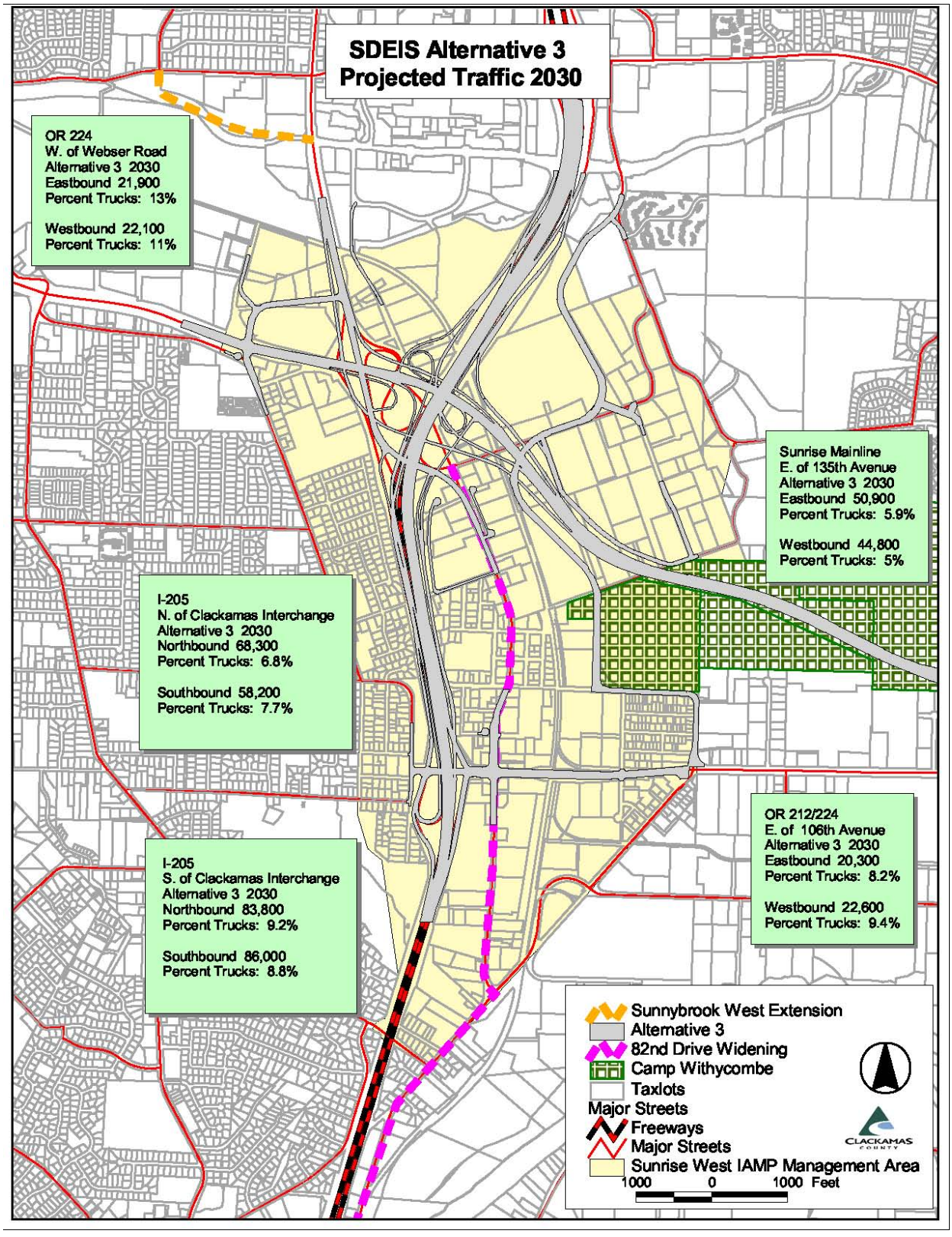


FIGURE 30 ALTERNATIVE 3, 2030 BUILD ADT FORECAST, PERCENTAGE HEAVY TRUCKS

Analyses also indicate where congested road segments would occur and the level-of-service at individual intersections with Alternative 3. Figure 31 and Figure 32 show the congestion influence areas, arterial LOS and intersection LOS for the AM and PM peak periods respectively.

Improvements during the PM peak (over the AM peak) were found for the following traffic movements: eastbound on the Milwaukie Expressway between Webster Road and Johnson Road; northbound on I-205 south of the Clackamas Interchange and for the northbound ramp from I-205 to the Expressway. SE 82nd Drive also did not have congestion at its northbound transition to SE 82nd Avenue.

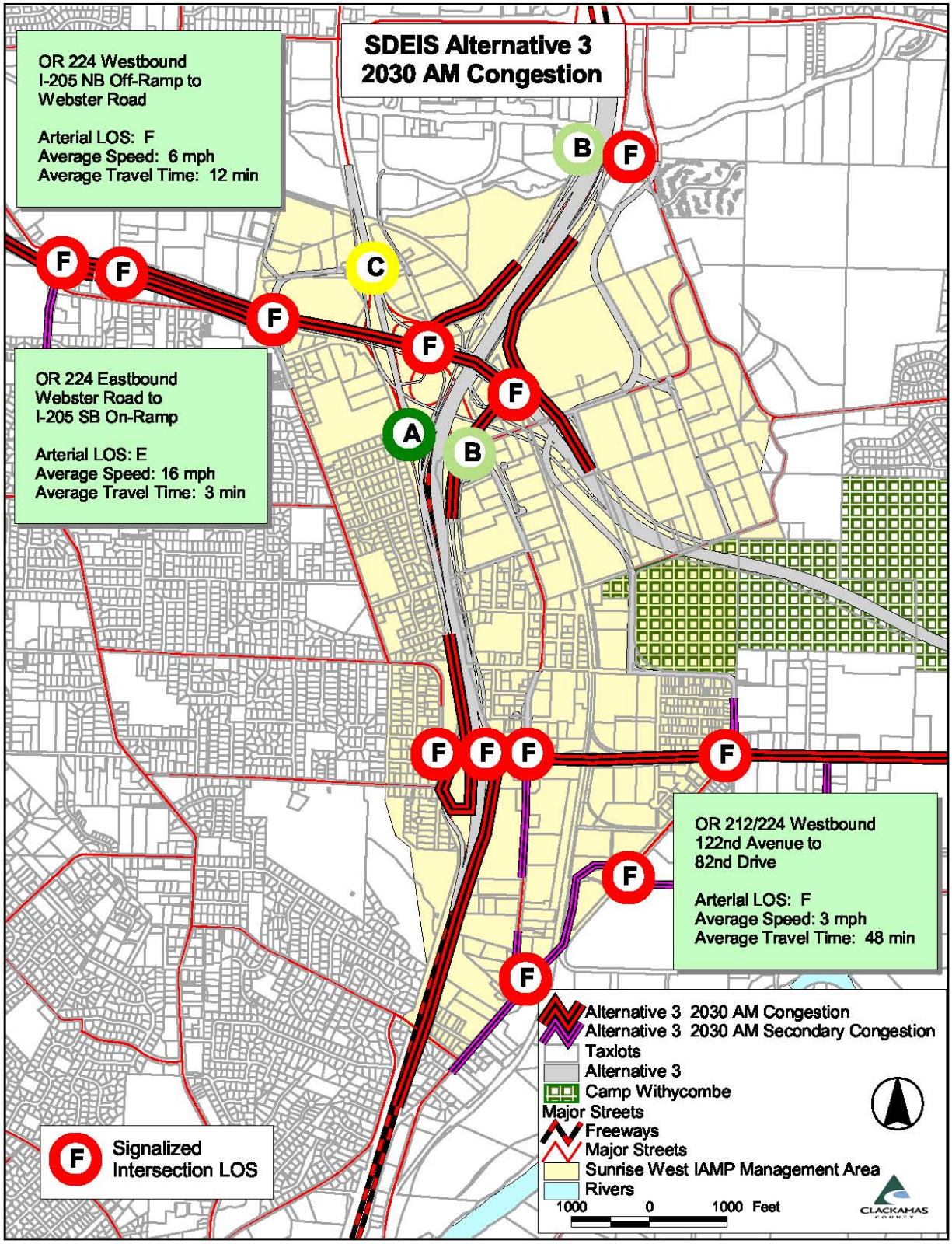


FIGURE 31 ALTERNATIVE 3, YEAR 2030 AM PEAK INTERSECTION LOS

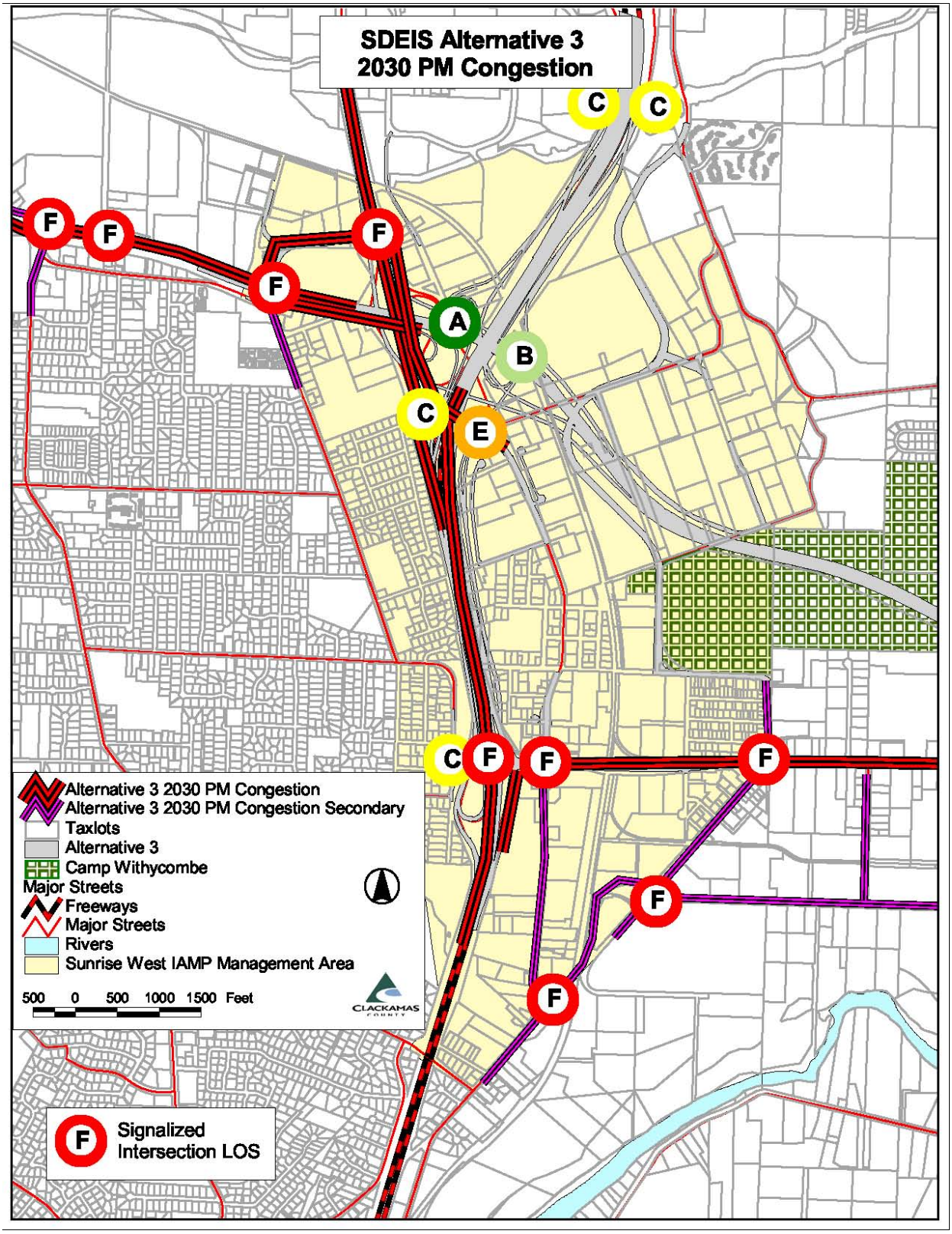


FIGURE 32 ALTERNATIVE 3, YEAR 2030 PM PEAK INTERSECTION LOS

Alternative 3: Intersection Level of Service and Operations

Alternative 3 showed level-of-service results similar to those found in Alternative 2. However, without the Midpoint Interchange near SE 122nd, Alternative 3 would have somewhat higher traffic volumes than under Alternative 2, which cause poorer lane LOS at intersections.

Even with the increased capacity of Alternative 3, intersection failures would occur at the I-205/ Sunrise southbound and northbound off-ramps during the AM peak period under both Build alternatives. The PM peak period did not have congestion. The Clackamas Interchange (I-205 / OR 212-224) would function somewhat better than under the No Build, but intersection failures were forecasted at the north ramps for one hour during both the AM and PM peak periods (as would happen under Alternative 2).

Alternative 3 would have LOS F also at the south ramps of the Clackamas Interchange for one hour during the AM peak period, while level-of-service improved over the No Build alternative during the other time periods.

Signalized intersections that access the State Highway system would incur more delay under this alternative than under Alternative 2, but less delay than under the No Build alternative.

Details about the intersections are described in "Intersection Operations" (Appendix 1) and summarized in Table 2.

Alternative 3: Traffic Control

Within the Sunrise West IAMP area, Alternative 3 would have the same traffic control measures as Alternative 2.

Alternative 3: Effect of Traffic Operations on the Facilities System

With the same Sunrise West interchange design, Alternative 3 and Alternative 2 would have similar traffic operations. As noted, however, Alternative 3 would not have the Midpoint Interchange, causing slower travel times to the midpoint area on OR 212/224.

As with Alternative 2, Alternative 3 had congestion and intersection failures at both interchanges even with improved connections between the highway systems. Still, its vehicle hours of delay and hours of congestion would be less than those experienced under the No Build alternative:

"Under Alternative 3, vehicle hours of delay would decrease by approximately 1 percent during the morning peak hours and by approximately 33 percent during the evening peak hours compared to Alternative 1." (pg 39)

"The duration of congestion of congestion along OR 212/224 is approximately . . . 5.5 hours for Alternative 3, compared to 9 hours under Alternative 1." "Because safety can be correlated to congestion, Alternatives 2 and 3 hold more potential for addressing safety concerns due to their correspondingly shorter durations of congestion."

"The mid-day peak (the most important for the freight community) will be preserved at or near existing levels."

Alternative 3: Transit

Alternative 3 would add new local transit service from Happy Valley to the Springwater area, more frequent service between Damascus and Gresham, more frequent service between Airport Way and

Damascus, and new express bus service along the proposed Sunrise Expressway between the Clackamas Transit Center and Damascus Town Center.

Alternative 3: Bike and Pedestrian Networks

Alternative 3 would improve walking and bicycling conditions over the existing and no build conditions. By: filling in the missing section of the I-205 multi-use path between SE 82nd Drive and SE Roots Road. The build alternative also would provide a new multi-use path that parallels the proposed Sunrise Expressway until it connects to the existing on-street facilities at SE 122nd Avenue.

"Additional improvements to further enhance bicycle and pedestrian circulation and connectivity are identified in the Transportation Technical Report." (pg 40)

Existing Conditions

Intersection	LANE DATA AM (PM) Delay [1]	LANE DATA AM (PM) Queue [2]	Intersection LOS 1st Hour (2nd Hour) AM	Intersection LOS 1st Hour (2nd Hour) PM	Intersection V/C 1st Hour (2nd Hour) AM	Intersection V/C 1st Hour (2nd Hour) PM
3: Hwy 224/Johnson Road	23 (62) -2	0 **(3)**	C (C)	D (E)	0.81 (0.66)	0.88 (0.91)
4: Hwy 224 / SB 82nd Off Ramp	11 (26)	0 **(1)**	B (B)	B (C)	0.75 (0.66)	0.66 (0.69)
5: Hwy 224 / NB 82nd Off Ramp	26 (69) -1	**2 (3)**	C (C)	E (E)	0.79 (0.77)	0.83 (0.83)
6: 82nd Dr/ I-205 NB / Lawnfield	20 (72) -1	0 **(2)**	C (C)	E (E)	0.60 (0.56)	0.76 (0.83)
7: 82nd Dr/Jannsen Rd.	6 (20)	0 (0)	A, unsig	**F, Ebnd right**	---	---
12: I-205/Hwy 212-224 South ramps	14 (32)	**1 (3)**	E, Wbnd Left	**E/F, Wbnd left**	---	---
13: I-205/Hwy 212-224 North ramps	25 (51)	**1 (2)**	C (C)	C (D)	0.69 (0.83)	0.73 (0.73)
14: 82nd Dr/ Hwy 212-224	55 **(216)**	**2 (4)**	E **(F)**	**F (F)**	0.78 (0.74)	0.83 (0.85)
15: Hwy 212/224 @ 102nd Avenue	19 (53) -2	0 **(2)**	C (D)	C (E)	0.69 (0.60)	0.85 (0.84)
29: 82nd Dr / Evelyn St.			B (B)	B (D)	0.43 (0.43)	0.60 (0.58)
30: Jennifer / Evelyn St.			B, unsig	**F, Wbd+ Ebd**	---	---

No Build, Alternative 1

Portential Design Exception	Intersection	LANE DATA AM (PM) Delay [1]	LANE DATA AM (PM) Queue [2]	Intersection LOS 1st Hour (2nd Hour) AM	Intersection LOS 1st Hour (2nd Hour) PM	Intersection V/C 1st Hour (2nd Hour) AM	Intersection V/C 1st Hour (2nd Hour) PM
Yes	3: Hwy 224/Johnson Road	**524 (177)**	**2 (3)**	**F (F)**	**F (F)**	**1.09** (0.88)	**1.46 (1.56)**
Yes	4: Hwy 224 / SB 82nd Off Ramp	**311 (152)**	**2 (2)**	**F (F)**	**F (F)**	**1.04** (0.90)	**1.24 (1.32)**
Yes	5: Hwy 224 / NB 82nd Off Ramp	**244 (115)**	**4 (3)**	**F (F)**	**F (F)**	**1.35 (1.15)**	**0.98 (1.04)**
Yes	6: 82nd Dr/ I-205 NB / Lawnfield	**1970 (584)**	**2 (2)**	**F (F)**	**F (F)**	**1.35 (1.46)**	**1.33 (1.46)**
	7: 82nd Dr/Jannsen Rd	**3600 (3600)**	0 **(2)**	**F, Ebnd**	**F, Ebd + Nbd**	---	---
Yes	12: I-205/Hwy 212-224 South ramps	**1655 (859)**	**2 (3)**	**F (F)**	**F (F)**	0.93 (0.87)	0.94 **(1.00)**
Yes	13: I-205/Hwy 212-224 North ramps	70 **(792)**	**2 (2)**	E **(F)**	**F (F)**	**1.04** (0.80)	0.87 (0.73)
Yes	14: 82nd Dr/ Hwy 212-224	**1395 (849)**	**4 (4)**	**F (F)**	**F (F)**	**2.02 (1.66)**	**1.35 (1.36)**
Yes	15: Hwy 212/224 @ 102nd Avenue	**199 (678)**	**3 (3)**	**F (F)**	**F (F)**	**1.36 (1.10)**	**1.26 (1.35)**
Yes	29: 82nd Dr / Evelyn St.			**F (F)**	**F (F)**	**1.40 (1.31)**	**1.57 (1.66)**
Yes	30: Jennifer / Evelyn St.			**F (F)**	**F (F)**	**1.07** (0.91)	0.81 (0.80)

Information in **BOLD** indicates over-capacity or failing levels of service.

[1] **Delay in seconds. Number of individual approach failures, even if intersection has suitable LOS, is shown by last digits: " -2 " indicates two approaches fail at this intersection.**

[2] **Queue: number of the 4 approaches (North, South, East, West) with forecasted queue lengths greater than available storage. Multiple lanes on one approach may have insufficient queue length.**

Alternative 2

Potential Design Exception	Intersection	LANE DATA AM (PM) Delay [1]		Queue [2]		Intersection LOS 1st Hour (2nd Hour) AM		PM		Intersection V/C 1st Hour (2nd Hour) AM		PM	
Yes	3: Hwy 224 / Johnson	**228**	(38)	**2**	**(2)**	**F**	**(F)**	**F**	(D)	**0.96**	(0.87)	**1.08**	**(1.00)**
	7: 82nd Dr/Jannsen Rd.	14	**(78)**	0	(0)	B	(A)	**F, Ebd + Nbd**		---		---	
Yes	12: I-205/Hwy 212-224 South ramps	21	(17)	**2**	**(2)**	C	(B)	B	(B)	0.79	(0.71)	0.88	(0.92)
	13: I-205/Hwy 212-224 North ramps	**223**	**(99)**	**2**	**(2)**	**F**	(E)	C	**(F)**	0.83	(0.83)	0.82	(0.71)
Yes	14: 82nd Dr/ Hwy 212-224	**417**	**(270)**	**3**	**(4)**	**F**	**(F)**	**F**	**(F)**	**0.98**	(0.87)	**1.13**	**(1.11)**
Yes	15: Hwy 212/224 @ 102nd	**118**	**(561)**	**2**	**(3)**	**F**	**(F)**	**F**	**(F)**	0.79	(0.80)	**1.12**	**(1.04)**
Yes	29: 82nd Dr / Evelyn St.					**F**	**(F)**	**F**	**(F)**	**1.44**	**(1.23)**	**1.66**	**(1.77)**
Yes	30: Jennifer / Evelyn St.					**F**	**(F)**	**F**	**(F)**	**1.10**	(0.88)	0.78	(0.70)
Yes	34: 82nd Ave / Deer Creek Road	18	(51) -1	0	**(2)**	B	(B)	D	(D)	0.60	(0.55)	0.84	(0.92)
Yes	35: Sunrise / I-205 SB Off-Ramp	**226**	(2)	**2**	(0)	**F**	**(F)**	A	(A)	0.87	(0.80)	0.59	(0.60)
Yes	36: Sunrise / I-205 NB Off-Ramp	**579**	(15)	**1**	(0)	**F**	**(F)**	B	(B)	0.82	(0.75)	0.84	(0.86)
	37: 82nd Ave / I-205 SB On-Ramp	2	(5)	0	(0)	A	(A)	A	(A)	0.45	(0.42)	0.32	(0.61)
	38: 82nd Ave / I-205 NB Off-Ramp	11	(10)	0	(0)	B	(B)	B	(B)	0.57	(0.52)	0.46	(0.51)

Alternative 3

Portential Design Exception	Intersection	LANE DATA AM (PM) Delay [1]		Queue [2]		Intersection LOS 1st Hour (2nd Hour) AM		PM		Intersection V/C 1st Hour (2nd Hour) AM		PM	
Yes	3: Hwy 224 / Johnson	**164**	**(179)**	**3**	**(2)**	**F**	**(F)**	**F**	**(F)**	0.92	(0.84)	0.81	(0.92)
	7: 82nd Dr/Jannsen Rd.	9	(14)	0	(0)	B	(A)	**F, Ebnd Left**		---		---	
Yes	12: I-205/Hwy 212-224 South ramps	**101**	(21)	**3**	**(2)**	**F**	(E)	B	(C)	0.74	(0.73)	0.89	(0.95)
	13: I-205/Hwy 212-224 North ramps	**865**	**(110)**	**3**	**(2)**	**F**	(E)	D	**(F)**	0.65	(0.60)	0.64	(0.69)
Yes	14: 82nd Dr/ Hwy 212-224	**623**	**(324)**	**3**	**(4)**	**F**	**(F)**	**F**	**(F)**	**1.03**	(0.94)	**1.05**	**(1.07)**
Yes	15: Hwy 212/224 @ 102nd	**275**	**(696)**	**3**	**(4)**	**F**	**(F)**	**F**	**(F)**	0.92	(0.83)	**1.02**	**(1.06)**
Yes	29: 82nd Dr / Evelyn St.					**F**	**(F)**	**F**	**(F)**	**1.41**	**(1.32)**	**1.46**	**(1.52)**
Yes	30: Jennifer / Evelyn St.					**F**	**(F)**	**F**	**(F)**	0.86	(0.67)	0.78	(0.70)
Yes	34: 82nd Ave / Deer Creek Road	21	**(157)**	0	**(2)**	C	(C)	**F**	**(F)**	0.62	(0.56)	0.92	(0.99)
Yes	35: Sunrise / I-205 SB Off-Ramp	**250**	(3)	**1**	(0)	**F**	**(F)**	A	(A)	0.86	(0.79)	0.55	(0.60)
Yes	36: Sunrise / I-205 NB Off-Ramp	**1188**	(12)	**2**	(0)	**F**	**(F)**	B	(B)	0.79	(0.73)	0.80	(0.88)
	37: 82nd Ave / I-205 SB On-Ramp	2	(25)	0	**(1)**	A	(A)	A	(C)	0.47	(0.44)	0.53	(0.58)
	38: 82nd Ave / I-205 NB Off-Ramp	11	(74) -2	0	**(1)**	B	(B)	B	(E)	0.59	(0.54)	0.49	(0.53)

Information in **BOLD** indicates over-capacity or failing levels of service.

[1] **Delay in seconds. Number of individual approach failures, even if intersection has suitable LOS, is shown by last digits: " -2 " indicates two approaches fail at this intersection.**

[2] **Queue: number of the 4 approaches (North, South, East, West) with forecasted queue lengths greater than available storage. Multiple lanes on one approach may have insufficient queue length.**

SDEIS Intersection Operations

This section is organized by grouping two intersections with descriptions of their operations under Existing Conditions, No Build, Alternative 2 and Alternative 3. The descriptions are followed by Figures with the traffic operations information. Each intersection has two figures, the first with AM peak period information and the second with PM peak information.

West End Intersections

Sunrise Intersection 1: OR 224/Webster Road

Sunrise Intersection 2: OR 224/Pheasant Court

Sunrise Intersection 3: OR 224/Johnson Road

At present the intersection has an acceptable LOS, although long queue lengths appear in the PM peak period, with corresponding poorer LOS and higher V/C ratio.

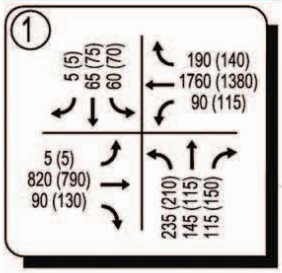
The No Build alternative has lane delays and over-capacity queues which cause intersection LOS F in both the AM and PM peak periods.

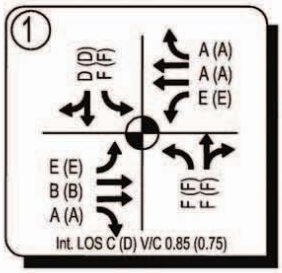
Alternative 2 has reduced the delay for both peak periods from the No Build, but the overall intersection is still at LOS F. Two approach lanes have over-capacity queues.

Alternative 3 also has shorter delays than the No Build, but the intersection is at LOS F.

WEBSTER ROAD / MILWAUKIE EXPRESS WAY INTERSECTION (SUNRISE SDEIS #1)

2004 Existing





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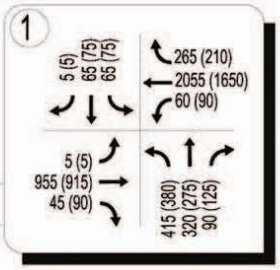
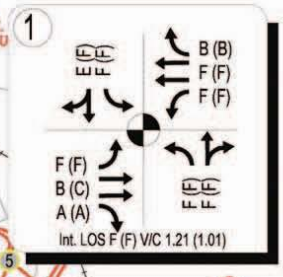
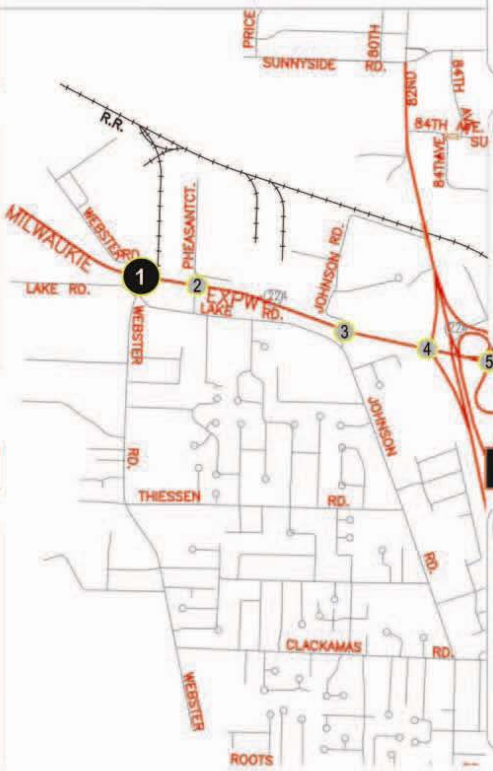
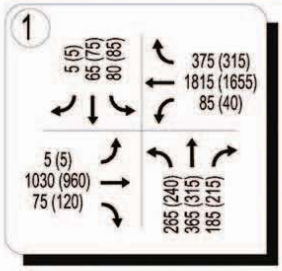
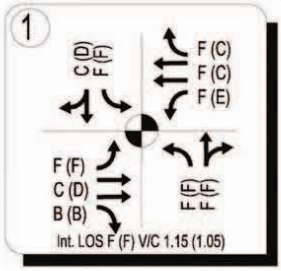






2030 Alternative 2





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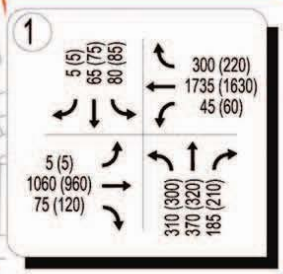
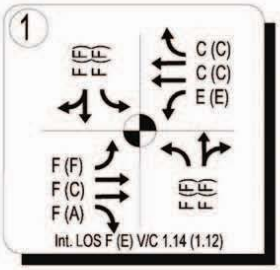
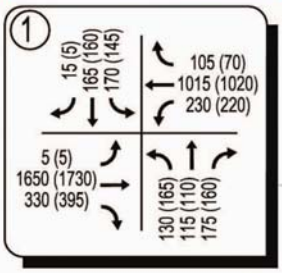


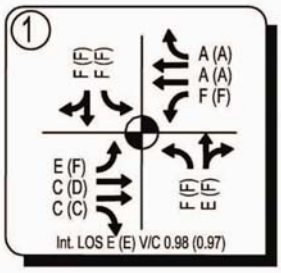


AM PEAK HOURS
VOLUME AND LOS
1ST HOUR (2ND HOUR)

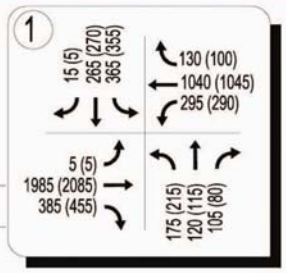
WEBSTER ROAD / MILWAUKIE EXPRESS WAY INTERSECTION (SUNRISE SDEIS #1)

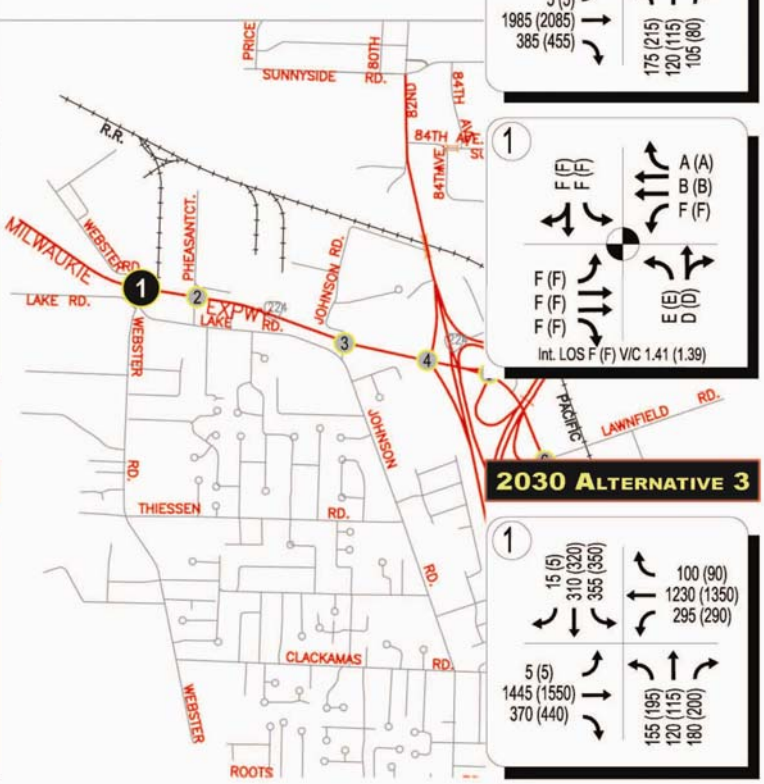
2004 Existing



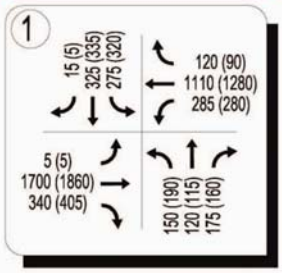


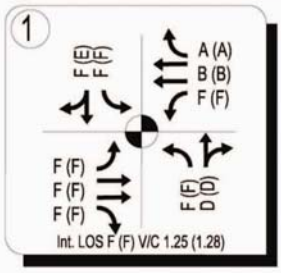
2030 No Build



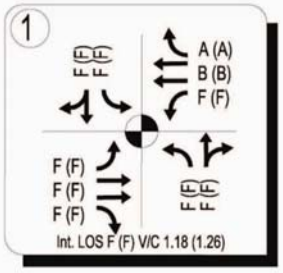


2030 Alternative 2



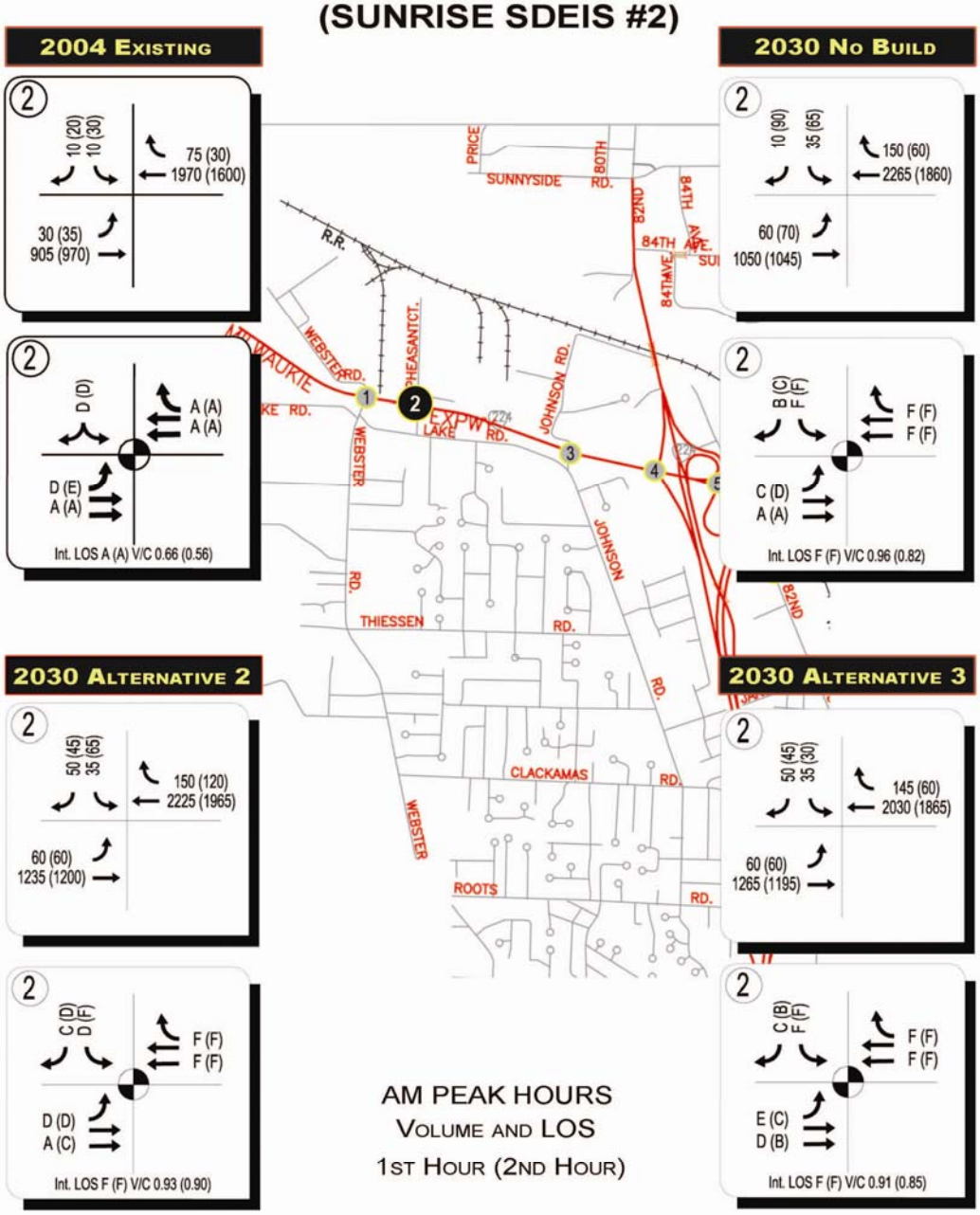


2030 Alternative 3



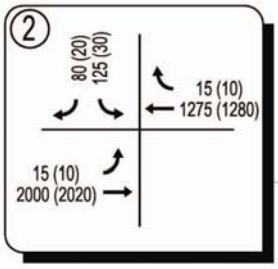
PM PEAK HOURS
VOLUME AND LOS
1ST HOUR (2ND HOUR)

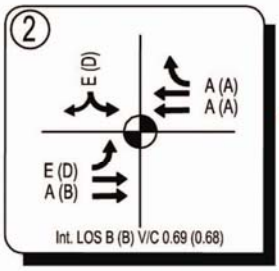
OR 224 AND PHEASANT COURT INTERSECTION (SUNRISE SDEIS #2)



OR 224 AND PHEASANT COURT INTERSECTION (SUNRISE SDEIS #2)

2004 EXISTING





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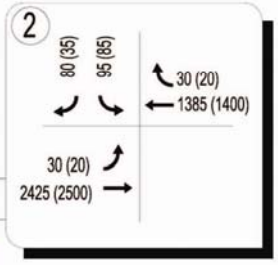
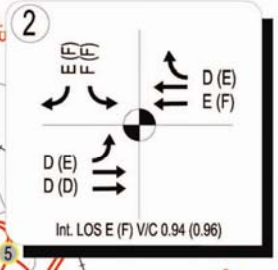
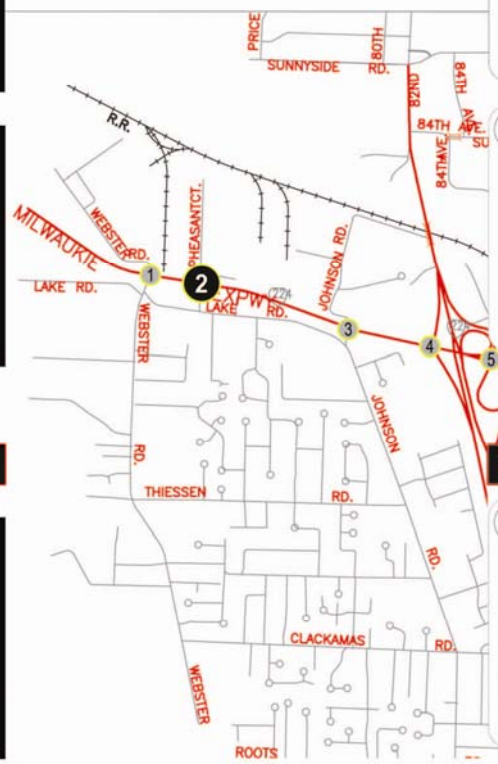
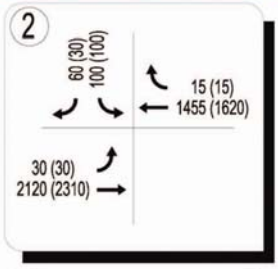
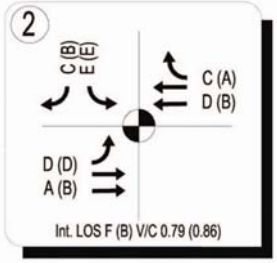




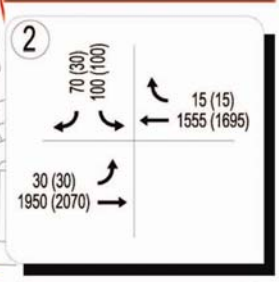


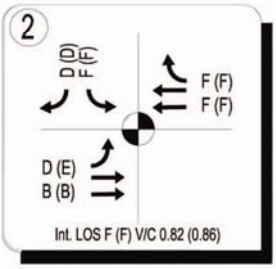
2030 ALTERNATIVE 2





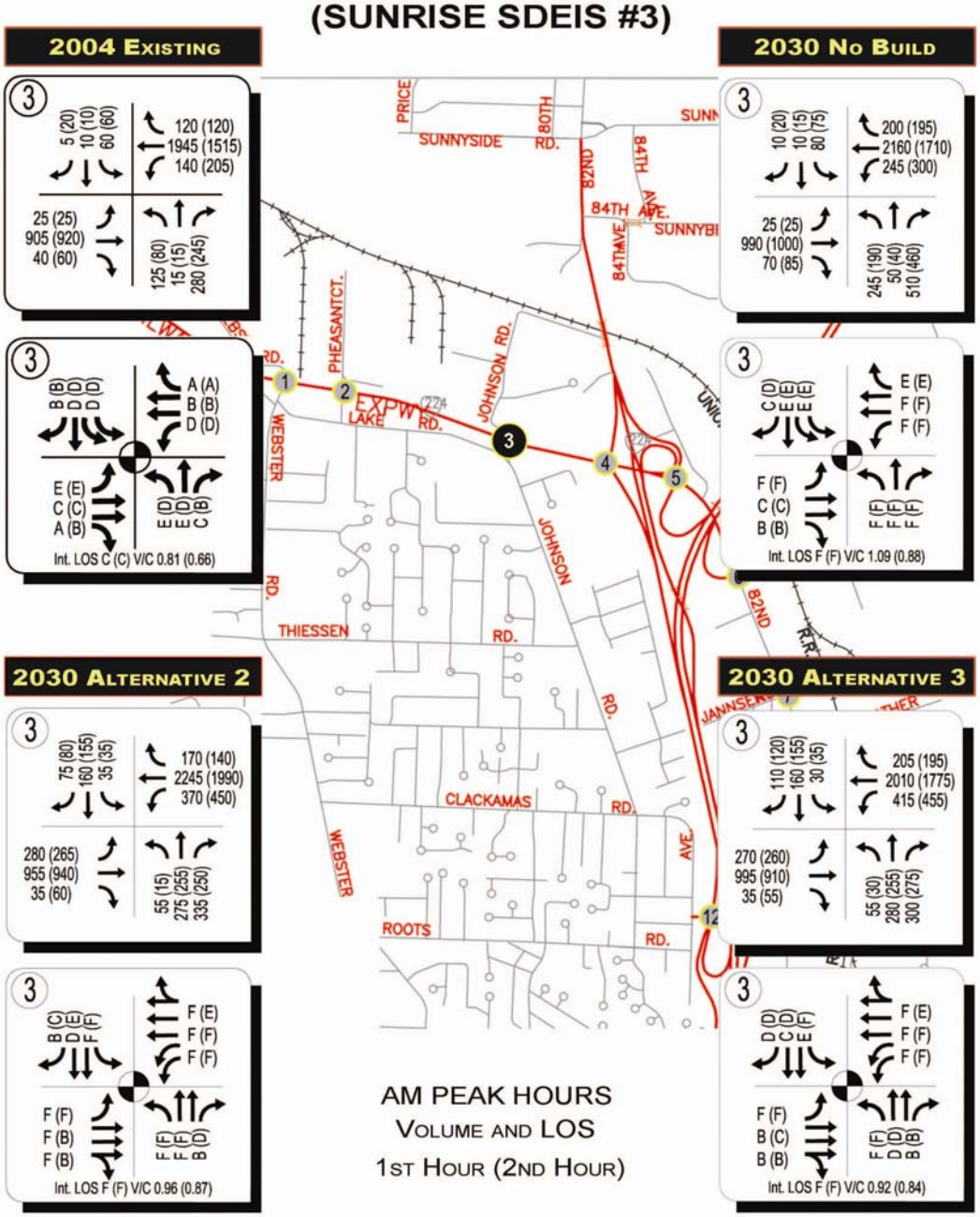
2030 ALTERNATIVE 3



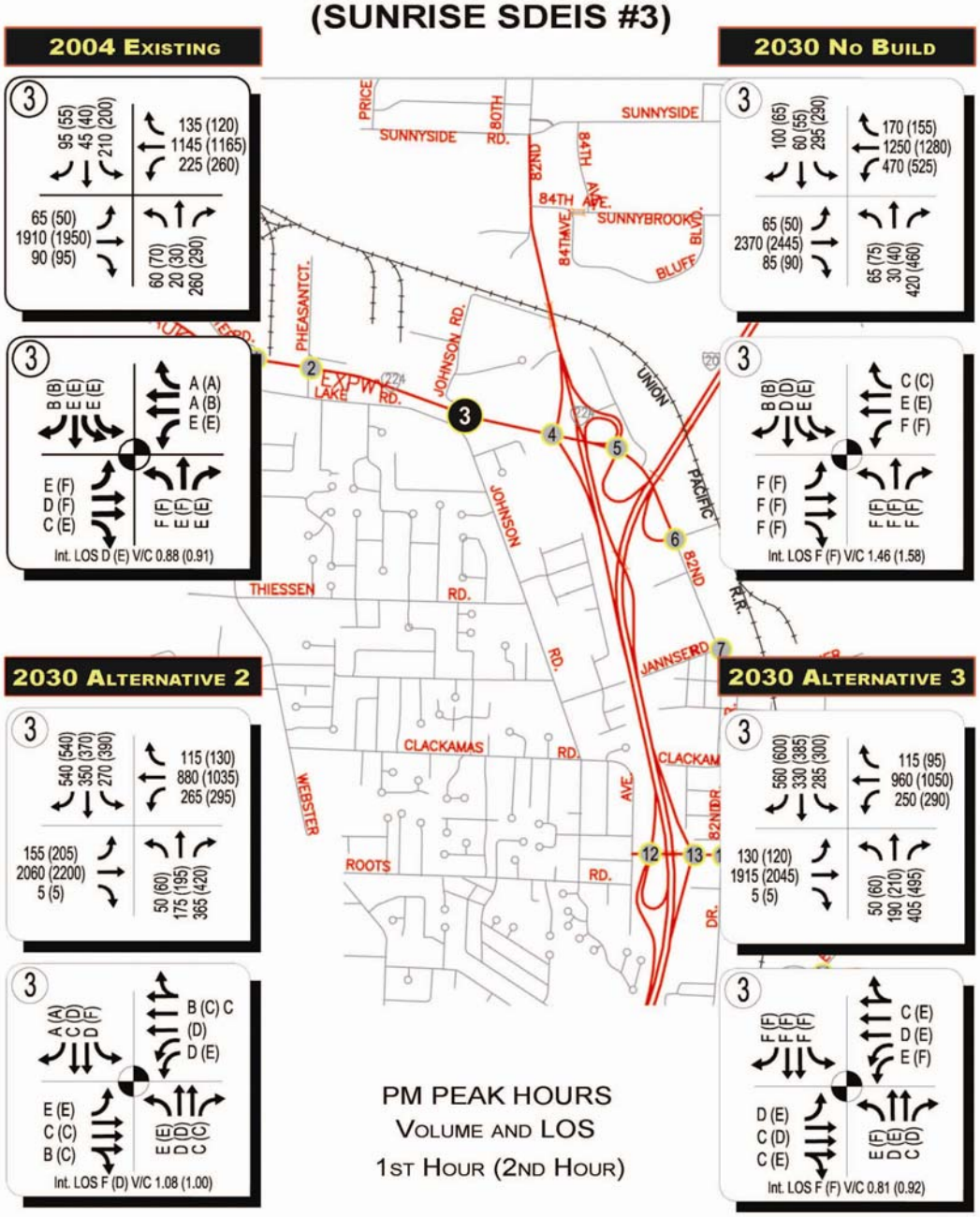


PM PEAK HOURS
VOLUME AND LOS
1ST HOUR (2ND HOUR)

JOHNSON ROAD / MILWAUKIE EXPRESS WAY INTERSECTION (SUNRISE SDEIS #3)



WEBSTER ROAD / MILWAUKIE EXPRESS WAY INTERSECTION (SUNRISE SDEIS #3)



PM PEAK HOURS
VOLUME AND LOS
1ST HOUR (2ND HOUR)

Sunrise Intersection 4: OR 224/Southbound off-ramp from 82nd Ave and southbound on-ramp to I-205 (Existing Conditions Only)

Currently, the intersection meets operational standards, but there is one over-capacity queue in the PM peak.

Under the No Build these southbound ramps fail.

Sunrise Intersection 5: OR 224/Northbound off-ramp from 82nd Ave (from I-205), southbound off-ramp from I-205, and northbound connection to SE 82nd Avenue (Existing Conditions Only)

This intersection meets operational standards today, but with several over-capacity queue lengths in the PM peak.

Intersection fails in the No Build in both peak periods.

Sunrise Intersection 6: SE 82nd Drive/I-205 northbound On Ramp/Lawnfield Road (Existing Conditions Only)

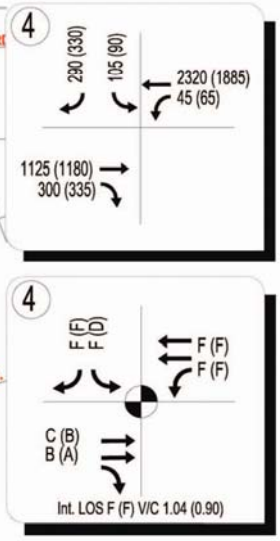
At present, the intersection has acceptable LOS, but with one over-capacity queue in the PM peak.

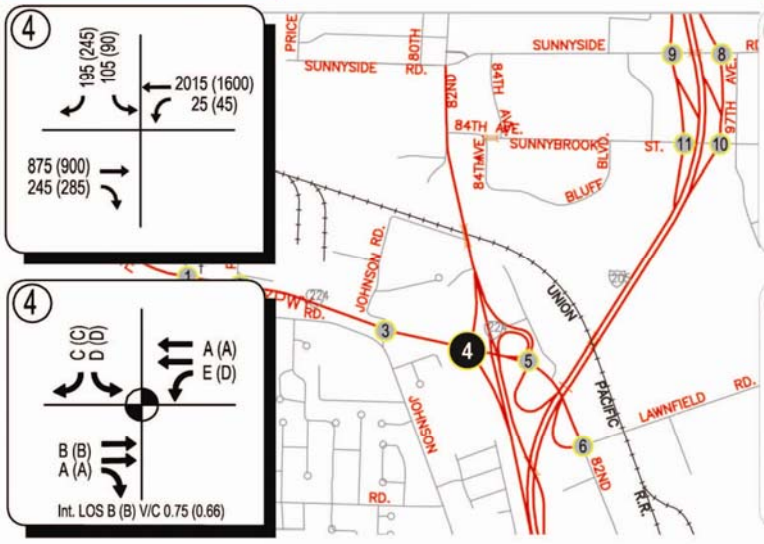
The No Build alternative has intersection failure in both peak periods.

82ND AVENUE RAMPS / OR 224 INTERSECTION (SUNRISE SDEIS #4)

2004 Existing

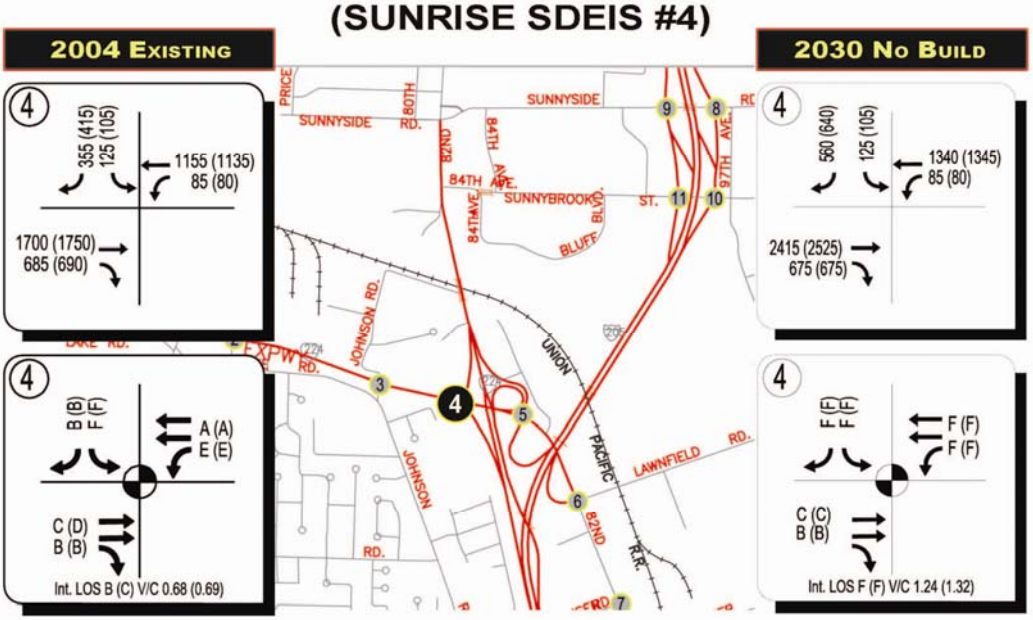
2030 No Build





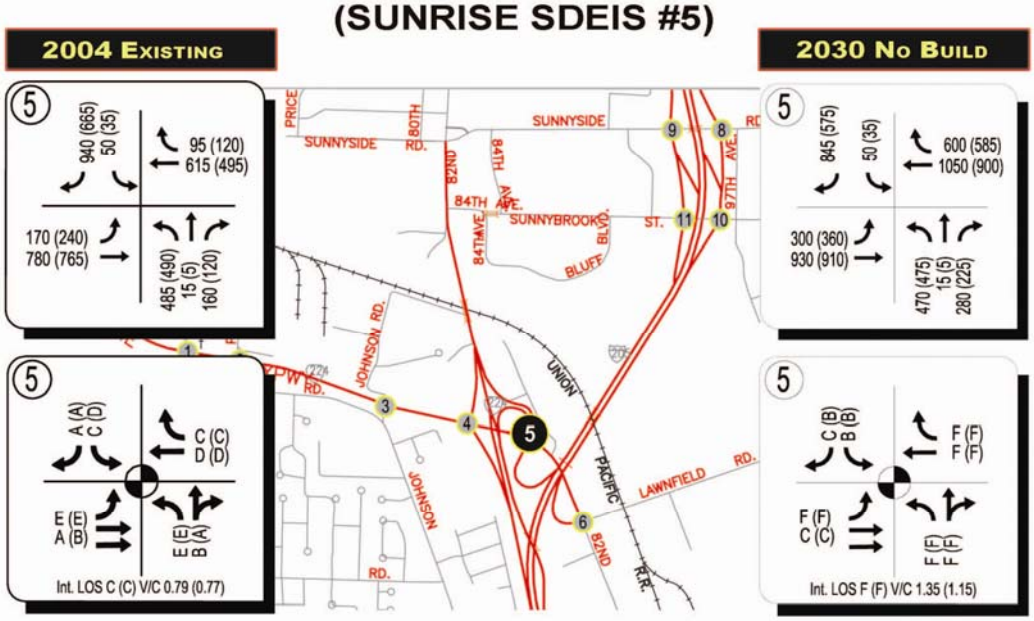
AM PEAK HOURS
VOLUME AND LOS
1ST HOUR (2ND HOUR)

82ND AVENUE RAMPS / OR 224 INTERSECTION (SUNRISE SDEIS #4)



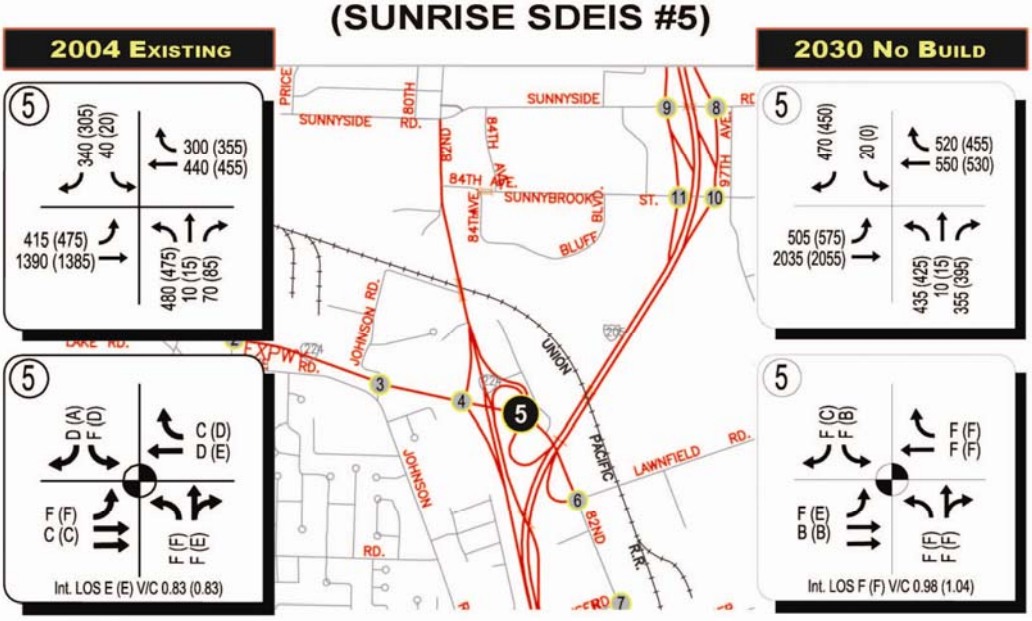
PM PEAK HOURS
VOLUME AND LOS
1ST HOUR (2ND HOUR)

82ND AVENUE RAMPS / OR 224 INTERSECTION (SUNRISE SDEIS #5)



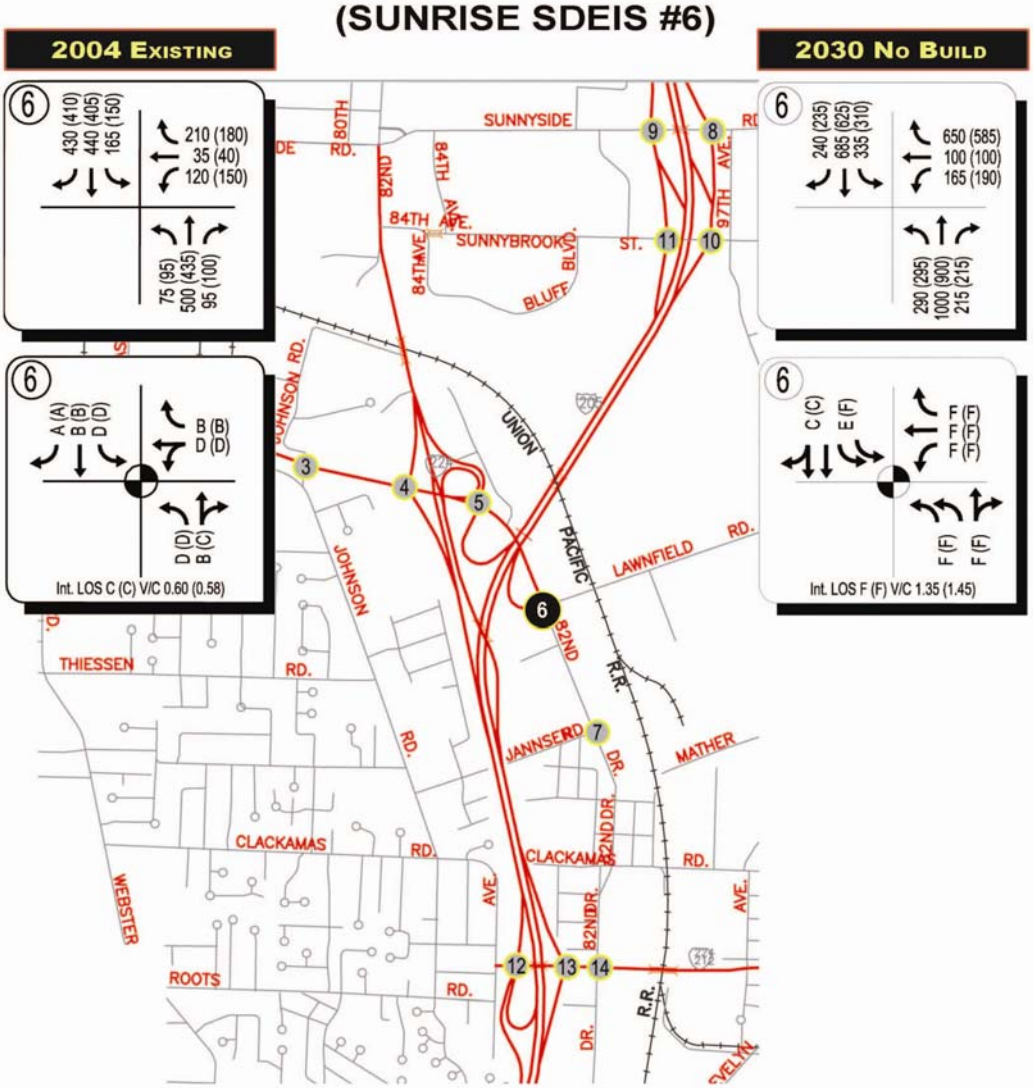
AM PEAK HOURS
VOLUME AND LOS
1ST HOUR (2ND HOUR)

82ND AVENUE RAMPS / OR 224 INTERSECTION (SUNRISE SDEIS #5)



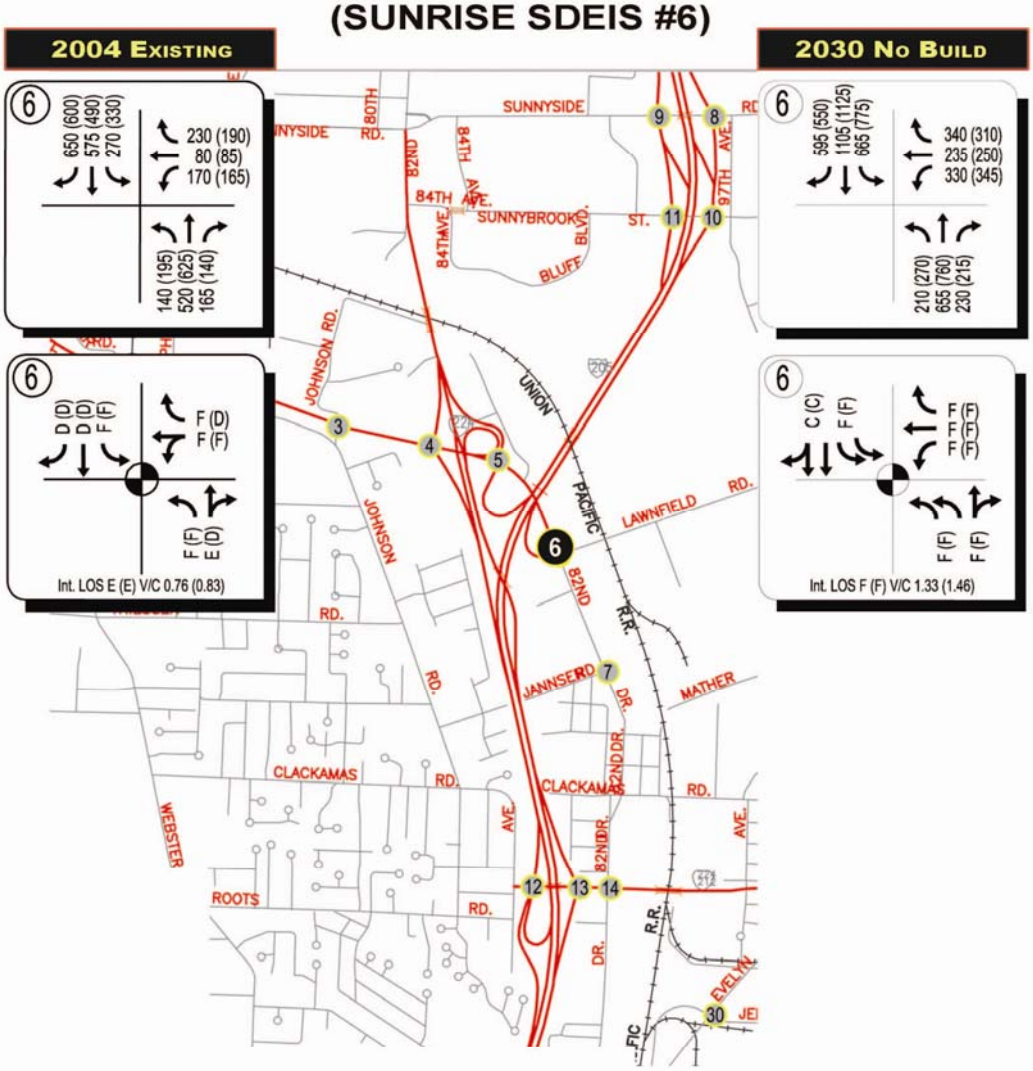
PM PEAK HOURS
VOLUME AND LOS
1ST HOUR (2ND HOUR)

LAWNFIELD ROAD / 82ND DRIVE INTERSECTION (SUNRISE SDEIS #6)



AM PEAK HOURS
VOLUME AND LOS
1ST HOUR (2ND HOUR)

LAWNFIELD ROAD / 82ND DRIVE INTERSECTION (SUNRISE SDEIS #6)



PM PEAK HOURS
VOLUME AND LOS
1ST HOUR (2ND HOUR)

Sunrise Intersection 7: SE 82nd Drive/Jannsen Road

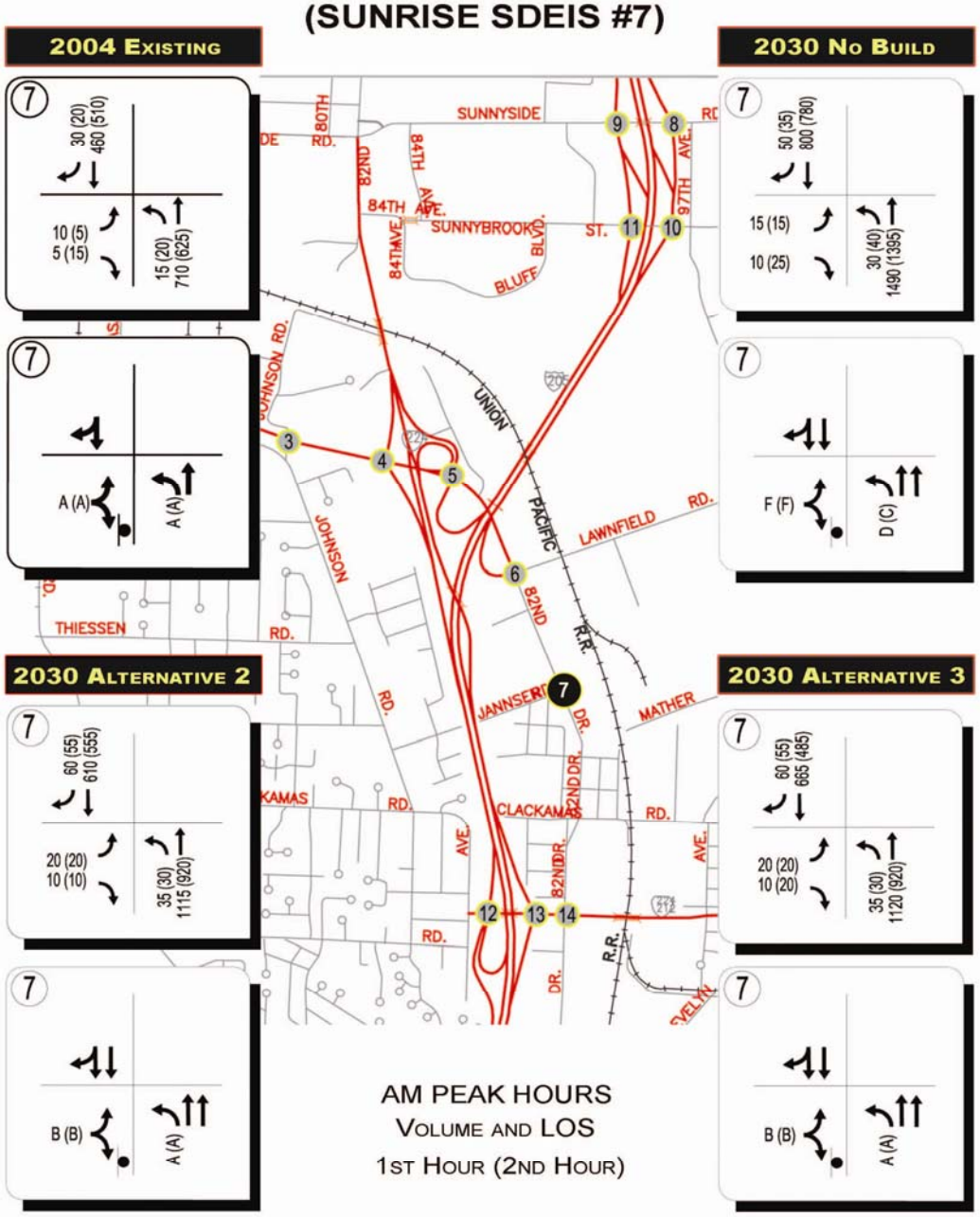
Currently the stop-sign controlled intersection has only one poor lane movement.

In the No Build alternative, the intersection fails due to extreme delays and inadequate storage lengths.

Alternative 2 has reduced delays in the AM peak from the No Build, but individual lane turns still fail.

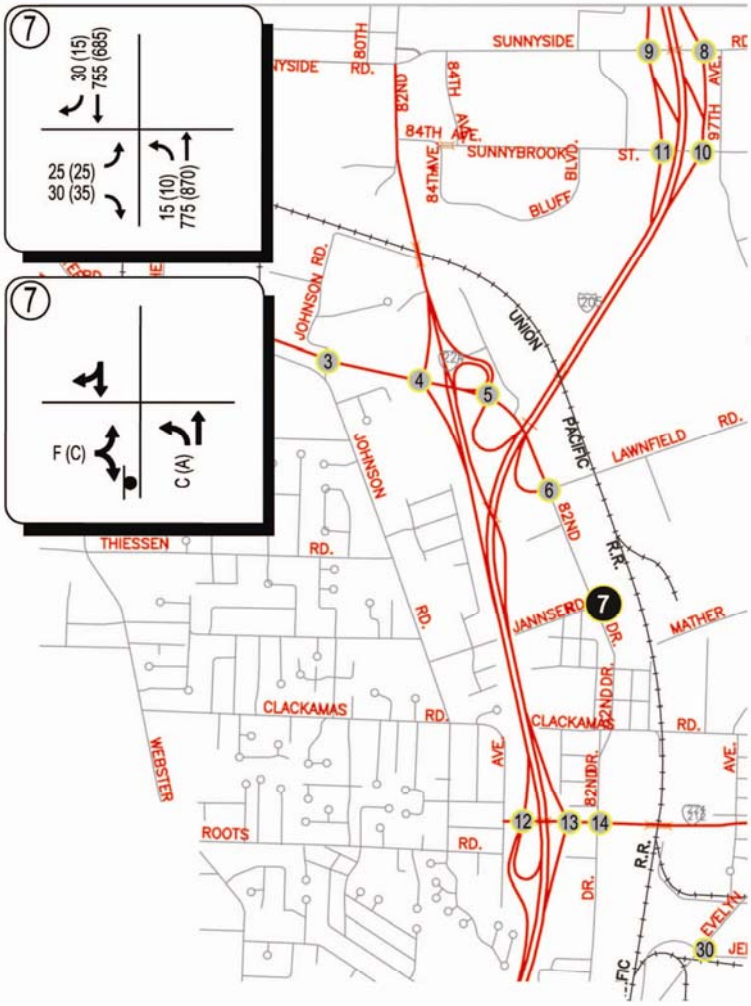
Alternative 3 has shorter delays in the AM and PM peak periods from Alternative 2 and the No Build, but individual lane turns still fail.

JANNSEN ROAD / 82ND DRIVE INTERSECTION (SUNRISE SDEIS #7)

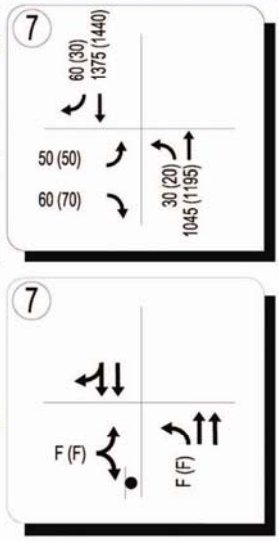


JANNSEN ROAD / 82ND DRIVE INTERSECTION (SUNRISE SDEIS #7)

2004 Existing



2030 No Build



PM PEAK HOURS
VOLUME AND LOS
1ST HOUR (2ND HOUR)

Clackamas Interchange Intersections

Sunrise Intersection 12: I-205 at OR 212/224 Southbound Ramps

Currently several approaches have over-capacity queues, with failure noted for westbound left turns.

The No Build brings complete failure of the southbound off-ramps from I-205 and southbound on-ramp from OR 212/224.

Over-capacity queues still occur in the AM and PM peak hours in Alternative 2, but delays are reduced and overall LOS for the intersection meets standards.

Alternative 3 has less delay than the No Build, but still has failure in the AM peak. Over-capacity queues occur and the overall intersection service level is F/(E).

Sunrise Intersection 13: I-205 at OR 212/224 Northbound Ramps

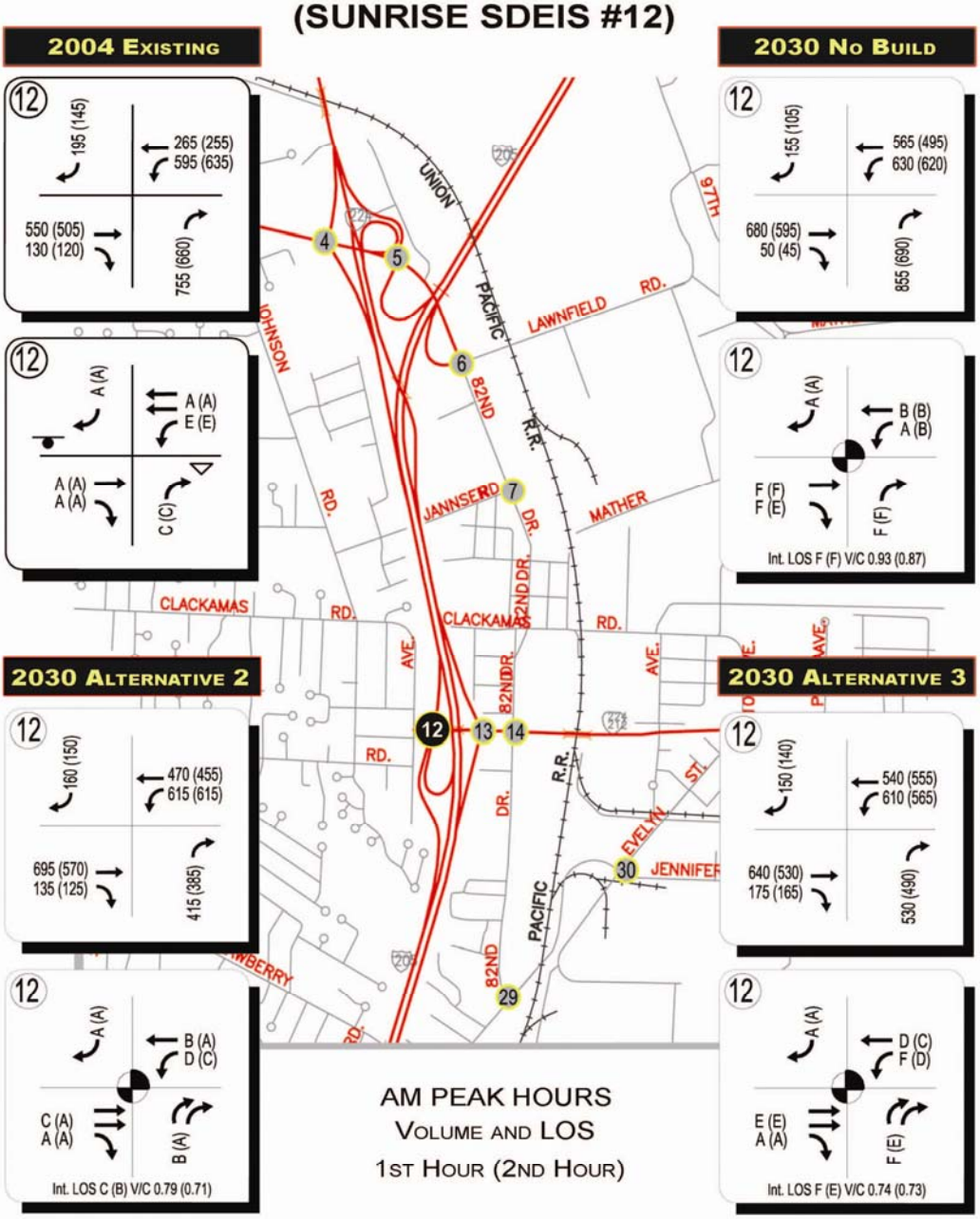
The existing intersection has good service levels, although over-capacity queue lengths are found in both AM and PM peak periods.

The No Build has an overall LOS F in the PM peak, with queue length problems and long delays.

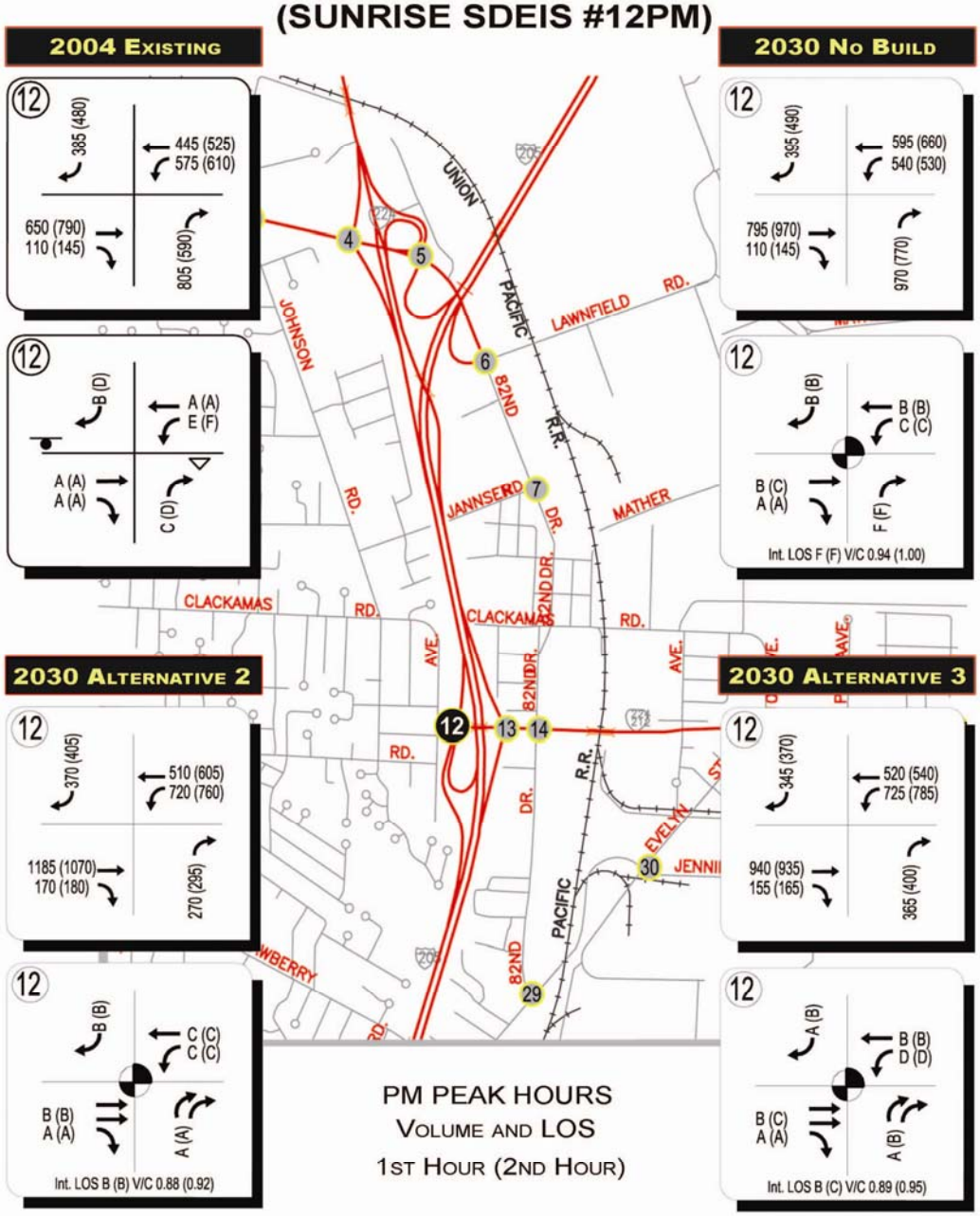
Alternative 2 has increased delay in the AM peak form the No Build, but improved PM peak hour (though one hour still has LOS F). Its overall LOS is comparable to the No Build.

Alternative 3 has higher AM delays than either the No Build or Alternative 2. There are over-capacity queues and poor overall LOS, with a slight improvement in LOS for one hour in the PM peak.

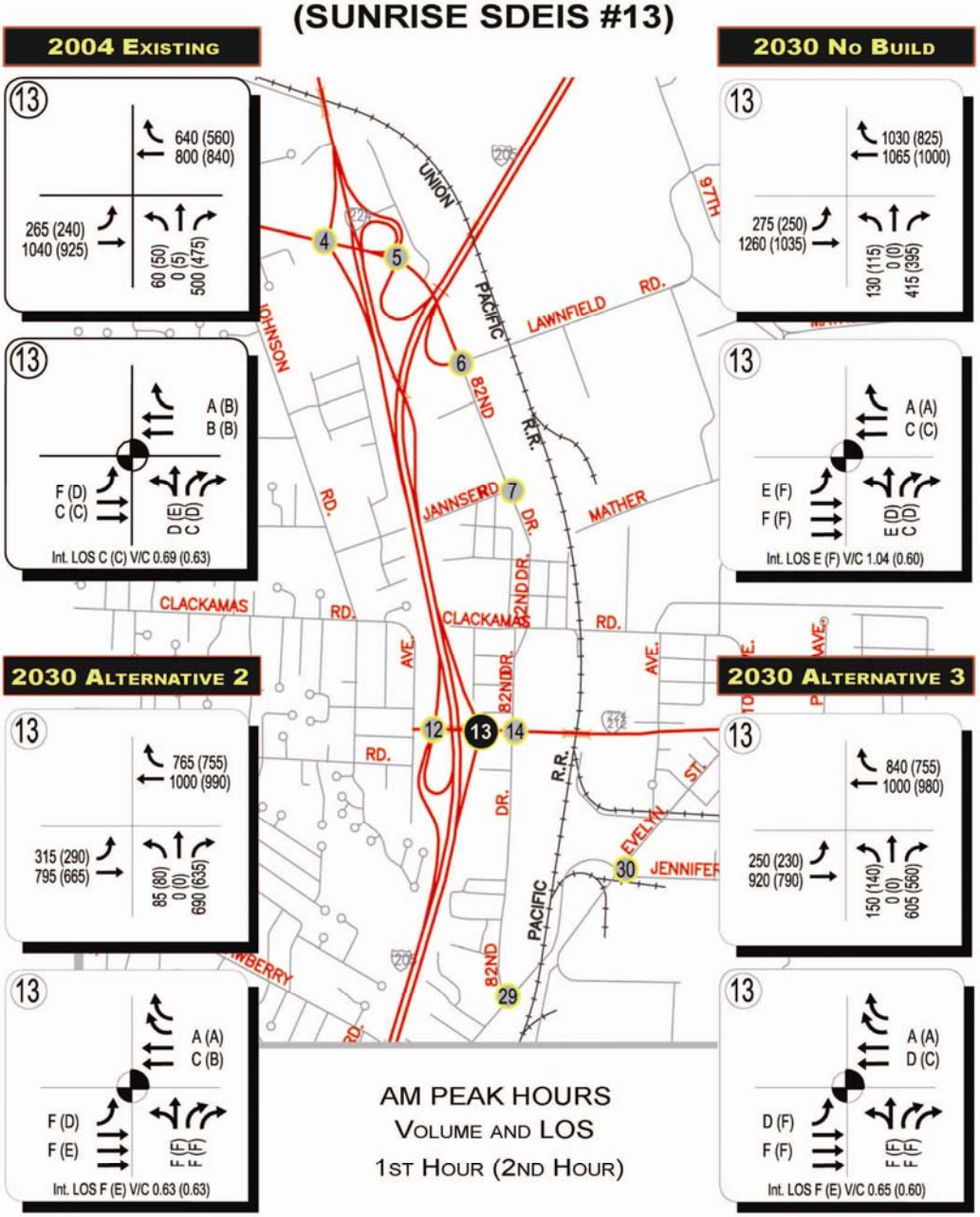
CLACKAMAS INTERCHANGE WESTSIDE RAMPS INTERSECTION (SUNRISE SDEIS #12)



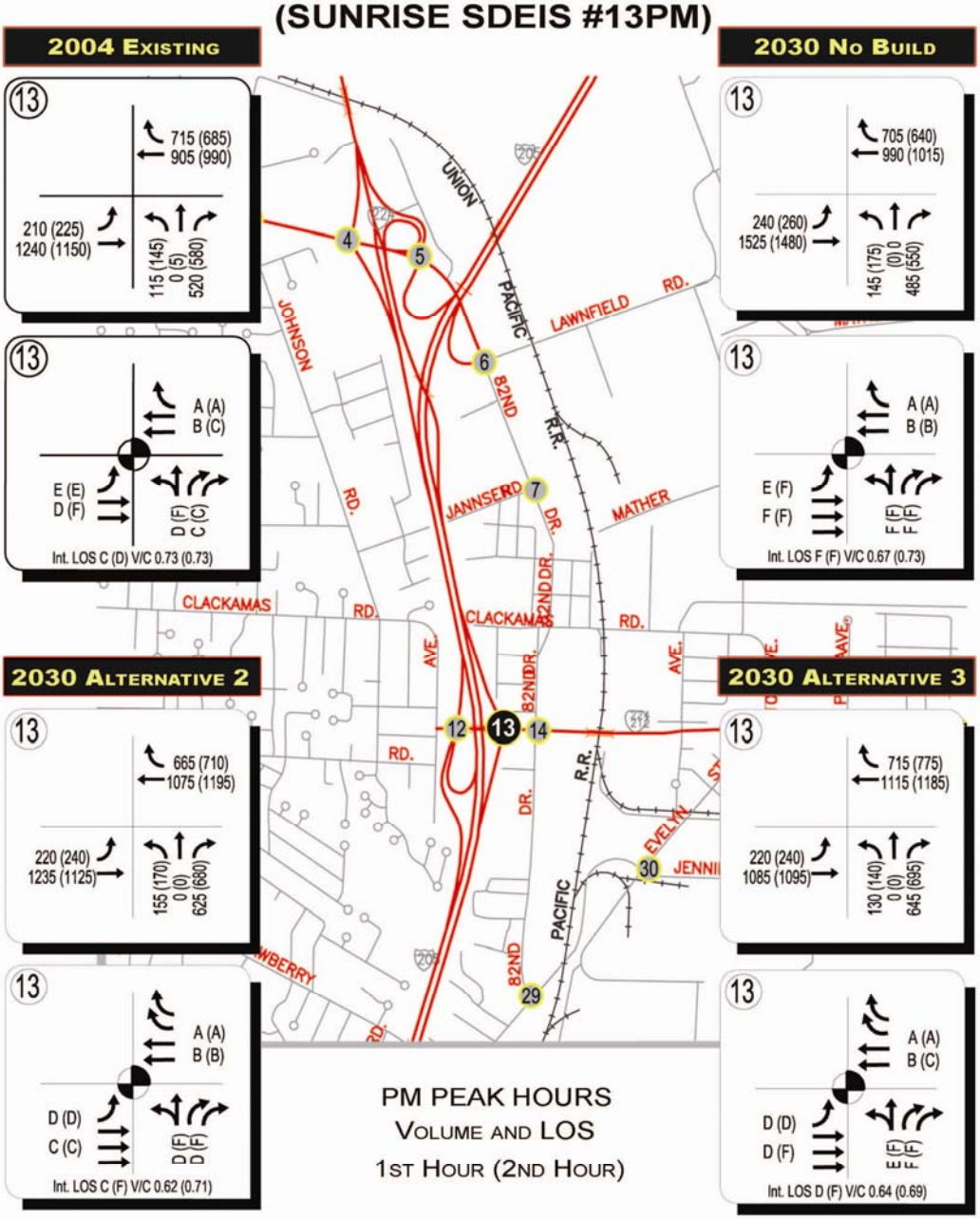
CLACKAMAS INTERCHANGE WESTSIDE RAMPS INTERSECTION (SUNRISE SDEIS #12PM)



CLACKAMAS INTERCHANGE EASTSIDE RAMPS INTERSECTION (SUNRISE SDEIS #13)



CLACKAMAS INTERCHANGE EASTSIDE RAMPS INTERSECTION (SUNRISE SDEIS #13PM)



Sunrise Intersection 14: OR 212/224 at SE 82nd Drive

Existing conditions have failing LOS and over-capacity queues in both AM and PM periods.

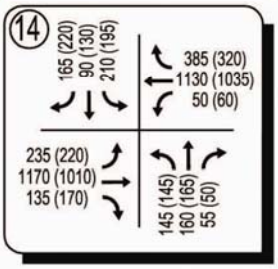
The No Build has total failure at this intersection.

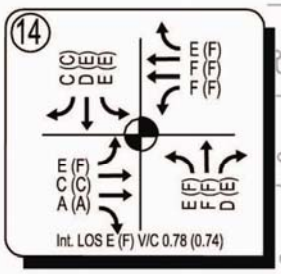
Alternative 2 also fails under all standards, though has shorter delay than the No Build.

Alternative 3 also fails under all standards. It has shorter delay than the No Build, but longer delay than Alternative 2.

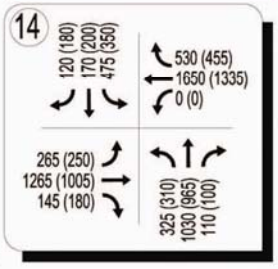
82ND DRIVE / HIGHWAY 212/224 INTERSECTION (SUNRISE SDEIS #14)

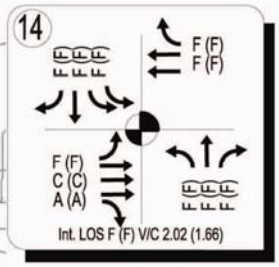
2004 Existing

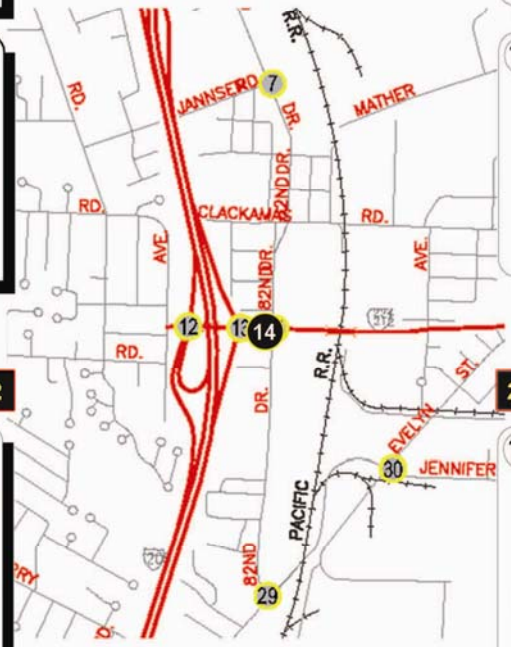




2030 No Build







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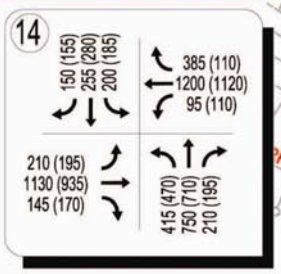

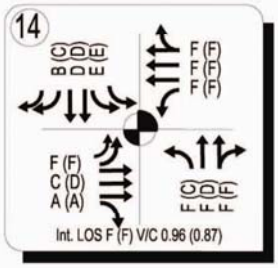

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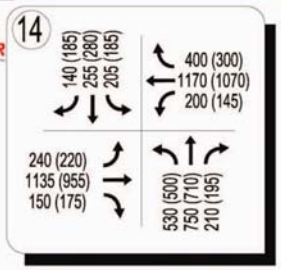
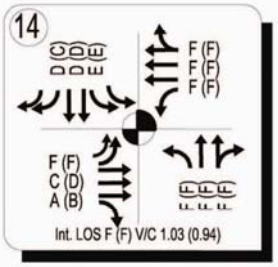
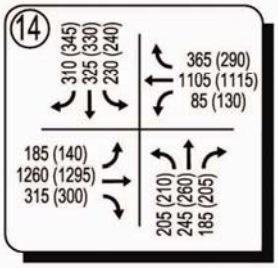


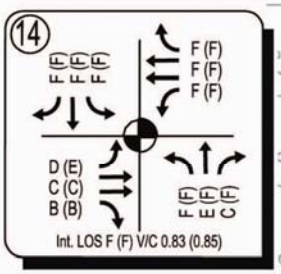


AM PEAK HOURS
VOLUME AND LOS
1ST HOUR (2ND HOUR)

82ND DRIVE / HIGHWAY 212/224 INTERSECTION (SUNRISE SDEIS #14)

2004 Existing





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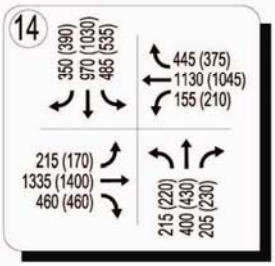

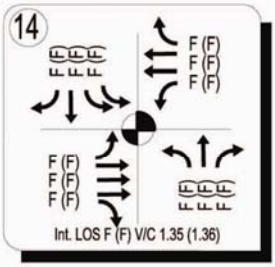

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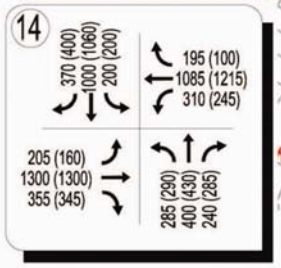

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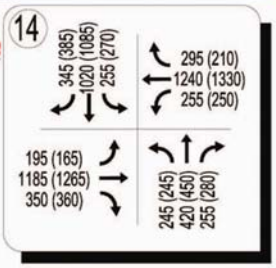
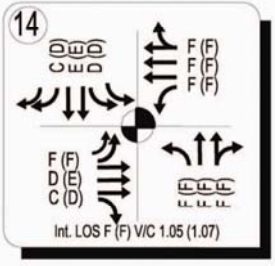




PM PEAK HOURS
VOLUME AND LOS
1ST HOUR (2ND HOUR)

Sunrise Intersection 15: OR 212/224 at 102nd Avenue

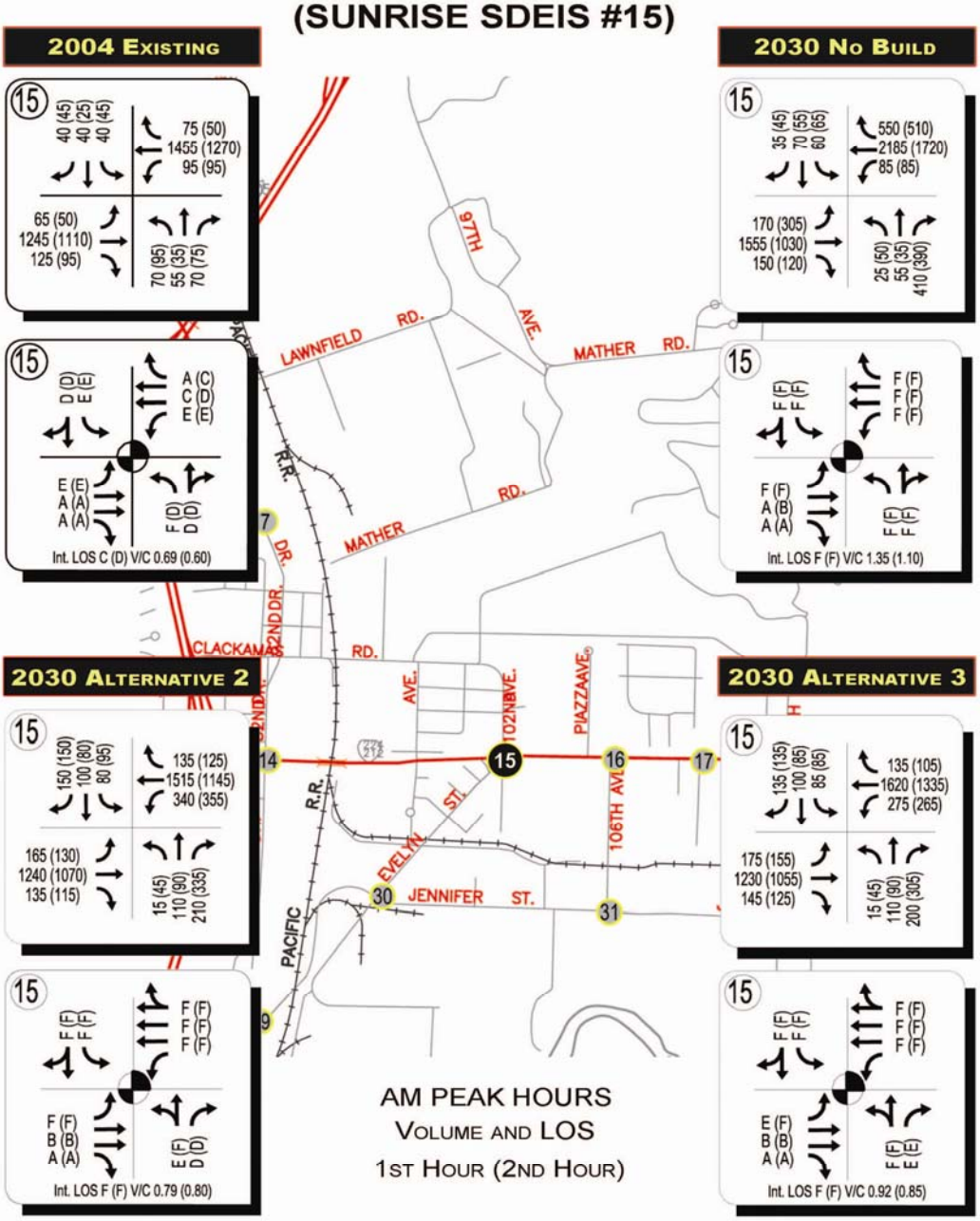
Currently, the intersection has acceptable LOS, although two approaches are over-capacity queues and two individual lanes have long delays.

The No Build fails under all operational standards.

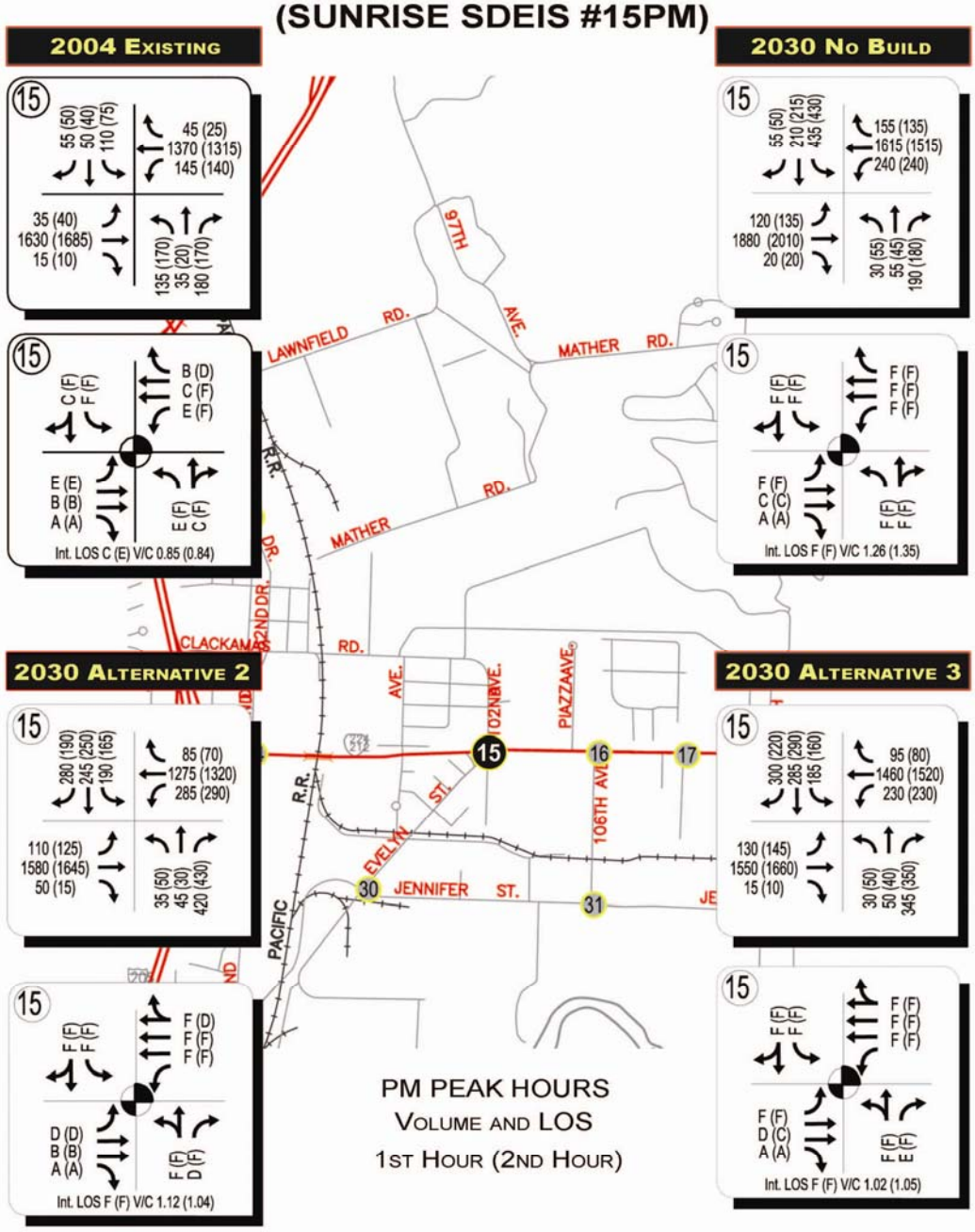
Alternative 2 fails with slightly shorter delay than the No Build.

Alternative 3 fails with slightly longer delay than the No Build.

102ND AVE / HIGHWAY 212/224 INTERSECTION (SUNRISE SDEIS #15)



102ND AVE /HIGHWAY 212/224 INTERSECTION (SUNRISE SDEIS #15PM)



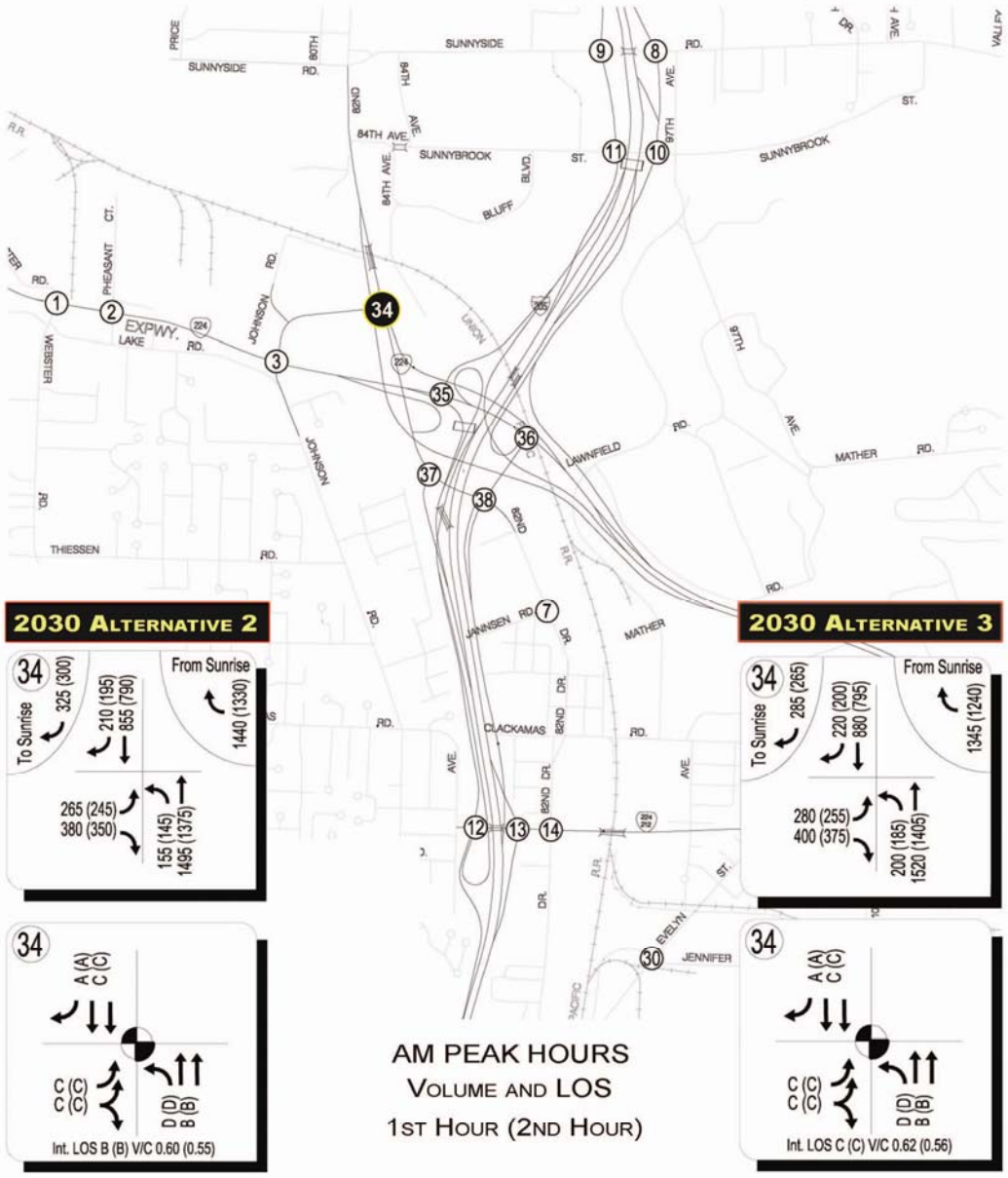
Build Alternatives Only

Sunrise Intersection 34: 82nd Ave / Deer Creek Road

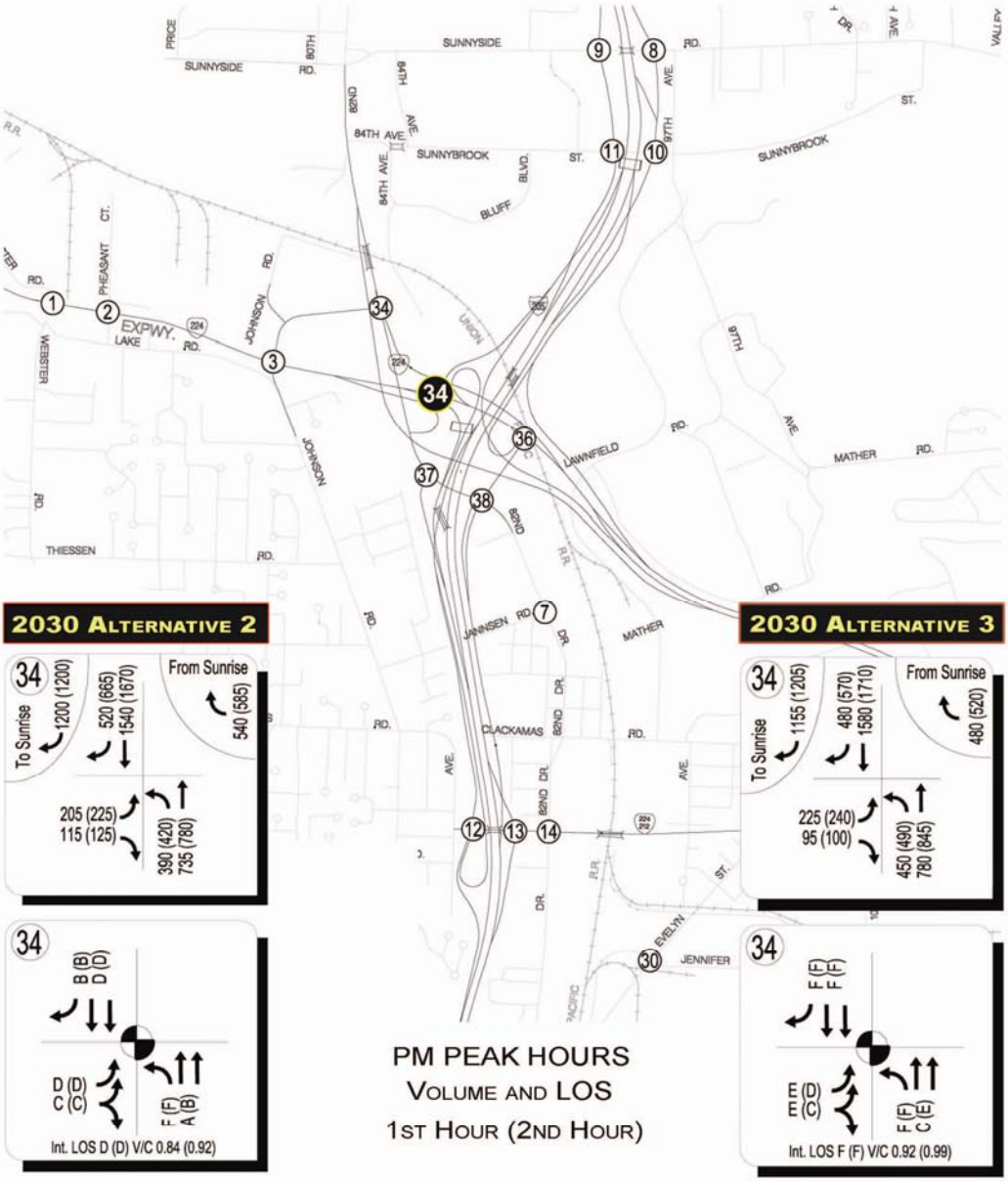
Alternative 2 has acceptable levels-of-service, although two approaches during the PM peak hours have over-capacity queue lengths.

Alternative 3 performs worse than Alternative 2. High delays in the PM peak cause LOS F and a V/C ratio of 0.99.

DEER CREEK LANE / 82ND AVE INTERSECTION (SUNRISE SDEIS #34)



DEER CREEK LANE / 82ND AVE INTERSECTION (SUNRISE SDEIS #34)



Sunrise System Interchange Intersections

Sunrise Intersection 35: Sunrise / I-205 SB Off-Ramp

Alternative 2 has long delays during the AM peak and two approaches with over-capacity queues; the AM peak hours have LOS F.

Alternative 3 has long delays during the AM peak and one approach with over-capacity queues; the AM peak hours have LOS F. It functions similarly to Alternative 2.

Sunrise Intersection 36: Sunrise / I-205 NB Off-Ramp

Alternative 2 has long delay during the AM peak and one approach with over-capacity queues; the AM peak hours have LOS F.

Alternative 3 has very long delays (twice as long as Alternative 2) during the AM peak and two approaches with over-capacity queues; the AM peak hours have LOS F. It functions similarly to Alternative 2.

Sunrise Intersection 37: 82nd Ave / I-205 SB On-Ramp

Alternative 2 meets all operational standards.

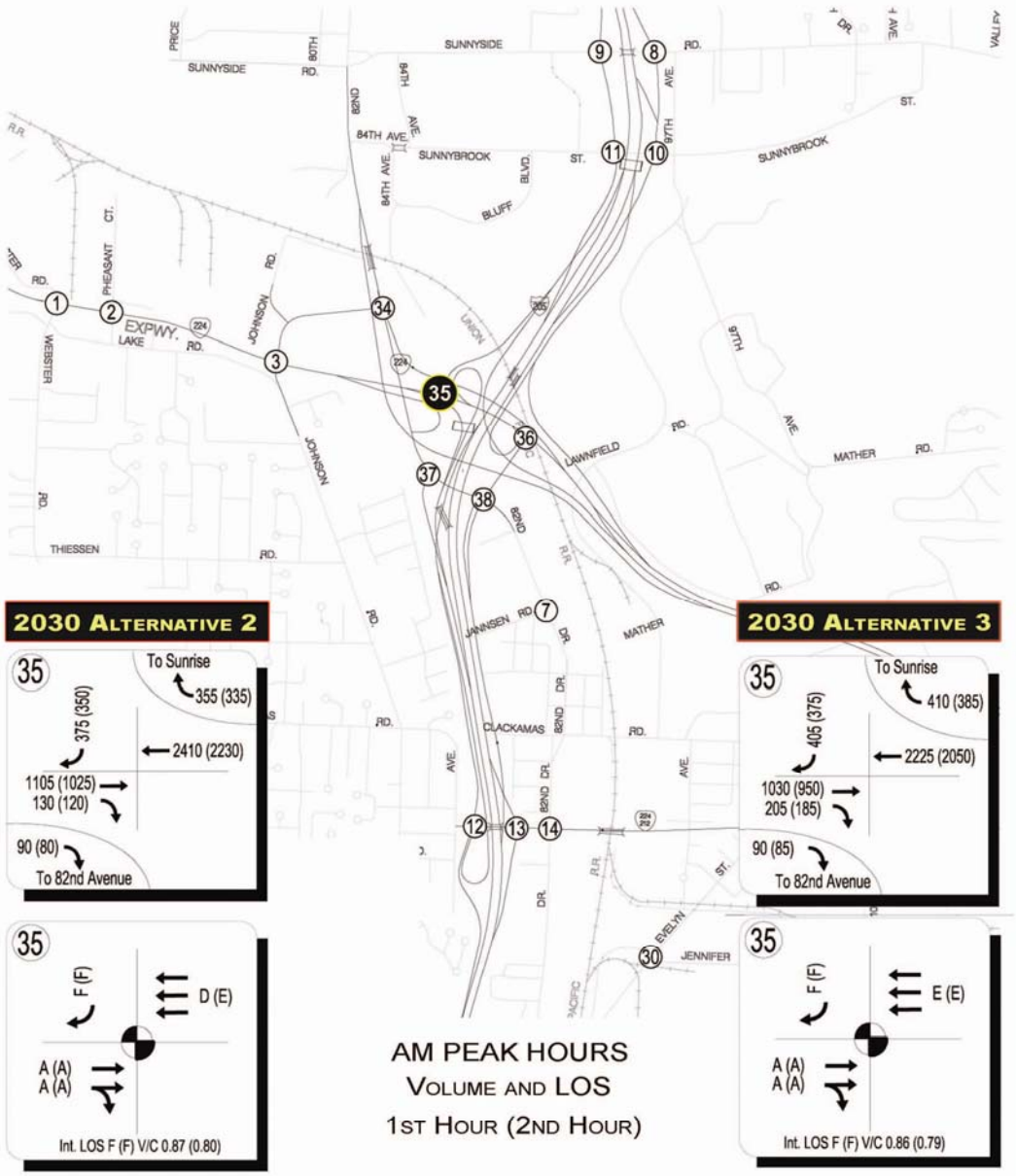
Alternative 3 meets all operational standards, although one approach had an over-capacity queue in the PM peak period.

Sunrise Intersection 38: 82nd Ave / I-205 NB Off-Ramp

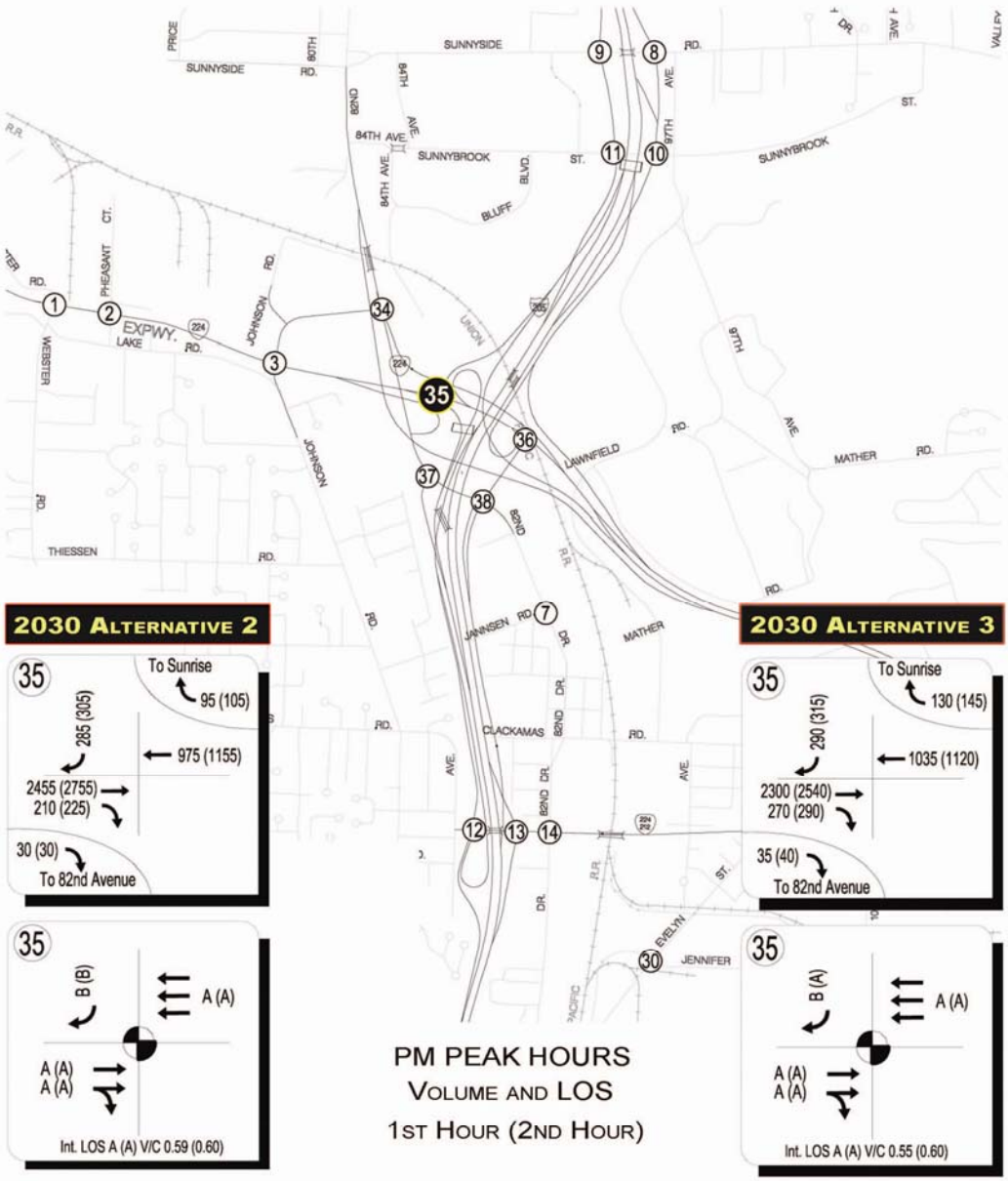
Alternative 2 meets operational standards.

Alternative 3 meets operational standards, although one approach had over capacity queue and 2 individual lanes had long delays during the PM peak period.

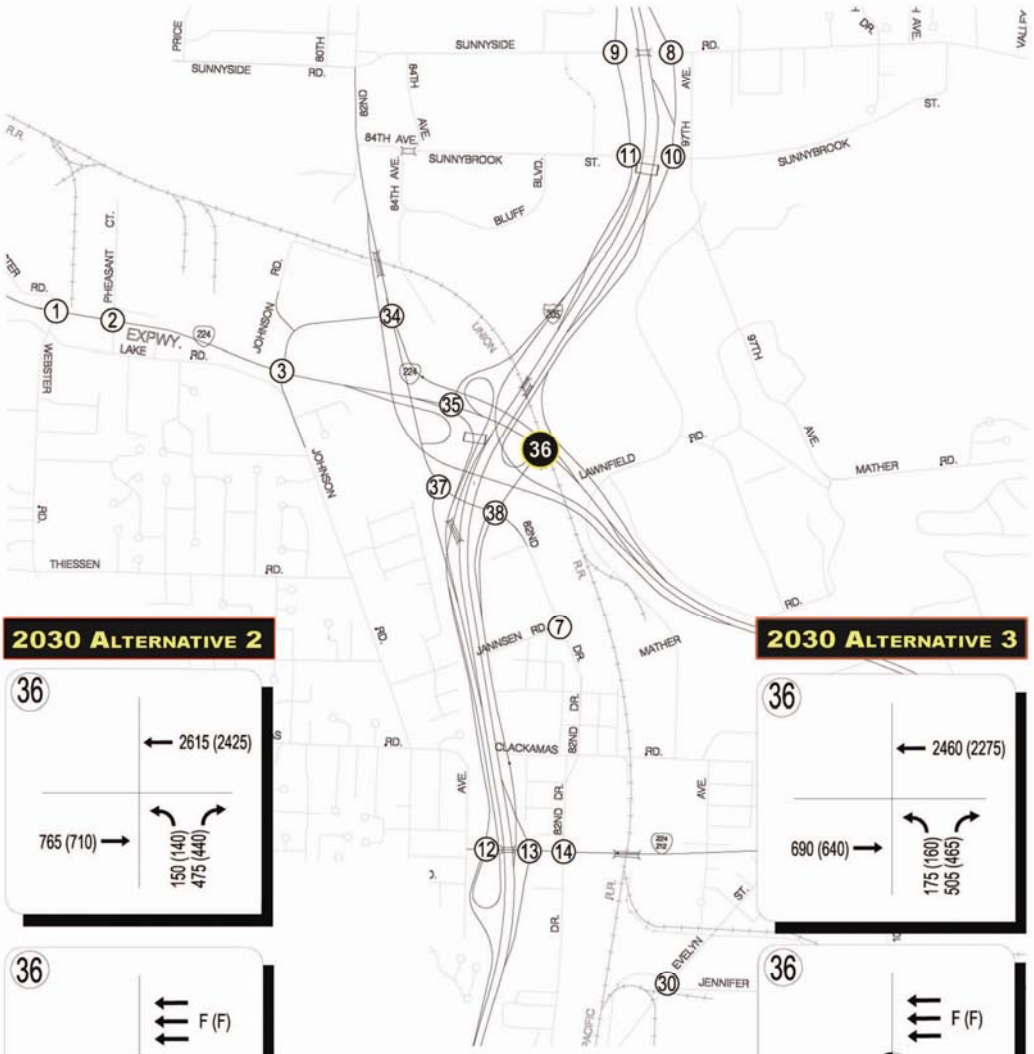
SUNRISE WB RAMP TO I-205 INTERSECTION (SUNRISE SDEIS #35)



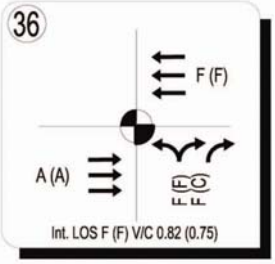
SUNRISE WB RAMP TO I-205 INTERSECTION (SUNRISE SDEIS #35)



I-205 NB RAMP TO SUNRISE INTERSECTION (SUNRISE SDEIS #36)



2030 Alternative 2



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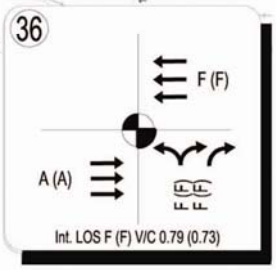
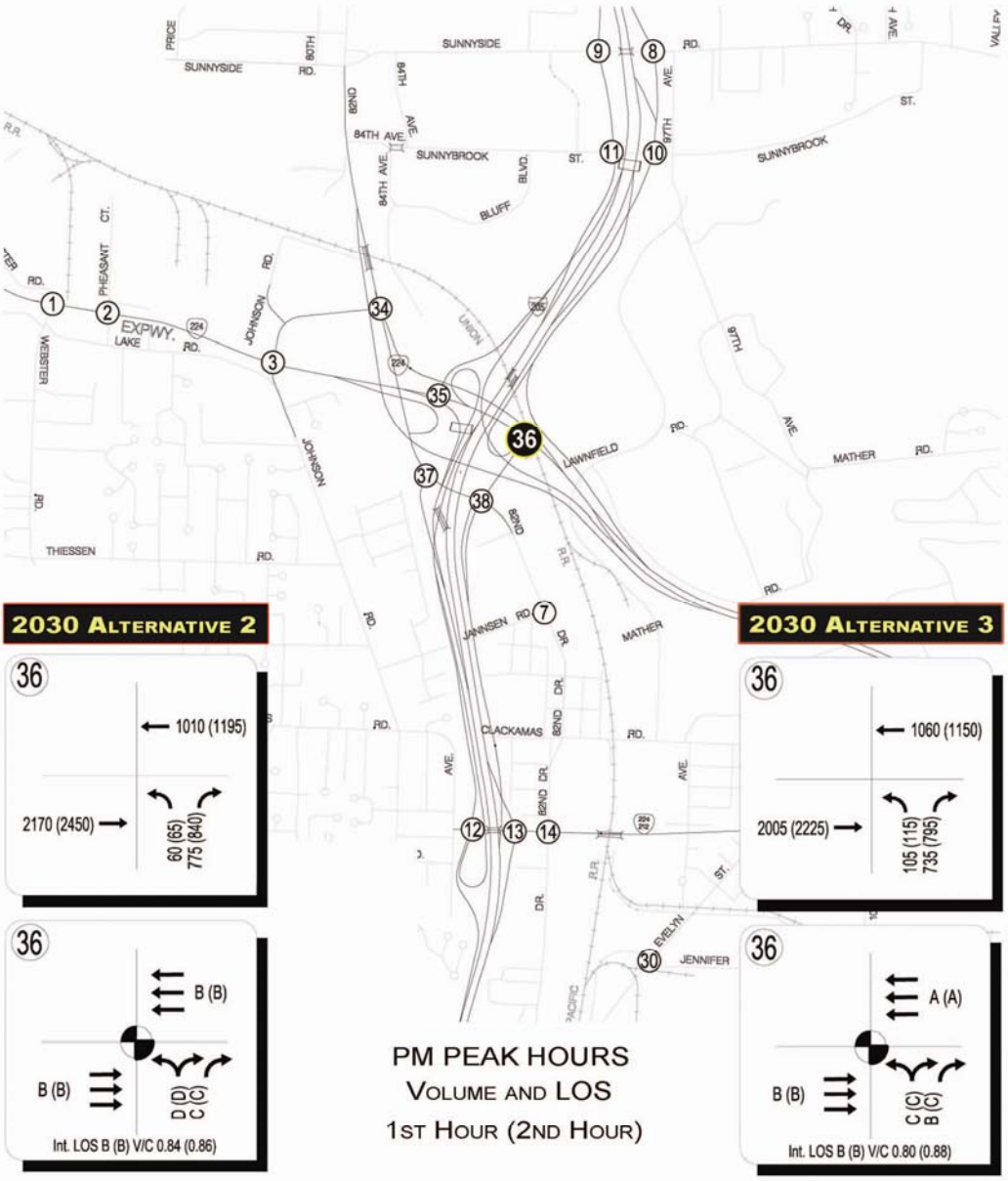


AM PEAK HOURS
VOLUME AND LOS
1ST HOUR (2ND HOUR)

I-205 NB RAMP TO SUNRISE INTERSECTION (SUNRISE SDEIS #36)

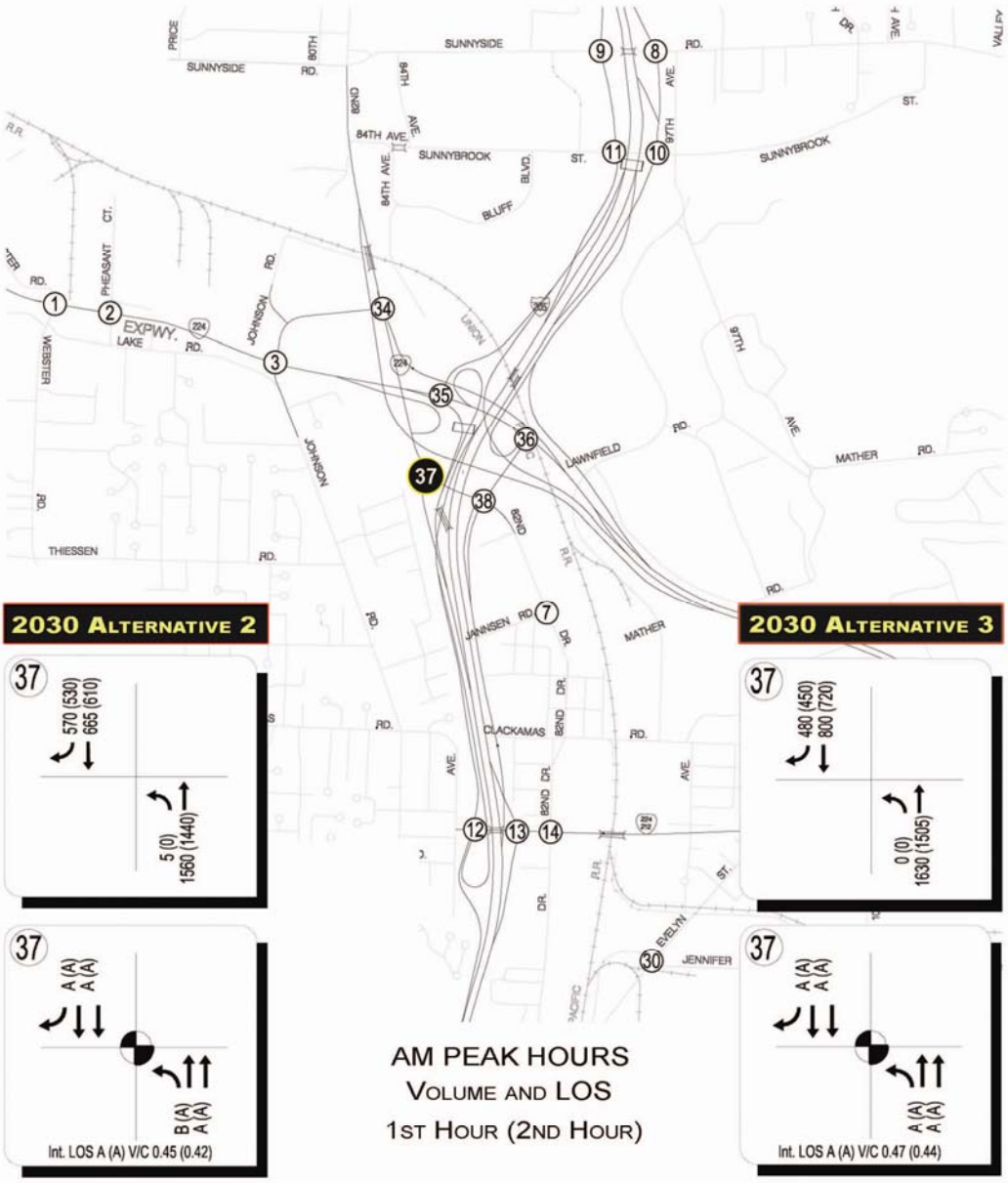


2030 Alternative 2

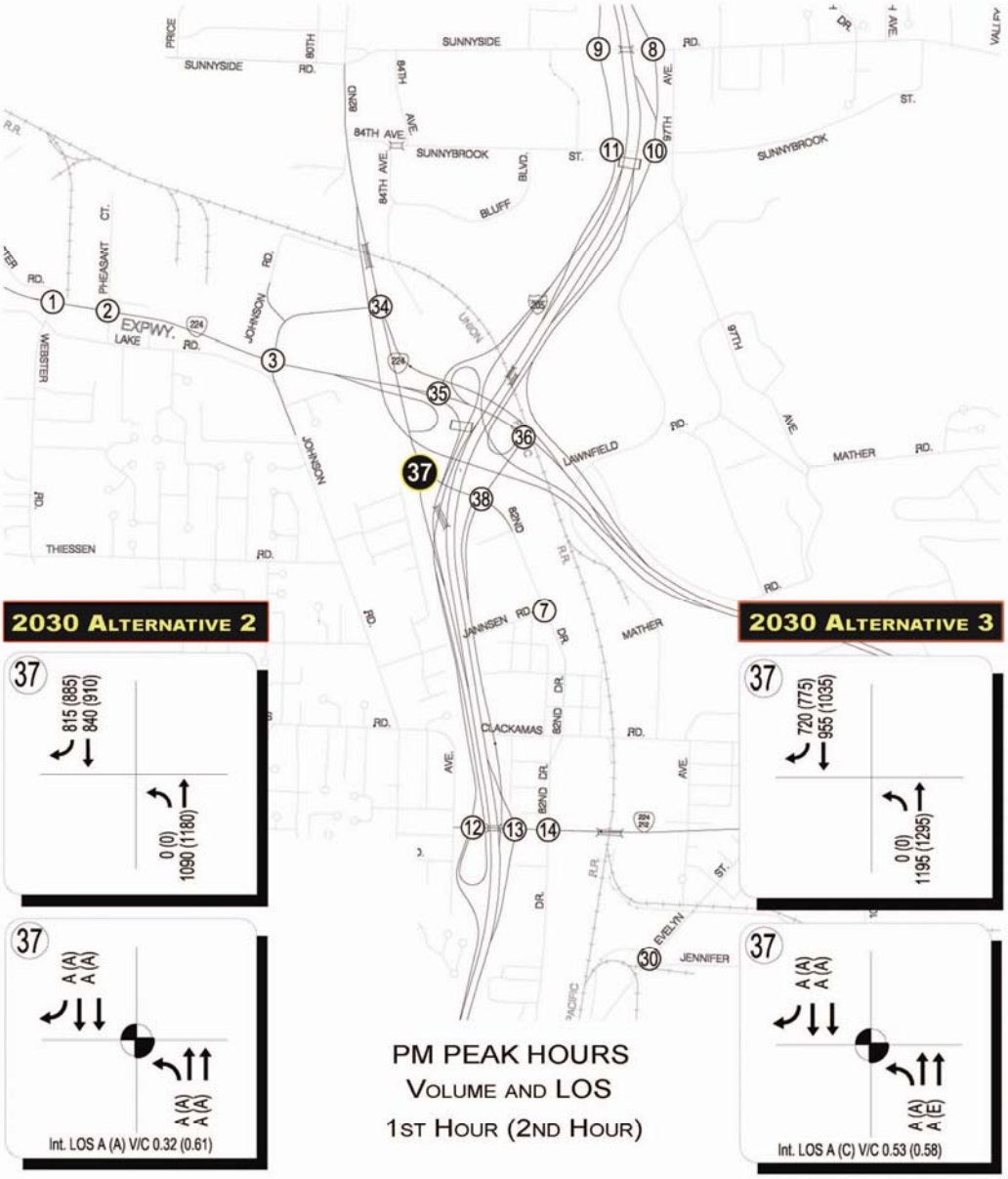
2030 Alternative 3

PM PEAK HOURS
VOLUME AND LOS
1ST HOUR (2ND HOUR)

82ND AVE SB RAMP TO I-205 INTERSECTION (SUNRISE SDEIS #37)



82ND AVE SB RAMP TO I-205 INTERSECTION (SUNRISE SDEIS #37)

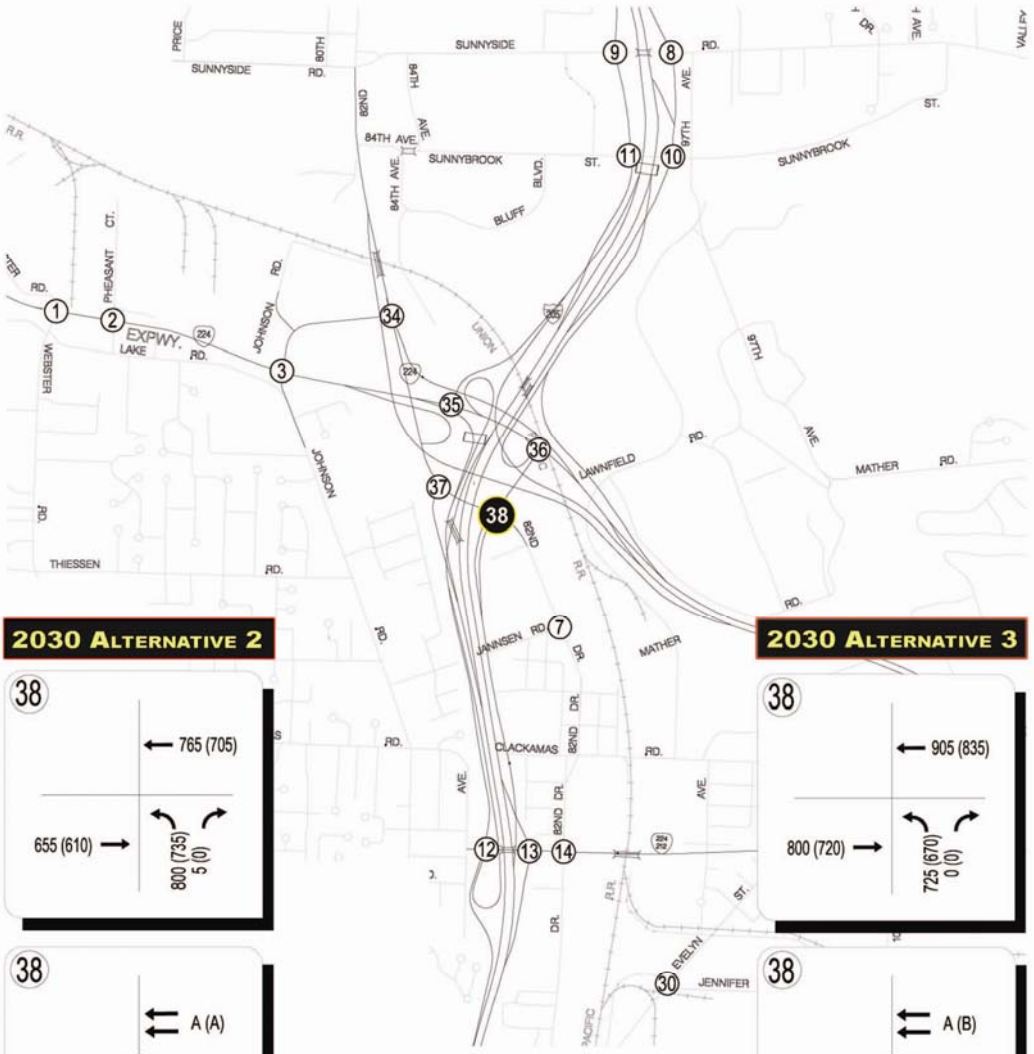


2030 Alternative 2

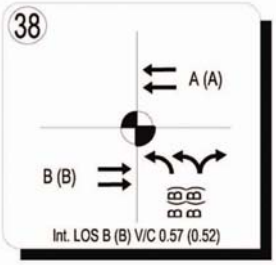
2030 Alternative 3

PM PEAK HOURS
VOLUME AND LOS
1ST HOUR (2ND HOUR)

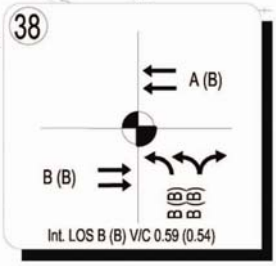
I-205 NB RAMP TO 82ND AVE INTERSECTION (SUNRISE SDEIS #38)



2030 Alternative 2

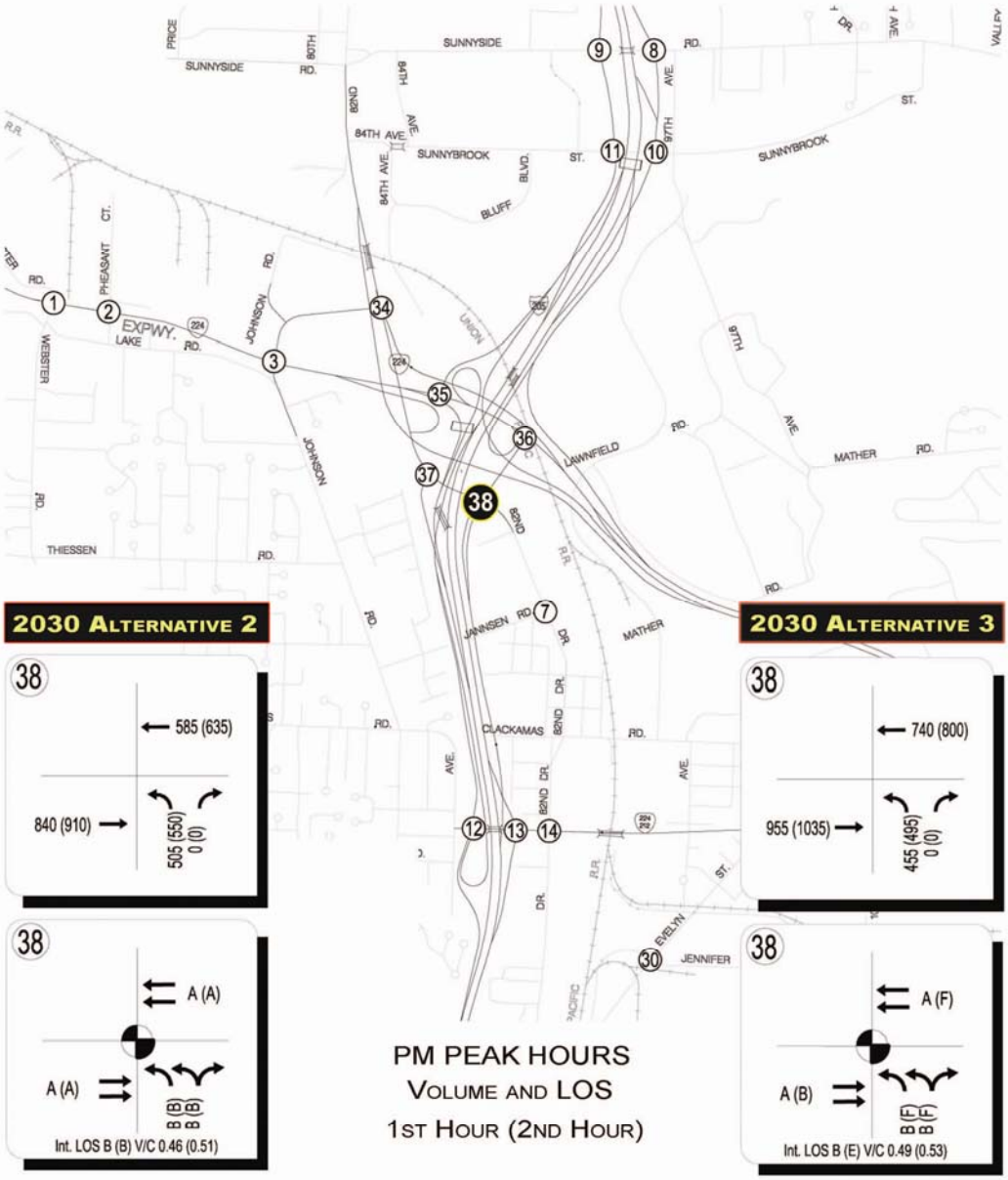


2030 Alternative 3



AM PEAK HOURS
VOLUME AND LOS
1ST HOUR (2ND HOUR)

I-205 NB RAMP TO 82ND AVE INTERSECTION (SUNRISE SDEIS #38)



Sunrise West Alternative Refinements

The Sunrise West IAMP considered a variety of major Sunrise Project Alternative Refinements in order to solve transportation problems identified during the Sunrise Project SDEIS process.

SDEIS Traffic Options Report

The following section is taken from the SDEIS Traffic Options Report by David Evans and Associates, Inc, August 2009.

82nd Drive/OR 212 Refinement

The intersection of 82nd Drive at OR 212 is the most influential bottleneck within the SDEIS study area in the year 2030. The SDEIS design at this intersection, shown at the right in FIGURE 1-1 is an improvement over the existing design, but would not meet any applicable jurisdictional standards in the design year (2030). Notice the eight-lane cross section on the north approach, the ten-lane cross section on the west approach, the five-lane plus median cross section on the south approach, and the seven-lane plus median cross section on the east approach.

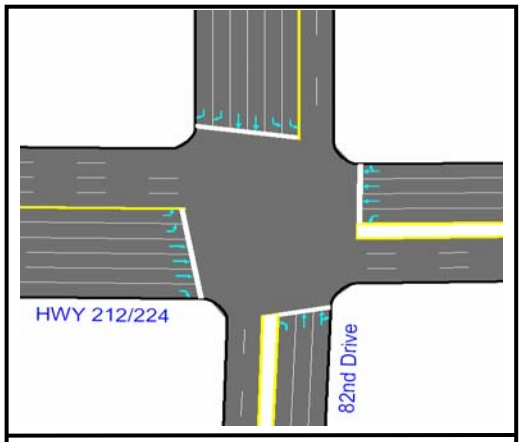


FIGURE 1-1 – 82nd Drive at OR 212/224 - SDEIS Lane Configurations

Traditional traffic engineering would suggest that additional capacity at the intersection be supplied via additional lanes. However, as transportation systems and individual intersections reach their capacity, new innovative approaches have to be sought, beyond capacity improvements, to provide additional or alternative access, mobility, and route choice.

There are four distinct improvements studied in this section:

1. Adding capacity via a third westbound lane between 102nd Avenue and 82nd Drive (also providing a dedicated westbound right turn lane at 82nd Drive).
2. Limiting access by restricting all left-turn movements at the 82nd Drive/OR 212 intersection and providing alternative access via signalized intersections with potential for U-turns along 82nd Drive at Clackamas Road and the north Fred Meyer access.
3. Rerouting the northbound and southbound through trips to a new bypass road that would be east of and parallel to 82nd Drive. Removing a signal phase from the intersection and allowing the remaining signal phases to use the additional capacity.
4. Grade separating the northbound and southbound through trips under the existing intersection. Again, removing a signal phase from the intersection and allowing the remaining signal phases to use the additional capacity.

The following is a list of assumptions that were made to complete the analysis of the four 82nd Drive improvement scenarios:

- The Lawnfield north connection between the Lawnfield Industrial Area and Sunnybrook Boulevard is constructed,
- The Tolbert Road bridge over the Union Pacific Railroad tracks has been constructed between 82nd Drive and Industrial Way,
- The intersection of Tolbert Road at 82nd Drive is signalized,

- The intersection at the southern Fred Meyer access is signalized, and
- A raised median is present on 82nd Drive between the north Fred Meyer intersection (south of OR 212) and Clackamas Road (north of OR 212), restricting all left turns along this stretch of 82nd Drive.

For the methodology and data sources used for the four studies in this 82nd Drive/OR 212 Refinement study, please reference Section 4 of the Transportation Technical Report for the "Sunrise Expressway, I-205 to Rock Creek Junction (OR 212/224)."

For the standards used for the four studies in this 82nd Drive/OR 212 Refinement study, please reference Section 4.6 of the Transportation Technical Report for the "Sunrise Expressway, I-205 to Rock Creek Junction (OR 212/224)."

Table 1-1 lists mitigations that were briefly studied and eliminated from consideration.

Table 1-1: 82nd Drive – Scenarios Not Carried Forward

Scenario	Reason for Dismissal
Closure of 82nd Drive at OR 212/224	Not practical due to: Traffic Operational Problems & Impacts to Local Businesses
Restrict north and southbound left turns	Not practical due to: Traffic Operational Problems
Restrict east and westbound left turns	Not practical due to: Traffic Operational Problems
SDEIS Design	Not practical due to: Traffic Operational Problems
Dual left turns on all approaches (Above SDEIS Improvements)	Not practical due to: Traffic Operational Problems
Jug handles in each quadrant – No left turns at 82nd Drive	Not practical due to: Design and Weaving Problems
Jug handles in NE and SW quadrants only – Left turns only allowed WB > SB and EB > NB	Not practical due to: Design and Weaving Problems
Require all trucks to use the Gladstone interchange	Not practical due to: Enforcement Issues & May require improvements to Gladstone interchange.
Add local road connections over I-205 at Clackamas Road and Roots Road	Not practical due to: Design Problems
Restrict all left turns – Provide no additional alternative routes	Not practical due to: Out-of-Direction Travel & Impacts to Local Businesses

Third Westbound Lane Between 102nd Ave and 82nd Drive

Introduction

This section summarizes the impacts to the 82nd Drive /OR 212 intersection if a third westbound lane were constructed between 102nd Avenue and 82nd Drive. Incorporated into this design would be an additional westbound right-turn lane that would allow the large turning volume to not conflict with the large through movement volume.

This analysis is based on a design year (2030) assuming Sunrise Alternative 2. This Alternative was chosen because it represents the preferred alternative that will be advanced into the FEIS. Operations in earlier years and other hours of the day are expected to be better than described below.

Results

While this improvement does lower the OR 212/82nd Drive intersection volume-to-capacity (V/C) ratio, delay, and travel time, and does increase the total number of vehicles served, it does not allow the intersection to meet any established jurisdictional standards.

Table 1-2 shows multiple methods of evaluation for the current SDEIS design and the three westbound lanes design.

Table 1-2: 82nd Drive – Intersection Operations for the Third Westbound Lane

Scenario	Two Westbound Lanes		Three Westbound Lanes	
	AM	PM	AM	PM
V/C – Overall Intersection	0.98	1.13	0.83	1.13
V/C – Westbound Approach	1.06	0.90	0.87	0.84
Delay per Vehicle – Overall Intersection	231 sec	196 sec	113 sec	158 sec
Delay per Vehicle – Westbound Approach	788 sec	342 sec	218 sec	151 sec
LOS – Overall Intersection	F	F	F	F
LOS – Westbound Approach	F	F	F	F
Vehicles Served – Overall Intersection	4,171	5,250	4,875	6,500
Vehicles Served – Westbound Approach	888	1,175	1,425	1,475

Source: DEA Synchro/SimTraffic modeling tool

Summary of Findings

Overall the third westbound lane improvement would significantly reduce the signalized delay associated with the 82nd Drive/OR 212 intersection, and allow the intersection to process more traffic. That said, this intersection is not expected to meet any jurisdictional standards, even with the addition of the third westbound lane project.

82nd Drive – No Left Turns

Introduction

This section summarizes the impacts to the 82nd Drive corridor along OR 212 if all left-turn movements were restricted at the 82nd Drive /OR 212 intersection. By removing all left turns from the intersection, four of the eight phases are removed and the intersection can process a higher number of vehicles, because there is less time lost to yellow and red transitions between phases and the green time from the left-turn phases is transferred to the through movements, which can move more traffic per second than turning movements.

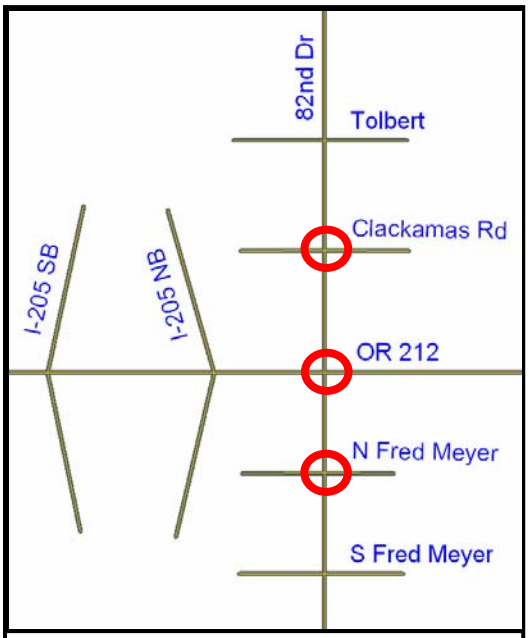


FIGURE 1-2 – No Left Turns – General Schematic

Two scenarios were analyzed that had no operational or design problems, and both incorporated the removal of all left-turns at the 82nd Drive/OR 212 intersection:

- Provide U-turn capabilities via multi-lane roundabouts (2-plus lanes) on 82nd Drive at Clackamas Road and the north Fred Meyer access.
- Provide U-turn capabilities via signalized intersections on 82nd Drive at Clackamas Road and the north Fred Meyer access.

FIGURE 1-2 shows a generalized schematic of the options with no left turns. The three intersections circled in red have lane configurations that are dependent upon which left-turn scenario is being studied.

Smaller additional projects are assumed to be constructed and in place in the analysis of these scenarios. They are:

- A third westbound lane (studied in **Section 1.1**) between 102nd Avenue and 82nd Drive along OR 212. This project would allow the high westbound right-turning volume to not delay the through movement vehicles.
- A Tolbert bridge connection between 82nd Drive and Industrial Way that is grade separated over the Union Pacific Railroad tracks.
- A north Lawnfield Road connection between Lawnfield Road/98th Court and Sunnybrook Boulevard/97th Avenue. This project would replace the current section of Lawnfield Road between 98th Court and 97th Avenue with a new roadway that is traversable by heavy trucks.
- Installation of a traffic signal at the intersection of Tolbert Road at 82nd Drive.

Three additional options were analyzed that were dismissed for either design or operational problems; all three incorporated the removal of all left-turns at the 82nd Drive/OR 212 intersection:

- Provide no U-turn capabilities north or south of OR 212 along 82nd Drive.
  - This option was dismissed for two reasons—the amount of out-of-direction travel that would have to occur within the study area and the associated impacts to local businesses.
- Provide U-turn only roundabouts north and south of OR 212 along 82nd Drive.
  - This option was dismissed for two reasons—the close spacing between the signals and the roundabouts causes many queuing problems that are of concern with roundabouts, and the overcapacity operations of the multi-lane U-turn roundabouts.

- Provide U-turn capabilities via 2-lane roundabouts on 82nd Drive at Clackamas Road and the north Fred Meyer access.
    - This option was dismissed due to overcapacity operations of the 2-lane U-turn roundabouts.

Intersection Designs

OR 212 at 82nd Drive

The intersection of OR 212 at 82nd Drive has approach volumes that would not allow for a roundabout to operate acceptability; therefore, a signalized intersection was analyzed under both scenario.

Under the signalized scenario, the intersection would have a six-lane cross section with a median on the north approach, a seven-lane cross section on the east approach, a five-lane cross section with a median on the south approach, and a seven-lane cross section on the west approach. The dual northbound left turns at Clackamas Road and the dual southbound left-turn lanes at the north Fred Meyer access require wide medians on the north and south sides of the OR 212 at 82nd Drive intersection.

The roundabout scenario would have the same cross sections on the north, east, and west approaches as the signalized scenario. With the three southbound through lanes on 82nd Drive, the south approach to this intersection would require three receiving lanes. **FIGURE 1-3** shows the generalized lane configurations.

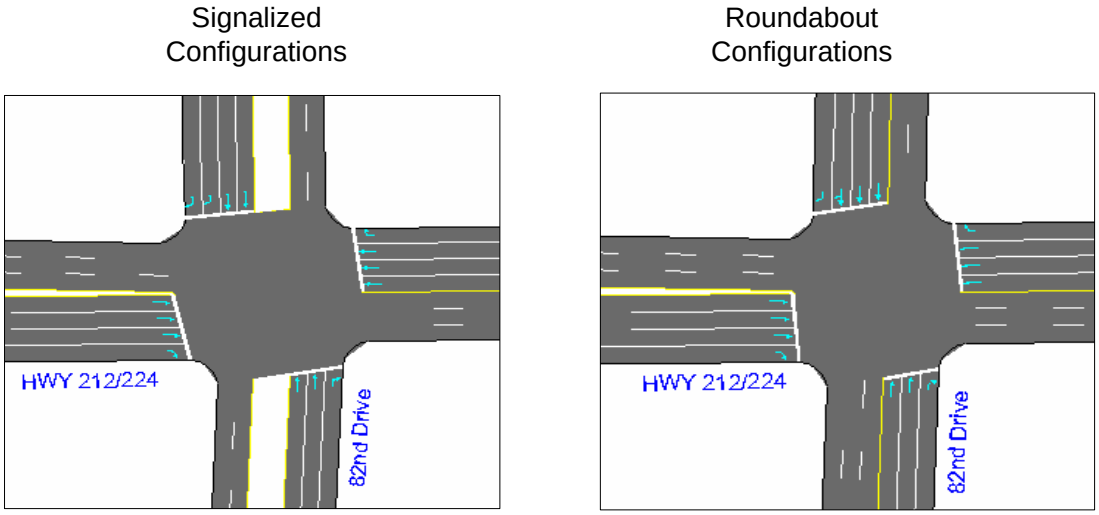


FIGURE 1-3 – No Left Turns – Lane Configurations at OR 212 – Signalized Intersections

Clackamas Road at 82nd Drive

The intersection of Clackamas Road at 82nd Drive was analyzed as a signalized intersection and as a roundabout.

The signalized controlled intersection would require a five-lane cross section with a median on the north approach, a three-lane cross section on the east approach, a six-lane cross section on the south approach, and a four-lane cross section on the west approach. The south approach would need to have dual northbound left-turn lanes where the innermost lane would allow U-turns for ALL vehicles, including trucks. This configuration would necessitate dual receiving lanes on the west leg of the intersection. To allow large trucks to safely navigate the U-turn, a large, traversable truck apron would need to be constructed on the southwest corner of the intersection. **FIGURE 1-4** shows the truck apron at Clackamas Road; it is highlighted in yellow.

FIGURE 1-4 – No Left Turns – Example Truck Apron for Signalized Intersections

The roundabout-controlled intersection would require a five-lane cross section on the north approach, a two-lane cross section on the east approach, a five-lane cross section on the south approach, and a two-lane cross section on the west approach. 82nd Drive would need to have three southbound lanes to allow a roundabout to function and not cause unnecessary delay at this location. The three southbound lanes on 82nd Drive would necessitate a roundabout that has three circulating lanes on the west side. ODOT and Clackamas County do not have guidelines for roundabouts larger than two lanes. **FIGURE 1-5** shows the generalized lane configurations.

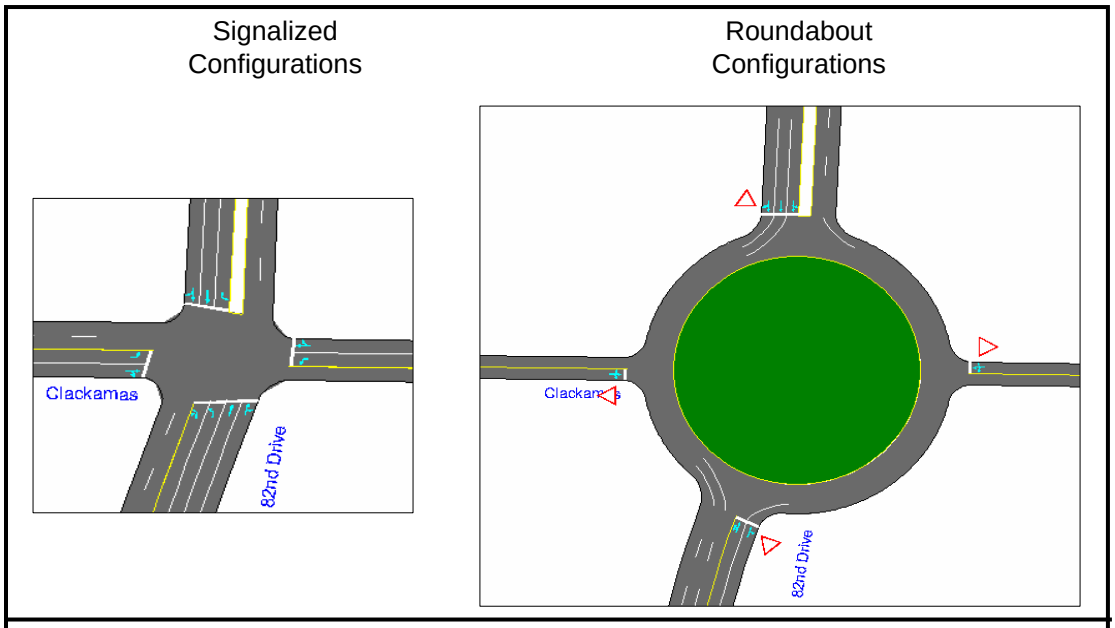


FIGURE 1-5 – No Left Turns – Lane Configurations at Clackamas Road – Signalized Intersections and Roundabouts

North Fred Meyer Access at 82nd Drive

The intersection along 82nd Drive at the north Fred Meyer access was analyzed as a signalized intersection and as a roundabout.

The signalized intersection would require a five-lane cross section on the north approach, a four-lane cross section with a median on the east approach, a five-lane cross section with a median on the south approach, and a four-lane cross section on the west approach. The north approach would need to have dual southbound left-turn lanes where the innermost lane would allow U-turns for ALL vehicles, including trucks. This configuration would necessitate dual receiving lanes on the east leg of the intersection. To allow large trucks to safely navigate the U-turn, a large truck apron would need to be constructed on the northeast corner of the intersection. **FIGURE 1-6** shows the truck apron at the north Fred Meyer access; it is highlighted in yellow.

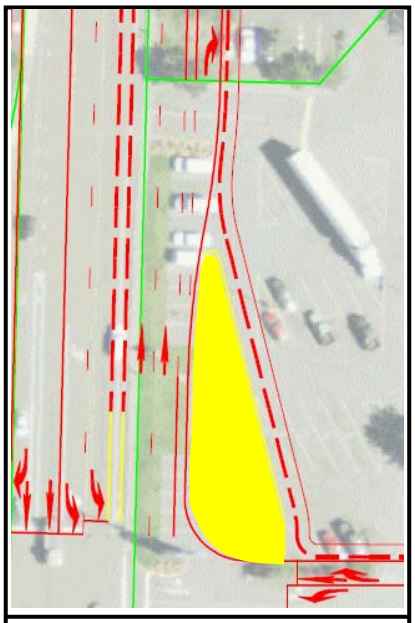


FIGURE 1-6 – No Left Turns – Example Truck Apron for Signalized Intersections

The roundabout-controlled intersection would require a five-lane cross section on the north approach, a two-lane cross section on the east approach, a five-lane cross section on the south approach, and a two-lane cross section on the west approach. 82nd Drive would need to have three southbound lanes to allow a roundabout to function and not cause unnecessary delay at this location. The three southbound lanes on 82nd Drive would necessitate a roundabout that has three circulating lanes on the west side. ODOT and Clackamas County do not have guidelines for roundabouts larger than two lanes. **FIGURE 1-7** shows the generalized lane configurations.

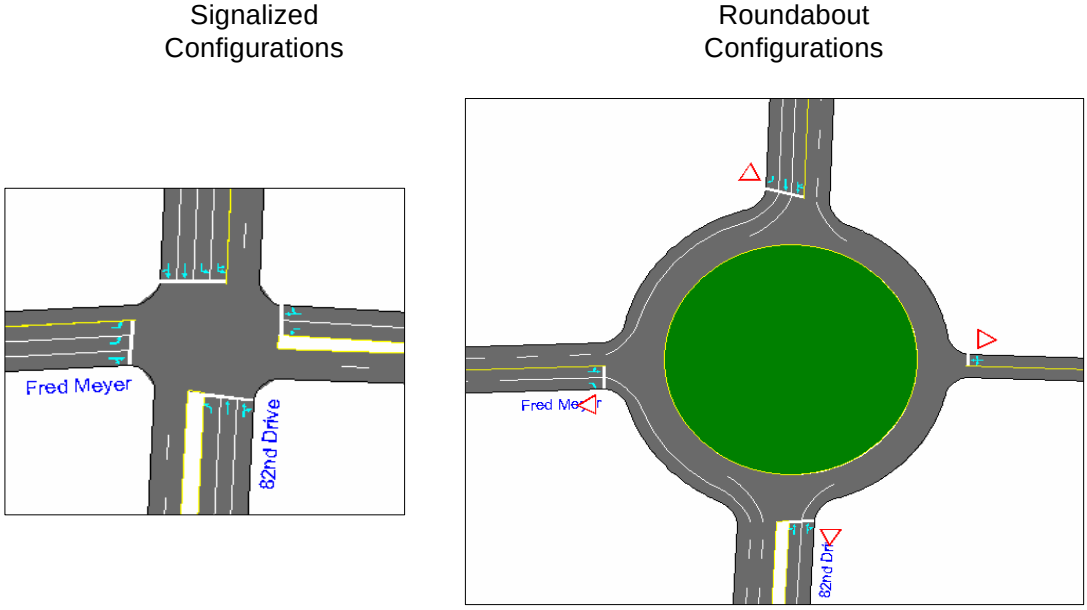


FIGURE 1-7 – No Left Turns – Lane Configurations at the North Fred Meyer Access – Signalized Intersections and Roundabouts

Operational Results

Originally the roundabouts were analyzed as two-lane roundabouts and were found to have V/C ratios in excess of 1.00 and in the case of the north Fred Meyer access, in excess of 1.75. This led to the additional southbound through lane on 82nd Drive. The operational results shown in **Table 1-3** are for the lane configurations described in **Sections 1.2.1 and 1.2.2** and shown in **FIGURES 1-2 through 1-7.**

Under both configurations in the AM and PM peak hours, the intersections along the 82nd Drive corridor operate within Clackamas County standards for industrial areas at Level of Service (LOS) E or better. V/C ratios are slightly higher than optimal under both the roundabout and the signalized configurations in the PM peak hour. As volumes approach capacity, a roundabout will start to break down faster than a signalized intersection and could create gridlock whereas a signalized intersection may continue to function on some level.

Table 1-3: 82nd Drive – Intersection Operations for No Left Turns

	Signalized Configurations		Roundabout Configurations	
Scenario	AM	PM	AM	PM
82nd Dr. at Tolbert Rd				
V/C ratio	0.48	0.66	0.48	0.66
Delay per Vehicle (Sec)	35.0	34.2	32.5	32.9
Level of Service	D	C	C	C
82nd Dr. at Clackamas Rd				
V/C ratio	0.52	0.78	0.66*	0.76*
Delay per Vehicle (Sec)	24.8	56.0	8.4*	10.2*
Level of Service	C	E	A*	B*
82nd Dr. at OR 212				
V/C ratio	0.73	0.83	0.73	0.74
Delay per Vehicle (Sec)	20.4	59.9	25.2	67.7
Level of Service	C	E	C	E
82nd Dr. at north Fred Meyer Access				
V/C ratio	0.61	0.79	0.71*	0.69*
Delay per Vehicle (Sec)	40.5	35.5	11.9*	10.5*
Level of Service	D	D	B*	B*
82nd Dr. at south Fred Meyer Access				
V/C ratio	0.46	0.62	0.46	0.62
Delay per Vehicle (Sec)	25.4	28.4	21.9	31.6
Level of Service	C	C	C	C

Source: DEA Synchro/SimTraffic modeling tool

* Source: DEA Sidra Intersection modeling tool for roundabouts

Two different configurations were studied for the signalized U-turns intersection design. The first configuration incorporated a dedicated U-Turn trap lane and a dedicated left-turn lane. This configuration is thought to violate driver expectation as well as create a potential safety concern for drivers who would want to be turning left and would be in the left-most U-turn trap lane. The second configuration incorporated a shared left-turn/U-turn lane along with a dedicated left-turn lane scenario. In this scenario, it is necessary to have dual receiving lanes on the minor leg. The dual lanes would need to be only a few hundred feet long at most to allow turning vehicles to merge safely into a single lane after navigating the turn.

Alternative Route Choices

In restricting left-turn movements at the 82nd Drive /OR 212 intersection, it is expected that not all vehicles will divert to the U-turn areas provided. Some will choose alternative routes that still serve their destinations. **FIGURES 1-8 through 1-11** show the alternative routes for each of the left-turn movements that would be restricted. The red lines show the left turn that is being replaced, with alternative routes shown as blue lines.

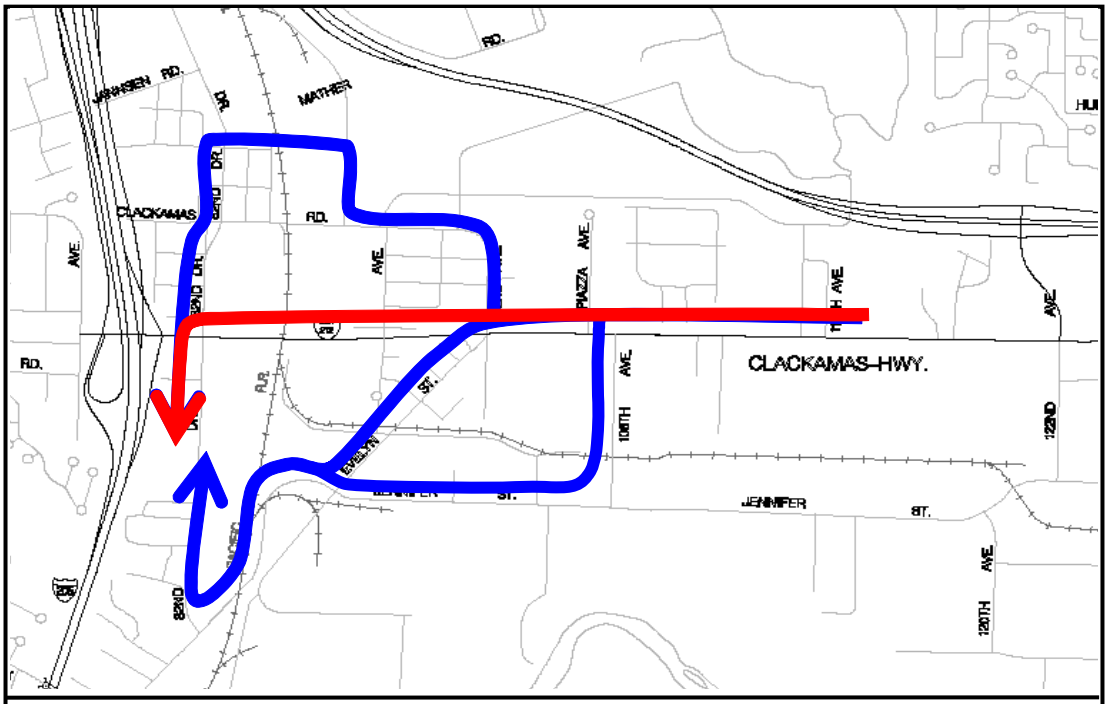


FIGURE 1-8 – No Left Turns – Alternative Westbound Left-Turn Routes

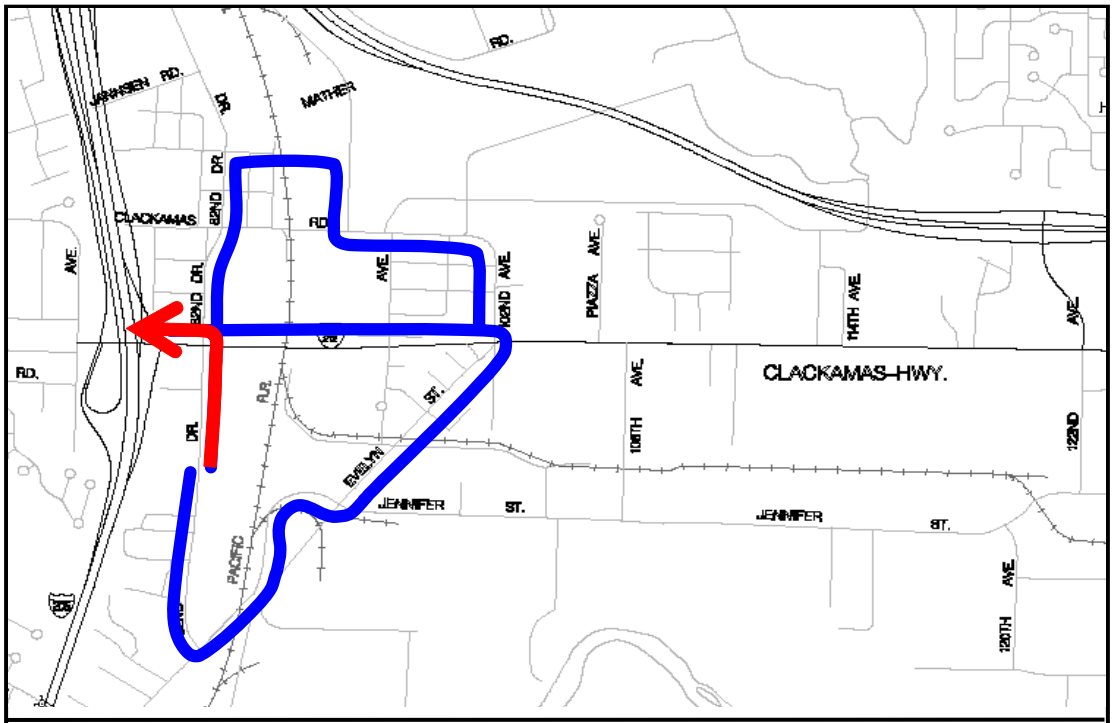


FIGURE 1-9 – No Left Turns – Alternative Northbound Left-Turn Routes

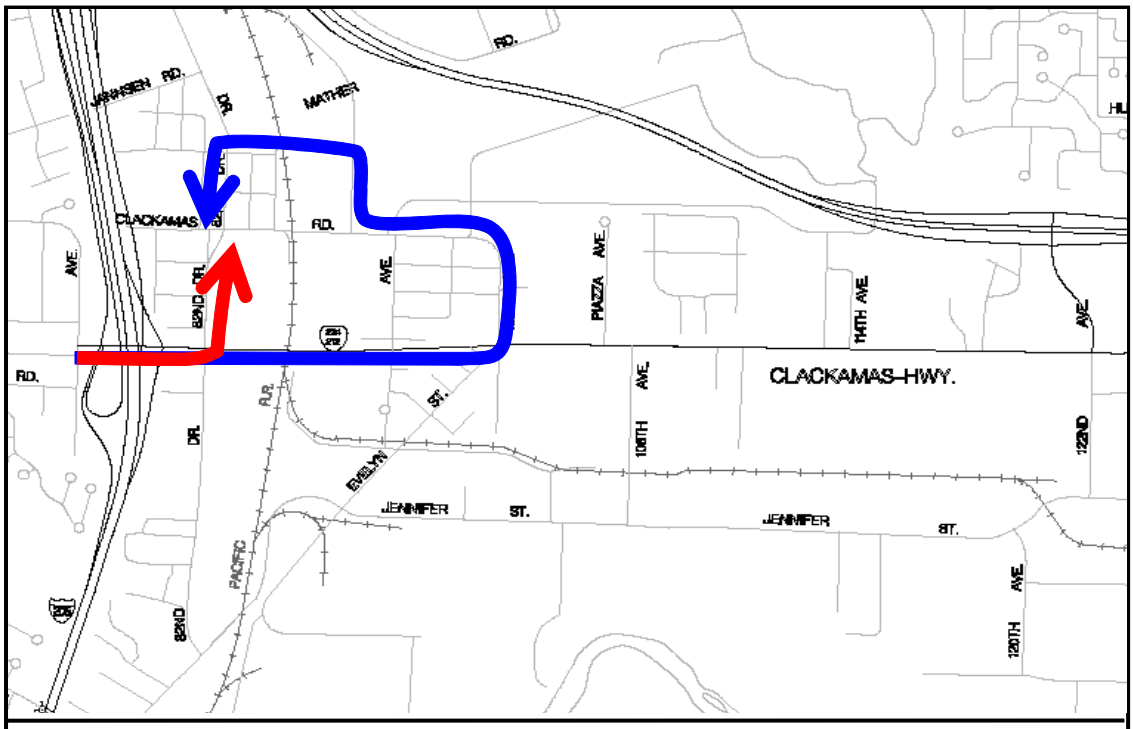


FIGURE 1-10 – No Left Turns – Alternative Eastbound Left-Turn Routes

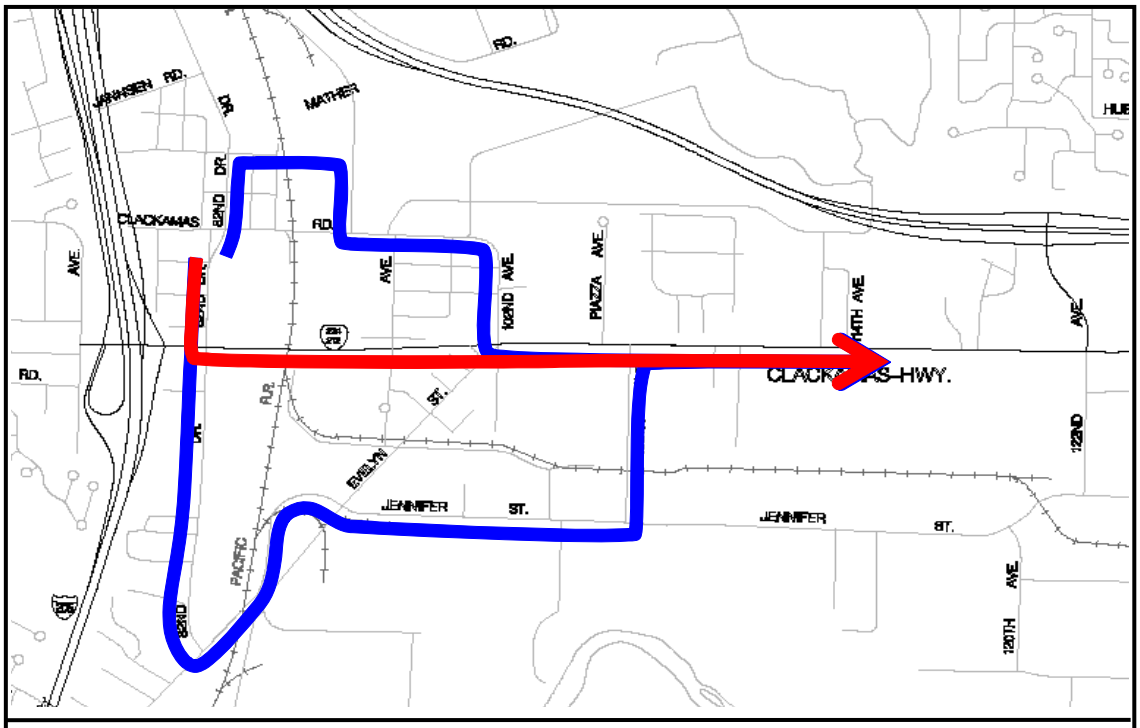


FIGURE 1-11 – No Left Turns – Alternative Southbound Left-Turn Routes

There are viable alternative routes for each of the four left-turn movements that are proposed to be restricted with the no-left-turn scenarios.

Travel Times

Table 1-4 compares the travel times of the no-left-turns scenarios, for the four routes shown above in **FIGURES 1-8 through 1-11,** with those of the SDEIS Alternative 2 scenario.

Table 1-4: 82nd Drive – Travel Times for No Left Turns

Travel Time (minutes)	SDEIS		No Left Turns	
	AM	PM	AM	PM
Westbound Left	**28**	**17**	**5 ½**	**7**
Northbound Left	**10**	**12**	**3**	**3 ½**
Eastbound Left	**3 ½**	**2 ½**	**2 ½**	**2 ½**
Southbound Left	**3**	**5**	**4**	**4 ½**

Source: DEA Synchro/SimTraffic modeling tool

The travel times for the no-left-turns scenarios assume that the drivers will use the U-turn intersections provided at Clackamas Road and the north Fred Meyer signals. Six of the eight travel times compared in **Table 1-4** are faster under the no-left-turns scenario than they are in the SDEIS. The westbound left turn is improved by over 20 minutes in the AM peak hour, by removing the left turns at 82nd Drive and redirecting drivers to make a legal U-Turn at Clackamas Road. The only travel time that is either the same or longer with the no-left-turn scenario is the southbound left turn in the AM peak hour. While this travel time does increase, it only increases by an average of one minute.

82nd Drive – Bypass Road

Introduction

This section summarizes the impacts to the 82nd Drive corridor along OR 212 if a bypass road were constructed to the east of the existing 82nd Drive alignment near the Union Pacific Railroad tracks. With the addition of a bypass road, all of the northbound and southbound through trips that are expected to cross the intersection of OR 212 at 82nd Drive would be on an alternate road and bypass this intersection altogether. With all of the through movements removed from the intersection, two phases of the eight-phase signal are removed and the intersection can process a higher number of vehicles because there is less time lost to yellow and red transitions between phases as well as reallocation of green time to through movements, which can move more traffic per second than turn movements. **FIGURE 1-12** shows a generalized schematic for the bypass road scenario. The two intersections circled in red are assumed to be roundabouts in this scenario.

Smaller additional projects are assumed to be constructed and in place in the analysis of this scenario. They are:

- A third westbound lane (studied in **Section 1.1**) between 102nd Avenue and 82nd Drive along OR 212. This project would allow the high westbound right-turning volume to not delay the through movement vehicles.
- A Tolbert bridge connection between 82nd Drive and Industrial Way that is grade separated over the Union Pacific Railroad tracks.
- A north Lawnfield Road connection between Lawnfield Road/98th Court and Sunnybrook Boulevard/97th Avenue. This project would replace the current section of Lawnfield Road between 98th Court and 97th Avenue with a new roadway that is traversable by heavy trucks.
- Installation of a traffic signal at the intersection of Tolbert Road and 82nd Drive.
- The north Fred Meyer access intersection would remain as a signalized intersection.

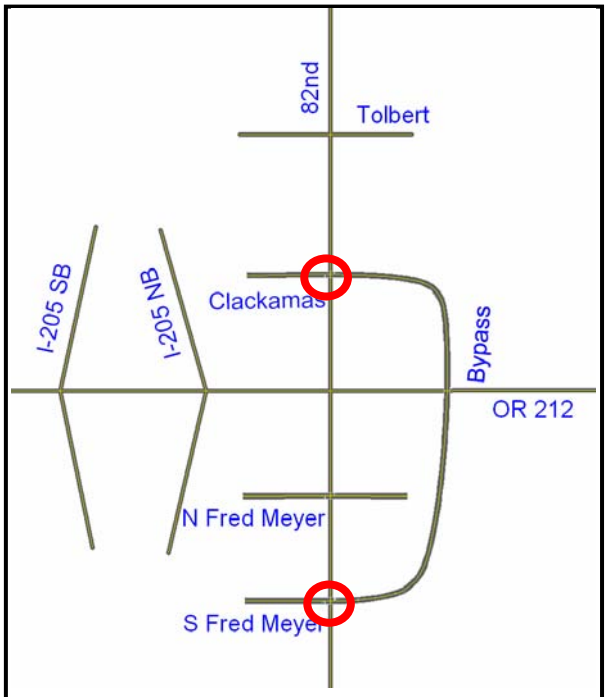


FIGURE 1-12 – Bypass Scenario – General Schematic

The portion of 82nd Drive between bypass road roundabouts would need to have at least a three-lane cross section and would operate most efficiently with a five-lane cross section. The bypass road itself would have a four-lane cross section.

Intersection Designs

OR 212 at 82nd Drive

The intersection of OR 212 at 82nd Drive has approach volumes that would not allow for a roundabout to operate at or below capacity; therefore, a signalized intersection was analyzed.

The intersection would have a four-lane cross section on the north approach, an eight-lane cross section with a median on the east approach, a four-lane cross section on the south approach, and a nine-lane

cross section on the west approach. The roundabouts at Clackamas Road and the south Fred Meyer access necessitate a nontraversable median along 82nd Drive between the two above-mentioned roundabouts. **FIGURE 1-13** shows the generalized lane configurations.

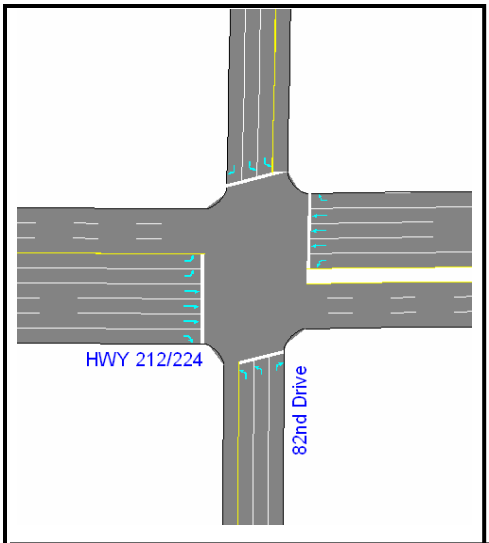


FIGURE 1-13 – Bypass Scenario – Lane Configurations at OR 212

Clackamas Road at 82nd Drive

The intersection of Clackamas Road at 82nd Drive was assumed to be a roundabout.

The roundabout-controlled intersection would require a four-lane cross section on the north approach, a four-lane cross section on the east approach, a three-lane cross section on the south approach, and a two-lane cross section on the west approach. 82nd Drive would need to have at least a three-lane cross section to the south of the roundabout. This roundabout design is fairly standard and would meet driver expectations for an urban roundabout. **FIGURE 1-14** shows the generalized lane configurations.

South Fred Meyer Access at 82nd Drive

The intersection along 82nd Drive at the south Fred Meyer access was analyzed as a roundabout in this scenario.

The roundabout-controlled intersection would require a three-lane cross section on the north approach, a four-lane cross section on the east approach, and a five-lane cross section on the south approach. 82nd Drive would need to have at least a three-lane cross section to the north of the roundabout. This is a somewhat standard three-leg roundabout design, and it would meet driver expectations for an urban roundabout. **FIGURE 1-15**, on the following page, shows the generalized lane configurations.

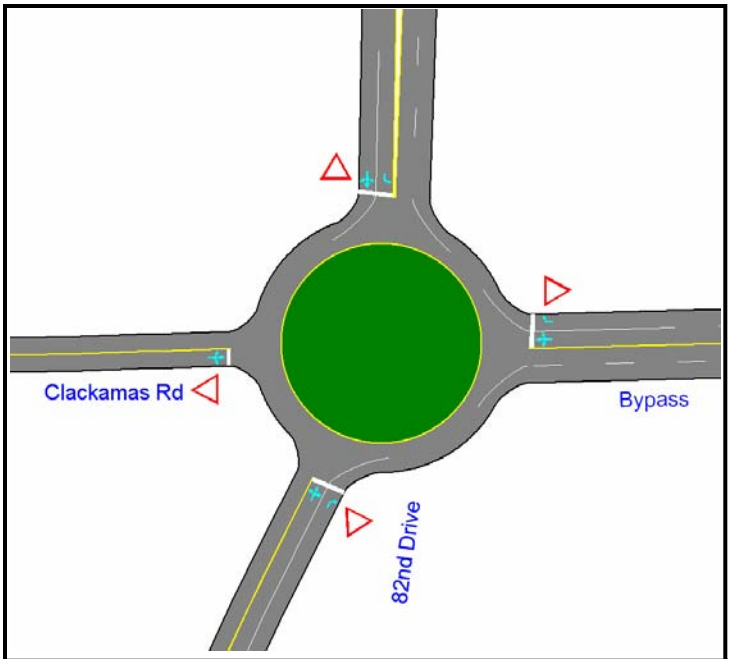


FIGURE 1-14 – Bypass Scenario - Lane Configurations at Clackamas Road

Operational Results

The bypass road operational results are shown in **Table 1-5** for the design described in **Sections 1.3.1 and 1.3.2** and shown in **FIGURES 1-12 through 1-15.**

In both the AM and PM peak hours, the intersections along the 82nd Drive corridor operate within Clackamas County standards for industrial areas at LOS D or better. V/C ratios are all below Oregon Highway Plan (OHP) standards at 0.74 in both the AM and PM peak hours.

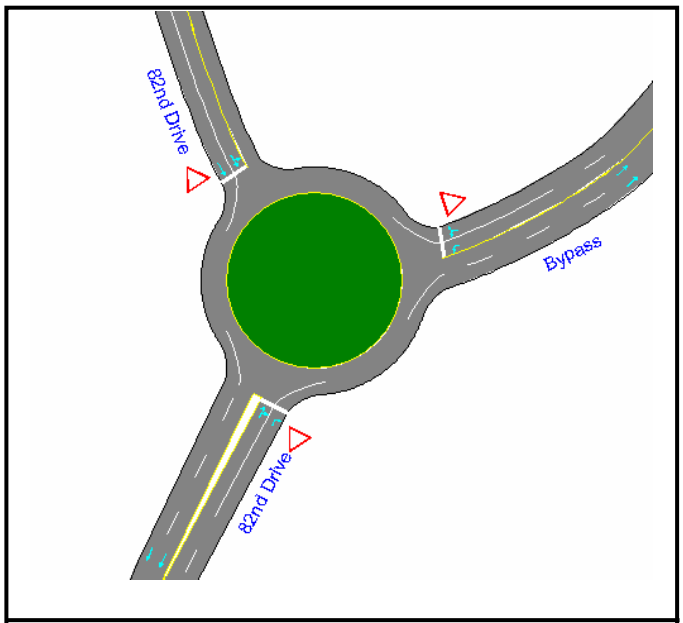


FIGURE 1-15 –Bypass Scenario – Lane Configuration at the South Fred Meyer Access

Table 1-5: 82nd Drive – Intersection Operations for the Bypass Road

Scenario	AM	PM
82nd Dr. at Tolbert Rd		
V/C ratio	0.53	0.72
Delay per Vehicle (seconds)	18.2	47.1
Level of Service	B	D
82nd Dr. at Clackamas Rd		
V/C ratio	0.62*	0.67*
Delay per Vehicle (seconds)	12.0*	11.0 *
Level of Service	B*	B*
82nd Dr. at OR 212		
V/C ratio	0.56	0.74
Delay per Vehicle (seconds)	24.2	33.1
Level of Service	C	C
82nd Dr. at north Fred Meyer Access		
V/C ratio	0.40	0.55
Delay per Vehicle (seconds)	27.4	39.6
Level of Service	C	D
82nd Dr. at south Fred Meyer Access		
V/C ratio	0.44*	0.70*
Delay per Vehicle (seconds)	8.0*	11.9 *
Level of Service	A*	B*

Source: DEA Synchro/SimTraffic modeling tool

* Source: DEA Sidra Intersection modeling tool for roundabouts

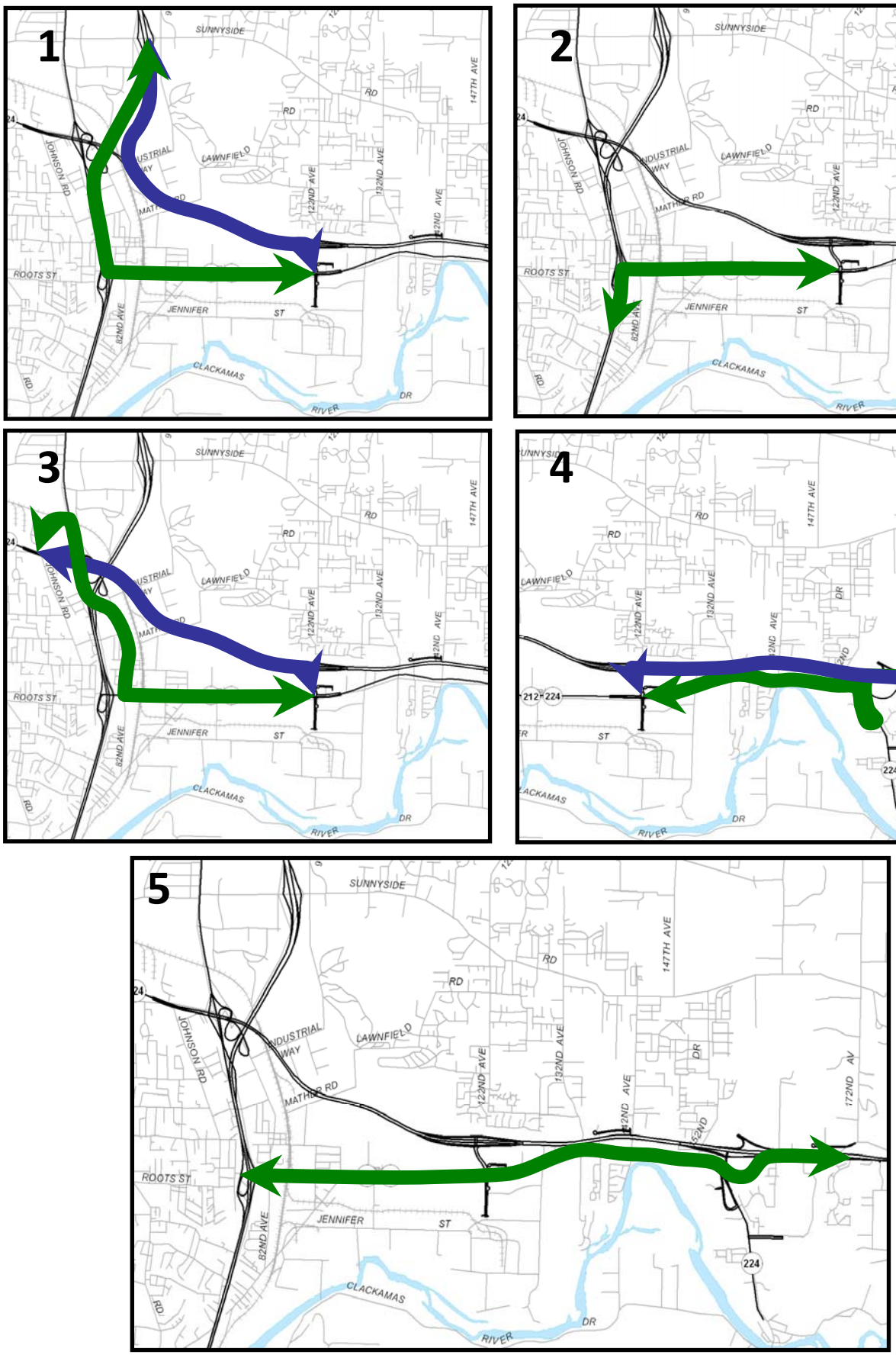


FIGURE 1-16 – Bypass Scenario – Travel Time Routes

Travel Times

FIGURE 1-16, on the following page, shows five travel time routes between select origins and destinations within the study area. The following lists the five origins and destinations:

1. Between I-205 under Sunnyside Road and OR 212 at 122nd Avenue,
2. Between I-205 under Strawberry Lane and OR 212 at 122nd Avenue,
3. Between Milwaukie Expressway at Johnson Road and OR 212 at 122nd Avenue,
4. Between OR 212 at 122nd Avenue and Sunrise Expressway at 172nd Avenue, and
5. Between OR 212 at McKinley Avenue and Sunrise Expressway at 172nd Avenue.

Table 1-6 compares travel times for the five routes between the SDEIS and the bypass road scenarios. Eastbound and westbound trips are shown separately, because the results vary by direction. The travel time values below are weighted average travel times based on the actual number of vehicles completing the entire route shown in **FIGURE 1-16**. The weighted average allows origin and destination pairs that are used by many drivers to have more of an impact on the average travel time than an origin and destination pair that are used by only a few drivers. In the westbound direction, the weighted average travel time is almost cut in half by using the bypass road scenario, falling from 17 minutes to only 9 minutes. In the eastbound direction, the weighted average travel time is unchanged with the addition of the bypass road.

Table 1-6: 82nd Drive – Weighted Average Travel Times for Bypass Road

Travel Time (minutes)	SDEIS	Bypass
Westbound	17	9
Eastbound	7	7

Source: DEA Synchro/SimTraffic modeling tool

82nd Drive – Undercrossing

Introduction

This section summarizes the impacts to the 82nd Drive corridor along OR 212 if the 82nd Drive/OR 212 intersection were grade separated, but removing the north and southbound through trips and having them go through an underpass under the existing signalized intersection. With all of the through movements removed from the intersection, two phases of the eight-phase signal are removed and the intersection can process a higher number of vehicles, because there is less lost time to yellow and red transitions between phases. **FIGURE 1-17** shows a generalized schematic for the undercrossing scenario. The wider roadway shown in the figure depicts the area that would be grade separated.

Smaller additional projects are assumed to be constructed and in place in the analysis of these scenarios.

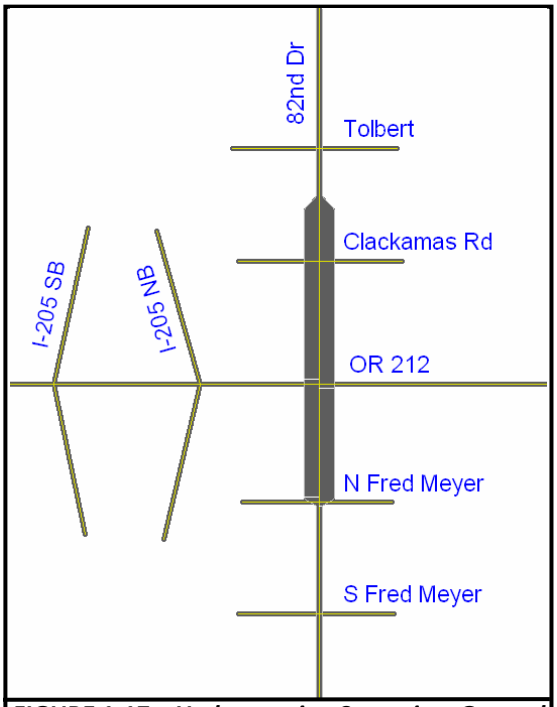


FIGURE 1-17 – Undercrossing Scenario – General Schematic

They are:

- A third westbound lane (studied in **Section 1.1**) between 102nd Avenue and 82nd Drive along OR 212. This project would allow the large westbound right-turning volume to not negatively delay the larger through movement vehicles.
- A Tolbert bridge connection between 82nd Drive and Industrial Way that is grade separated over the Union Pacific Railroad tracks.
- A north Lawnfield Road connection between Lawnfield Road/98th Court and Sunnybrook Boulevard/97th Avenue. This project would replace the current section of Lawnfield Road between 98th Court and 97th Avenue with a new roadway that is traversable by heavy trucks.
- Installation of a traffic signal at the intersection of Tolbert Road and 82nd Drive.
- The north and south Fred Meyer access points would remain as signalized intersections.

The northbound/southbound undercrossing would have a four-lane cross section. The at-grade portion of 82nd Drive that would access OR 212 would have a two-lane cross section at the merge and diverge points at the undercrossing, and would have a four-lane cross section at the OR 212 intersection. Detailed schematics of the merge/diverge points as well as the grade-separated intersection are shown in **FIGURES 1-18 through 1-20**.

Intersection Designs

OR 212 at 82nd Drive

The intersection of OR 212 at 82nd Drive has approach volumes that would not allow for a roundabout to operate at or below capacity; therefore, a signalized intersection was analyzed.

The intersection would have a five-lane cross section with a large median on the north approach, an eight-lane cross section with a median on the east approach, a four-lane cross section with a large median on the south approach, and a nine-lane cross section on the west approach. The median running north/south along 82nd Drive would need to be large enough to accommodate four lanes of travel, retaining walls, shoulders, curbs, and potentially pedestrian and bicycle facilities. The underground portion of 82nd Drive would come back up to grade at the north Fred Meyer access on the south side and between St. Helens and Clackamas roads on the north side. **FIGURE 1-18** shows the generalized lane configurations at the 82nd Drive/OR 212 intersection.

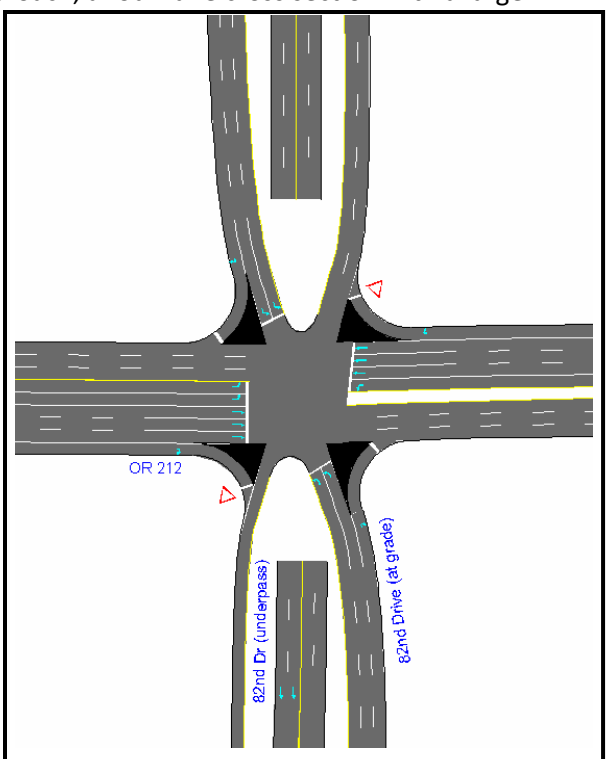


FIGURE 1-18 – Undercrossing Scenario – Lane Configurations at OR 212

Clackamas Road at 82nd Drive

The intersection of Clackamas Road at 82nd Drive would require a seven-lane cross section on the north approach, a three-lane cross section on the east approach, a seven-lane cross section on the south approach, and a three-lane cross section on the west approach. 82nd Drive would need to have a seven-lane cross section between Tolbert Street, to the north, and the merge/diverge point of the undercrossing, to the south. North of Tolbert Street, 82nd Drive would have a five-lane cross section.

FIGURE 1-19 shows the generalized lane configurations.

North Fred Meyer Access at 82nd Drive

The intersection along 82nd Drive at the north Fred Meyer access would require a two-lane cross section with a large median on the north approach, a four-lane cross section on the east approach, a six-lane cross section with a small median on the south approach, and a three-lane cross section on the east approach. The median along 82nd Drive on the north side of the intersection would again have to accommodate four lanes of travel, retaining walls, shoulders, curbs, and potentially pedestrian and bicycle facilities. The west leg of the intersection is an exit-only driveway from the Fred Meyer store and will be signed as "Exit Only, Do Not Enter." The northbound left-turn lane and westbound through movements are removed, because alternative access is provided via the south Fred Meyer access. The southbound right-turn lane is removed, because a new right-in/right-out access point will be provided roughly 400 feet north of this intersection. This new right-in/right-out access will remove some of the traffic from the north Fred Meyer signal and allow it to operate more efficiently. **FIGURE 1-20** shows the generalized lane configurations.

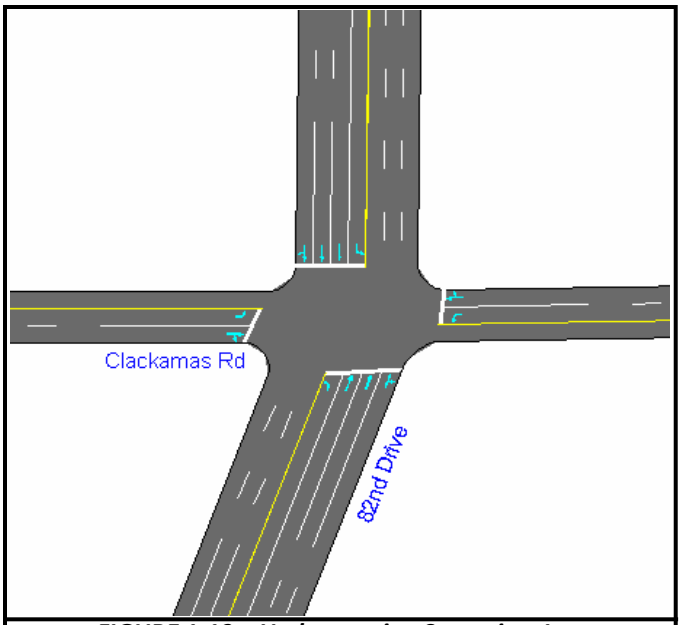


FIGURE 1-19 – Undercrossing Scenario – Lane Configurations at Clackamas Road

Operational Results

The undercrossing operational results are shown in **Table 1-7**, on the following page, for the design described in **Sections 1.4.1 and 1.4.2** and shown in **FIGURES 1-16 through 1-19.**

In both the AM and PM peak hours, the intersections along the 82nd Drive corridor operate within Clackamas County standards for industrial areas at LOS E or better. V/C ratios are all below OHP standards at 0.74 or below in both the AM and PM peak hours.

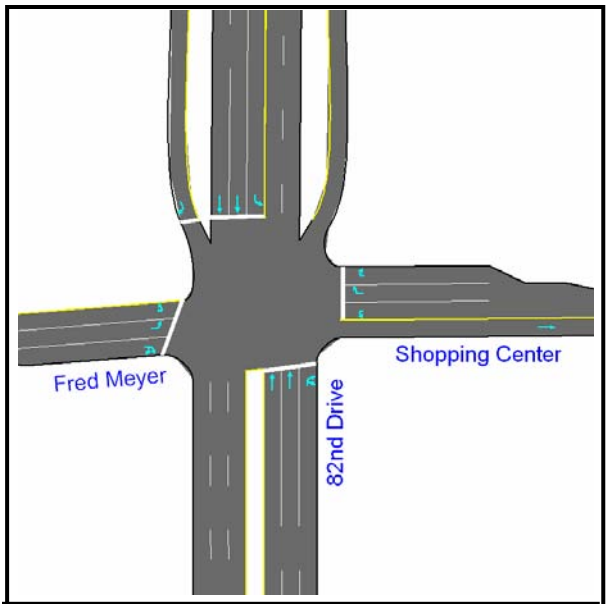


FIGURE 1-20 – Undercrossing Scenario – Lane Configurations at the North Fred Meyer Access

Travel Times

Travel times for the undercrossing scenario are virtually identical to those found in the bypass road scenario. For details, please refer to **Section 1.3.4**.

Table 1-7: 82nd Drive – Intersection Operations for the Undercrossing

Scenario	AM	PM
82nd Dr. at Tolbert Rd		
V/C ratio	0.47	0.64
Delay per Vehicle (seconds)	20.1	25.9
Level of Service	C	C
82nd Dr. at Clackamas Rd		
V/C ratio	0.38	0.50
Delay per Vehicle (seconds)	21.9	23.2
Level of Service	C	C
82nd Dr. at OR 212		
V/C ratio	0.56	0.74
Delay per Vehicle (seconds)	56.1	78.4
Level of Service	E	E
82nd Dr. at north Fred Meyer Access		
V/C ratio	0.47	0.51
Delay per Vehicle (seconds)	14.8	21.2
Level of Service	B	C
82nd Dr. at south Fred Meyer Access		
V/C ratio	0.45	0.60
Delay per Vehicle (seconds)	23.0	29.0
Level of Service	C	C

Source: DEA Synchro/SimTraffic modeling tool

Milwaukie Expressway Refinement – Pheasant Court Option

The public raised several traffic concerns at the SDEIS public open houses held for the area surrounding the Milwaukie Expressway. This section provides a summary of traffic findings for the following two questions in this area.

- The Sunrise Corridor Supplemental Draft Environmental Impact Statement (SDEIS) proposes closing the direct access from southbound 82nd Avenue to Milwaukie Expressway and providing that access via a new signalized intersection at Deer Creek Lane and 82nd Avenue. The proposed access change has the potential to substantially increase traffic volumes on Deer Creek Lane and Johnson Road and changes the character of Deer Creek Lane from a local access road to a regional connector. How is the project going to maintain or improve access and mobility on Deer Creek Lane and Johnson Road north of OR 224 (Milwaukie Expressway) relative to the year 2030 No-Build Alternative.
- The Sunrise SDEIS proposes closing the Lake Road access to Johnson Road, which leaves Webster Road as the only access to Milwaukie Expressway from Lake Road. How is the project going to maintain or improve access and mobility to Lake Road relative to the year 2030 No-Build Alternative

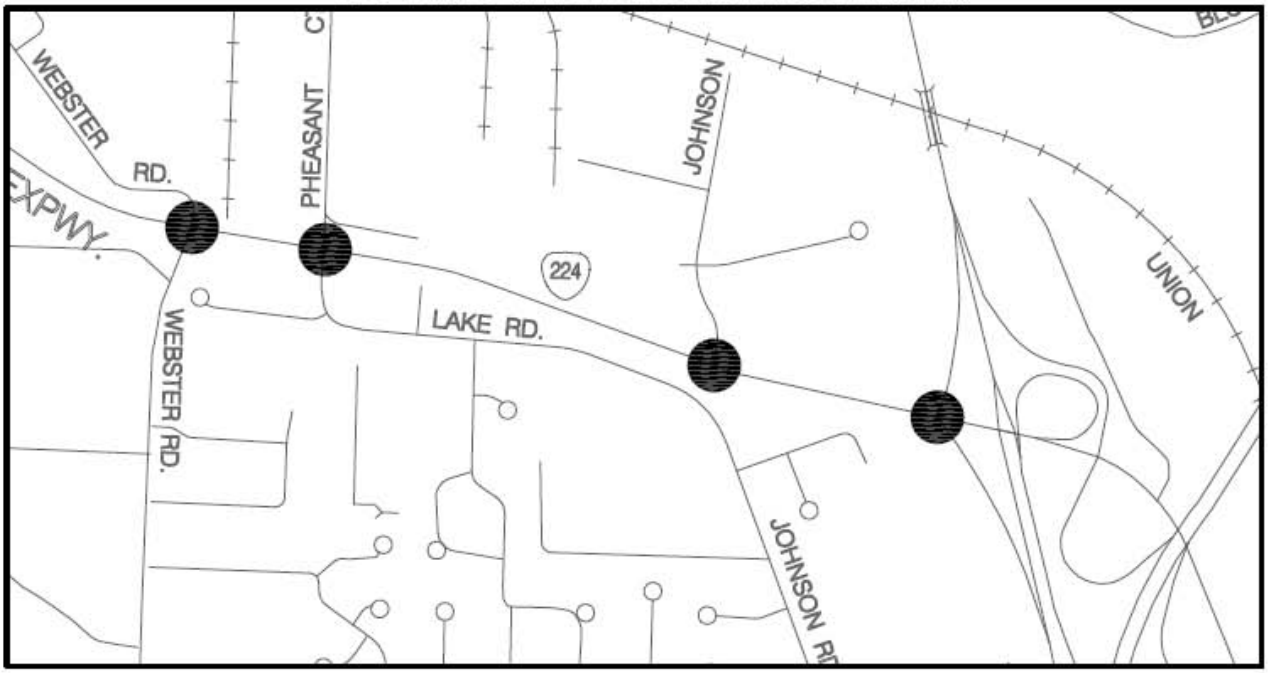
To help answer the access and mobility questions associated with Deer Creek Lane and Lake Road, the project team evaluated capacity improvements to the existing signalized intersection of Deer Creek Lane and Johnson Road, and the realignment of Lake Road and Johnson Road to provide access to Milwaukie Expressway at Pheasant Court instead of at Johnson Road and Webster Road. As shown in **FIGURE 2-1**, this realignment would turn Johnson Road into a three-leg intersection at Milwaukie Expressway and make Pheasant Court a four-leg intersection. Also, Lake Road would be turned into a cul-de-sac where it currently intersects with Webster Road.

Scenarios

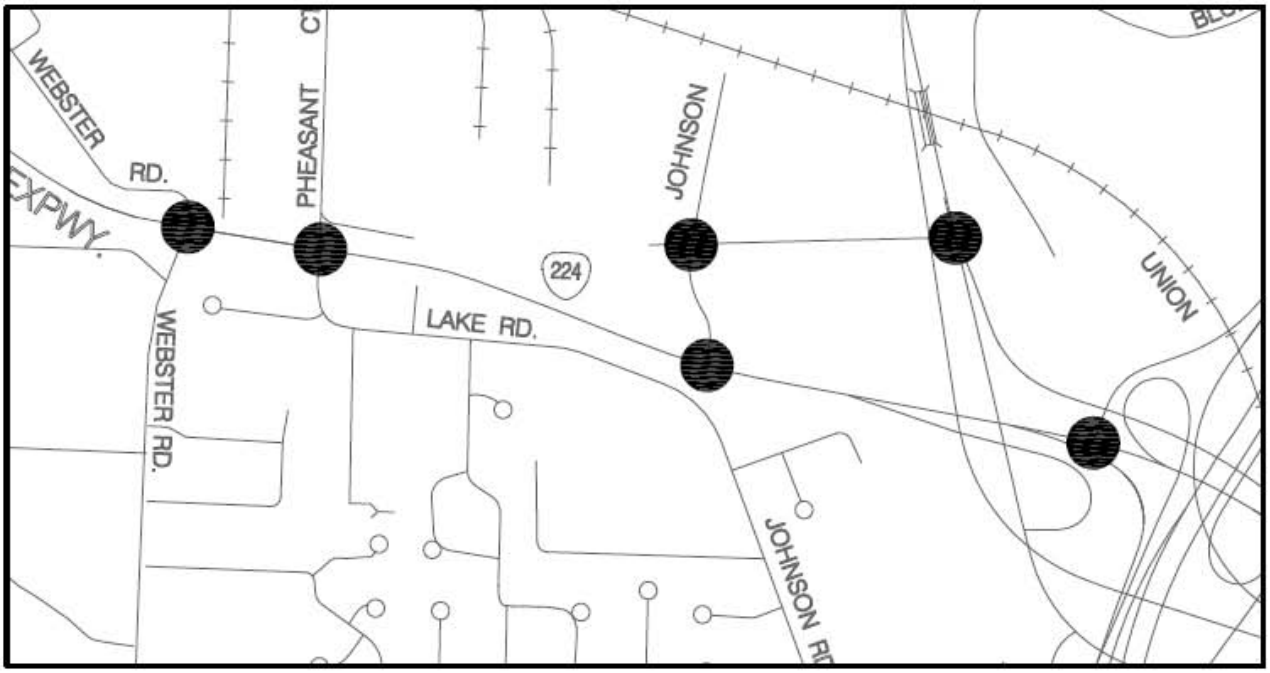
Four distinct scenarios were analyzed to help answer the access and mobility questions associated with Deer Creek Lane and Lake Road. All of these scenarios incorporate the realignment of Lake Road and Johnson Road as shown in **FIGURE 2-1**.

- **Scenario 1** assumes a Sunrise Corridor No-Build. This scenario provides a baseline for comparison to the other build scenarios. The lane configurations for Scenario 1 are shown in **FIGURE 2-2**.
- **Scenario 2** assumes Alternative 2 of the Sunrise Corridor SDEIS with no additional capacity enhancements along Milwaukie Expressway beyond those of the SDEIS lane configurations. This scenario shows how traffic would operate under Alternative 2 of the Sunrise Corridor SDEIS as shown in the IAMP open house. The lane configurations for Scenario 2 are shown in **FIGURE 2-2**.

NO-BUILD INTERSECTION LOCATIONS



BUILD INTERSECTION LOCATIONS



LEGEND:

- Study area intersection location
- Roadways affected by the re-alllgnment of the south leg of Johnson Rd. via Lake Rd. to Pheasant Ct.

NOT TO SCALE

FIGURE 2-1

Milwaukie Expressway Study Area Intersections

Sunrise Project, I-205 to Rock Creek Junction

- **Scenario 3** assumes Alternative 2 of the Sunrise Corridor SDEIS with capacity enhancements on side streets and turning movements along Milwaukie Expressway. This scenario is designed to determine whether the traffic operations would meet standards without adding a third lane on Milwaukie Expressway. Note that dual northbound left-turn lanes were provided at the intersection of Deer Creek Lane and 82nd Avenue. The lane configurations for Scenario 3 are shown in **FIGURE 2-2**.
- **Scenario 4** assumes Alternative 2 of the Sunrise Corridor SDEIS with a seven-lane cross section of Milwaukie Expressway 1,100 feet past Webster Road, as well as select side street and turning movement capacity enhancements along Milwaukie Expressway. This scenario is designed to determine the facility design needed to meet operational standards. The lane configurations for Scenario 4 are shown in **FIGURE 2-2**.

Key Findings

Deer Creek Lane

The evaluation of the proposed signalized connection of Deer Creek Lane to 82nd Avenue provided the following key findings:

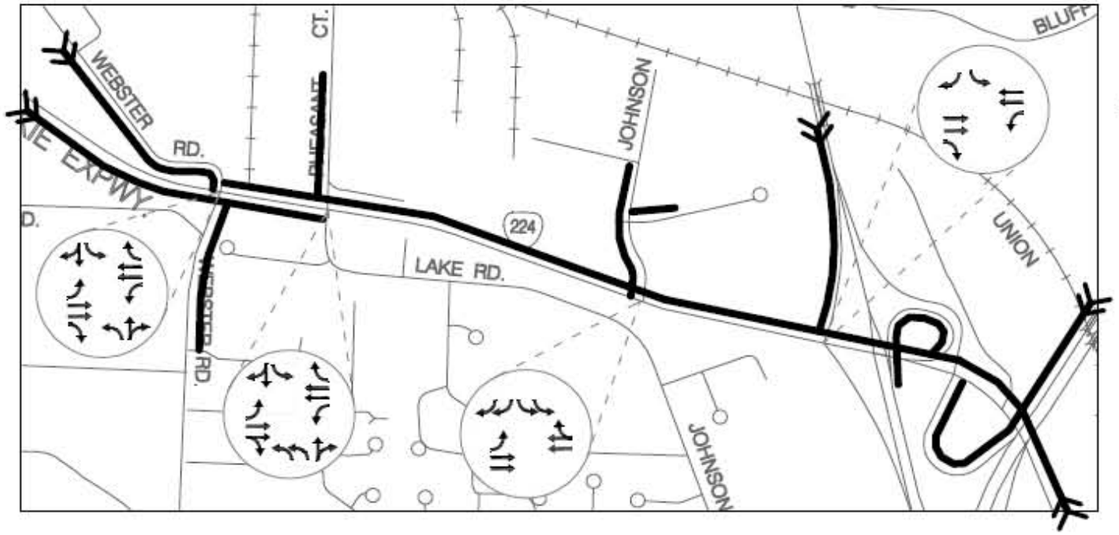
- Providing a signalized connection of Deer Creek Lane to 82nd Avenue would result in failing peak period traffic operations on Deer Creek Lane without additional capacity improvements in 2030.
- In addition to the proposed lane configuration in the build alternatives of the Sunrise Corridor SDEIS, the proposed signalized intersection at Deer Creek Lane and 82nd Avenue would require a double northbound left-turn lane to meet operational standards in all four scenarios in 2030.
- The intersection of Johnson Road and Milwaukie Expressway would need to be a three-leg intersection to meet operational standards. The intersection would also require Milwaukie Expressway to be widened to seven lanes as shown in Scenario 4 of **FIGURE 2-2** to operate efficiently and not experience queuing and congestion during peak periods in 2030.
- The intersection of Deer Creek Lane and Johnson Road would need to remain signalized, with additional capacity provided to meet operational standards. Regardless of where the intersection is located and aligned, the intersection would also require Milwaukie Expressway to be widened to seven lanes, as shown in Scenario 4 of **FIGURE 2-2**, to operate efficiently and not experience queuing and congestion during peak periods in 2030.

Lake Road

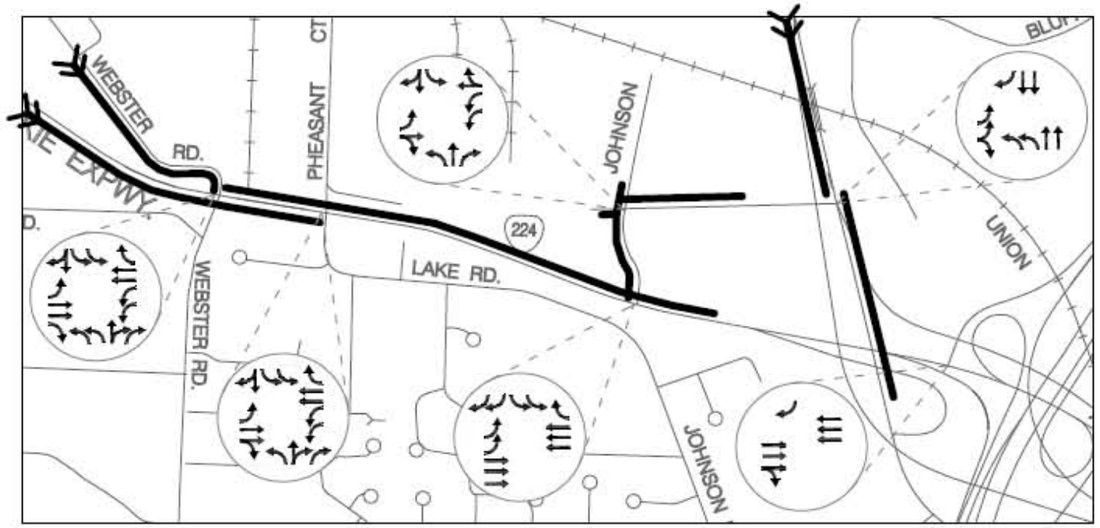
The evaluation of the proposed realignment of Lake Road and Johnson Road, as an option to closing Lake Road access to Johnson Road, provided the following key findings:

- Realigning Lake Road and Johnson Road to provide access to Milwaukie Expressway at Pheasant Court would improve access and mobility on Lake Road in 2030 compared to the SDEIS alternatives. However, without additional capacity improvements, the Milwaukie Expressway intersections of Johnson Road, Pheasant Court, and Webster Road would fail during peak periods in 2030.
- For the Milwaukie Expressway intersections of Johnson Road, Pheasant Court, and Webster Road to meet operational standards in 2030, Milwaukie Expressway would need to be widened to seven lanes with additional turn lanes, as shown in Scenario 4 of **FIGURE 2-2**.

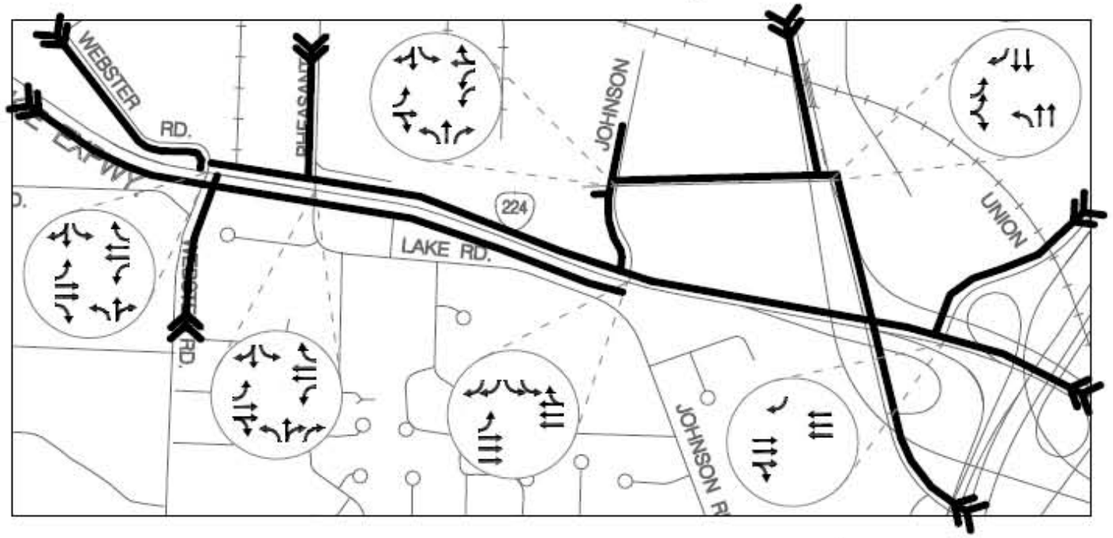
SCENARIO 1: No-Build Lane Configurations



SCENARIO 3: 5-Lane Milwaukie

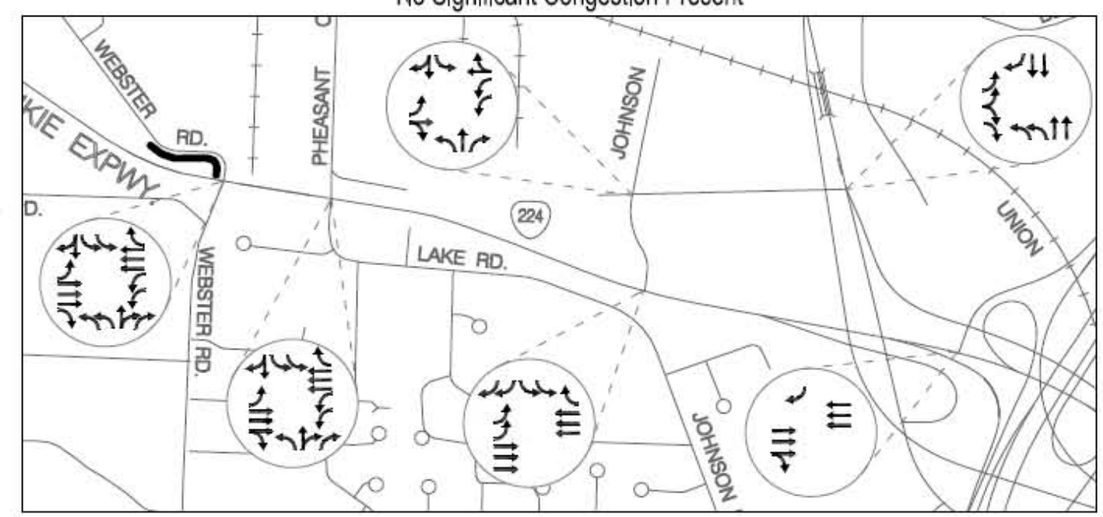


SCENARIO 2: SDEIS Lane Configurations



SCENARIO 4: 7-Lane Milwaukie

No Significant Congestion Present



NOT TO SCALE

LEGEND:

Location and Extent of Queuing/Congestion

Indicates queuing that could extend outside of the boundaries of the study area

FIGURE 2-2

Milwaukie Expressway
Location and Extent of Congestion
(PM Peak Period)

Sunrise Project, I-205 to Rock Creek Junction

Operational Results

Without a seven-lane cross section on Milwaukie Expressway, a queue forms on Milwaukie Expressway at the Webster Road intersection. This queue extends easterly as far back as Jannsen Road under Scenario 1 and as far back as the Sunrise mainline under Scenarios 2 and 3. This standing queue on Milwaukie Expressway causes a reduction in side street capacity because there is simply no available storage room for a vehicle to turn onto westbound Milwaukie Expressway.

To meet operational standards along Milwaukie Expressway between I-205 and Webster Road, the seven-lane cross section proposed in the Sunrise Corridor SDEIS Build models should be continued west to a point 1,100 feet past the intersection of Webster Road, and select turning movement capacity enhancements should be made along Milwaukie Expressway. These capacity enhancements are depicted in the attached Synchro/SimTraffic outputs.

Table 2-1 shows the AM and PM peak hour V/C ratios, while **Table 2-2** shows the average delay experienced by a vehicle, and **Table 2-3** shows the average LOS experienced by a vehicle that is attributed the associated intersection for all four scenarios.

Table 2-1: Milwaukie Expressway – V/C ratios by Intersection

	Scenario 1		Scenario 2		Scenario 3		Scenario 4	
Intersection	AM	PM	AM	PM	AM	PM	AM	PM
Webster @ Milwaukie Expwy	1.17	1.40	1.15	1.22	0.98	0.99	0.77	0.84
Pheasant @ Milwaukie Expwy	0.88	1.34	0.85	1.05	0.84	1.04	0.61	0.73
Johnson @ Milwaukie Expwy	0.92	1.07	0.86	0.73	0.71	0.72	0.71	0.72
82nd Ave. SB off-ramp @ Milwaukie Expwy[1]	0.96	1.28	--	--	--	--	--	--
I-205 SB off-ramp @ Milwaukie Expwy[2]	--	--	0.77	0.61	0.77	0.62	0.77	0.62
Deer Creek Lane @ Johnson Road	NA	NA	0.35	0.61	0.35	0.62	0.35	0.64
Pheasant @ Lake Road	*	*	*	*	*	*	*	*

Note: NA indicates an intersection that was not analyzed.
* indicates an intersection with a lane configuration that cannot be analyzed with the Highway Capacity Manual (HCM) methodology.
-- indicates an intersection that is not present in this scenario.
[1]Indicates an intersection that is only present in the No-Build scenario.
[2]Indicates an intersection that is only present in the Build scenarios.
Source: Synchro

Table 2-2: Milwaukie Expressway – Delay by Intersection (seconds)

	Scenario 1		Scenario 2		Scenario 3		Scenario 4	
Intersection	AM	PM	AM	PM	AM	PM	AM	PM
Webster @ Milwaukie Expwy	427.7	1210.1	459.1	1321.7	60.0	863.8	47.3	57.8
Pheasant @ Milwaukie Expwy	92.2	763.3	96.1	338.9	95.9	109.4	89.9	25.8
Johnson @ Milwaukie Expwy	59.6	258.0	391.2	154.7	193.7	28.8	17.6	36.7
82nd Ave. SB off-ramp @ Milwaukie Expwy[1]	61.1	548.3	--	--	--	--	--	--
I-205 SB off-ramp @ Milwaukie Expwy[2]	--	--	197.0	43.3	195.6	2.6	8.3	4.7
Deer Creek Lane @ Johnson Road	NA	NA	12.6	103.5	12.8	36.1	12.6	38.5
Pheasant @ Lake Road	9.5	0.4	1.7	2.3	2.1	2.4	2.2	2.4

Note: NA indicates an intersection that was not analyzed.
-- indicates an intersection that is not present in this scenario.
Shaded cells imply intersections that are operating at LOS F (> 80 sec. of delay).
[1]Indicates an intersection that is only present in the No-Build scenario.
[2]Indicates an intersection that is only present in the Build scenarios.
Source: SimTraffic

Table 2-3: Milwaukie Expressway – Level of Service (LOS) by Intersection

Intersection	Scenario 1		Scenario 2		Scenario 3		Scenario 4	
	AM	PM	AM	PM	AM	PM	AM	PM
Webster @ Milwaukie Expwy	F	F	F	F	E	F	D	E
Pheasant @ Milwaukie Expwy	F	F	F	F	F	F	F	C
Johnson @ Milwaukie Expwy	E	F	F	F	F	C	B	D
82nd Ave. SB off-ramp @ Milwaukie Expwy[1]	E	F	--	--	--	--	--	--
I-205 SB off-ramp @ Milwaukie Expwy[2]	--	--	F	D	F	A	A	A
Deer Creek Lane @ Johnson Road	NA	NA	B	F	B	D	B	D
Pheasant @ Lake Road	A	A	A	A	A	A	A	A

Note: NA indicates an intersection that was not analyzed.
-- indicates an intersection that is not present in this scenario.
Shaded cells imply intersections that are operating at LOS F.
[1]Indicates an intersection that is only present in the No-Build scenario.
[2]Indicates an intersection that is only present in the Build scenarios.
Source: SimTraffic

FIGURE 2-2 graphically depicts the location and extent of the queuing that propagates from the over capacity operations within the study area.

McKinley Avenue Analysis Summary

This section is a summary of work completed pertaining to the McKinley Avenue intersection with OR 224. The SDEIS is adding a signal to the I-205 Ramp Terminal immediately to the east of the McKinley Avenue intersection with OR 224. Analysis indicates that this new signal will improve traffic operations westbound on OR 224 but does little to improve anticipated future congestion on McKinley Avenue at OR 224.

Allow Free Westbound Right-Turn and Southbound Left-Turn Movements

With a two-lane cross section in the westbound direction at the southbound I-205 off-ramp (left and left-through lanes), the interchange area fails to meet standards in the PM peak hour. The V/C ratio for the westbound lane and the northbound approach at McKinley Avenue and OR 224 is well over 2.0. There are not enough gaps in the southbound approach to accommodate these movements. Due to this overcapacity issue at McKinley, the queue from the southbound off-ramp to westbound OR 224 is larger than 1,000 feet, causing a safety concern. During the AM peak hour, on the other hand, the interchange area meets all standards and operates adequately.

FIGURE 3-1, at right, depicts the actual network configurations for free westbound right turns (WBRs) and southbound left turns (SBLs) used in the analysis model.

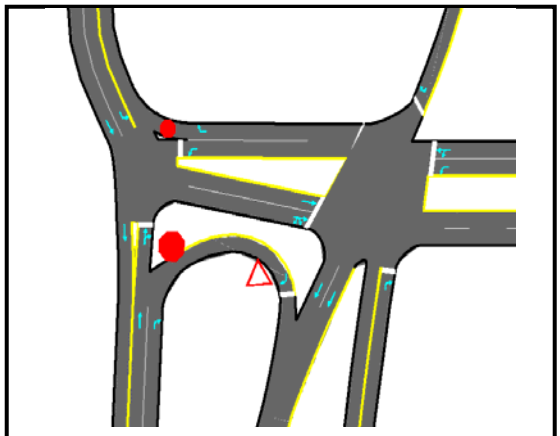


FIGURE 3-1 – McKinley Ave. – Lane Configurations for Free WBRs and SBLs

Combine McKinley and the Southbound I-205 Off-ramps into a Single Signalized Intersection

By combining the two southbound off-ramps, it is possible to eliminate the southbound-to-westbound ramp and reroute the traffic onto the southbound-to-northbound loop ramp. By realigning McKinley Avenue and the southbound I-205 ramps, one four-leg signalized intersection would replace the two existing unsignalized intersections. **FIGURE 3-2**below depicts the actual network configurations used in the analysis model. The resulting volumes/operations and queue lengths are shown in **FIGURE 3-3**. (Note: The old NBT on McKinley, now the EBL, was removed in order to remove a phase from the signal and improve traffic operations.)

This design operates well but fails to meet ODOT design standards because it aligns a freeway off-ramp directly across a signalized intersection from a minor arterial.

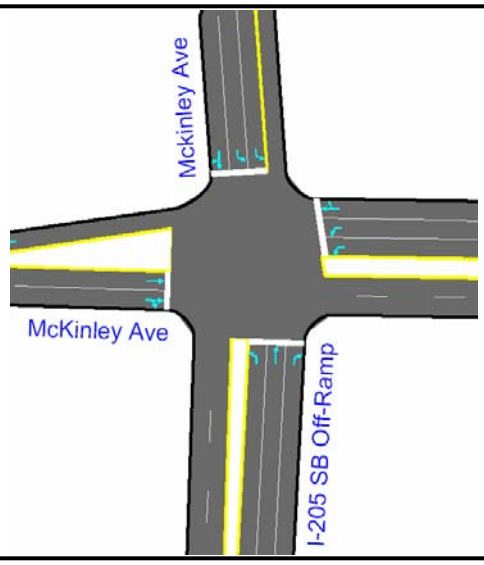


FIGURE 3-2 – McKinley Ave. – Lane Configurations for Single Signalized Intersection

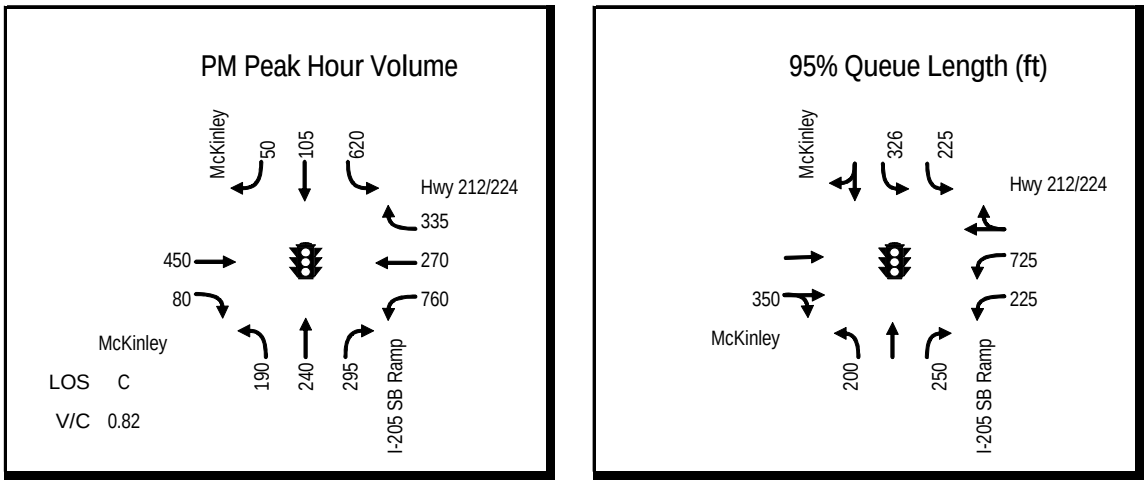


FIGURE 3-3 – McKinley Ave. – Volumes/Operations and Queue Lengths

It is also possible to keep the eastbound left turn of 50 vehicles in the model, but during the AM and PM peak periods the intersection V/C ratios are 0.60 and 0.89, respectively, and the resulting queuing effect is not desirable. The west leg of the intersection (McKinley northbound) will have significantly longer queuing.

NOTE: The analysis of this intersection was performed without the intersection of 82nd Drive with OR 212/224 in the model. The volumes on OR 212/224 are so high that the queues from that intersection do spill back into the McKinley Avenue intersection, thus creating a slight queuing problem for the southbound left turn from McKinley onto OR 212/224.

Turn McKinley Avenue into a One-Way Street Northbound

With McKinley Avenue as two lanes in the northbound direction, there are no large queues at the southbound ramp intersection with OR 224, and the V/C ratios are below 0.9 in both the AM and PM peak hours at 0.85 and 0.87, respectively. **FIGURE 3-4** a screenshot of the actual network for the above-mentioned configurations.

With McKinley Avenue only having a single-lane cross section on the approach and exit from OR 224, there are also no large queues at the southbound ramp intersection with OR 224, but the V/C ratio is 0.91 in the PM peak hour and 0.85 in the AM peak hour. **FIGURE 3-5**is a screenshot of the actual network for the above-mentioned configurations.

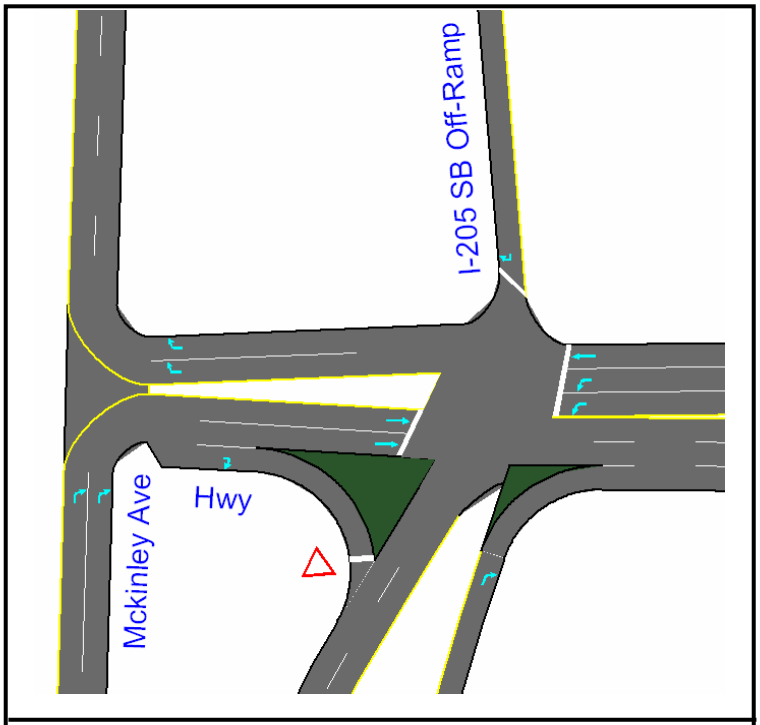


FIGURE 3-4 – McKinley Ave. – Lane Configurations for Two Northbound Lanes

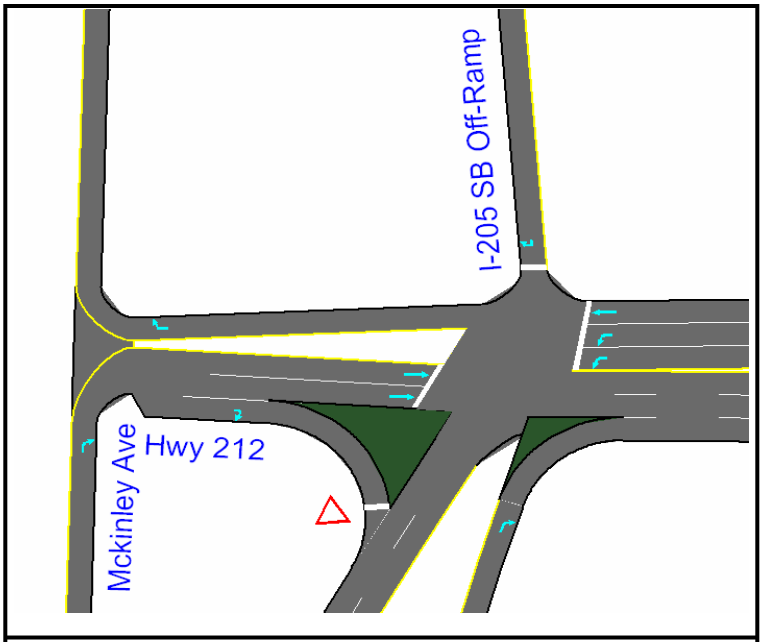


FIGURE 3-5 – McKinley Ave. – Lane Configurations for One Northbound Lane

Lawnfield Industrial Area Analysis

Purpose

This section is intended to help decision makers understand how various transportation system facility improvements in and around the Lawnfield Industrial Area (LIA) would operate in year 2030 with and without a Sunrise Corridor project. Specifically, this work effort was designed to evaluate transportation system performance related to a range of possible projects that provide expanded access to and from and within the LIA.

Background

Based on year 2030 analysis of the Sunrise No-Build Alternative, portions of the Clackamas Industrial Area (CIA) and the LIA transportation systems are projected to be congested during the morning (AM) and afternoon/evening (PM) peak periods. Increasing extent of and duration of congestion are forecast to occur, stemming from substantial increases in population and employment in the South Clackamas portion of the metropolitan region. Resulting high traffic volumes, high percentage of large trucks, challenging topography, and closely spaced intersections will combine to strain the CIA and the LIA transportation systems.

Clackamas County and Lawnfield businesses have been exploring ways to enhance local circulation within the LIA and access to the regional transportation system via I-205 and OR 212/224. Today, large trucks from the LIA access northbound I-205 via an on-ramp at Lawnfield Road. This access would be removed as part of a Sunrise project and alternative (Sunrise project-related) access could feasibly be provided to the Sunnybrook interchange to the north through a new 97th Avenue connector. Additional LIA access is being explored as a Sunrise project design option that would extend Tolbert Road from 82nd Drive east with grade separation over the Union Pacific Railroad (UPRR) line to a connection to a new Lawnfield Road extension (Clackamas County Capital Improvement Plan (CIP) project number 103).

Task 1: Year 2030 LIA Operations Analysis Assuming a Sunrise Build

Approach

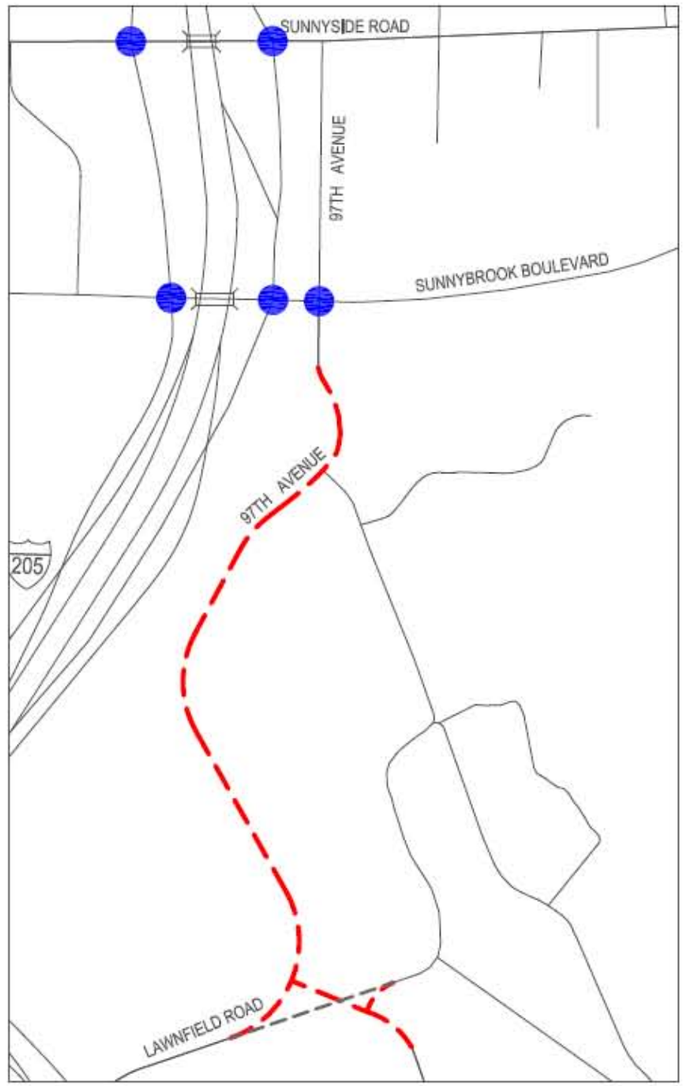
The first portion of the analysis (task 1) is a summary of traffic performance data associated with a potential Lawnfield Road extension north to 97th Avenue at Sunnybrook Boulevard, shown in **FIGURE 5-1**. The analysis was based upon an assumed Sunrise project (CIP project number 183). A potential Tolbert Road extension to Lawnfield Road was not assumed. The analysis represents PM Peak Hour operations only.

The study area for task 1 consisted of the following intersections:

1. Sunnyside at I-205 southbound off-ramp,
2. Sunnyside at I-205 northbound on-ramp,
3. Sunnybrook at I-205 southbound on-ramp,
4. Sunnybrook at I-205 northbound off-ramp, and
5. Sunnybrook at 97th Avenue.

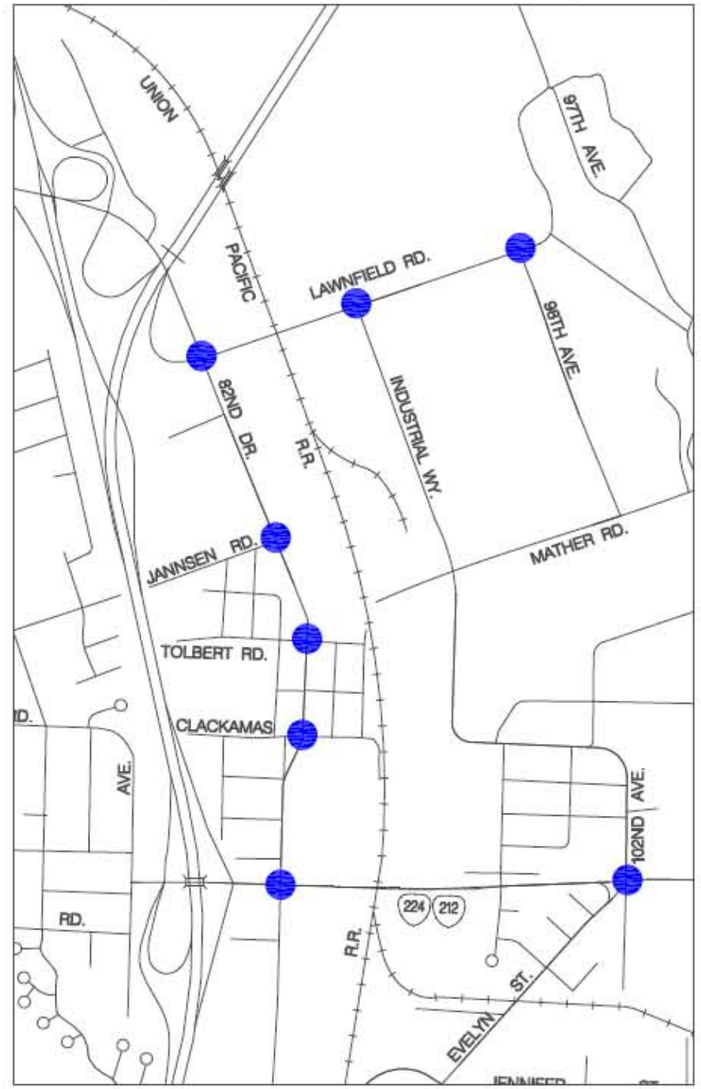
Particular attention was paid to traffic performance associated with the northbound Lawnfield Road/97th Avenue trips attempting to gain access to I-205 via the I-205 Sunnyside/Sunnybrook ramps by weaving across multiple lanes..

TASK 1



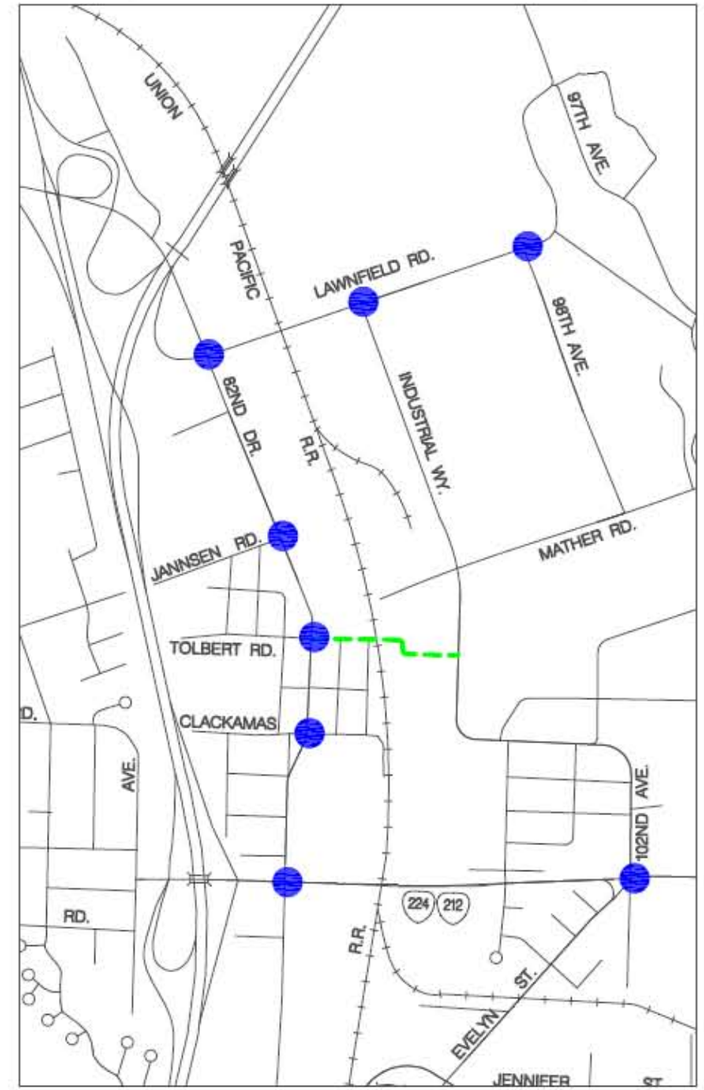
TASK 2

(Scenario 1: With the Tolbert Connection)



TASK 2

(Scenario 2: Without the Tolbert Connection)



Clackamas Industrial Corridor / Lawnfield Area Traffic Analysis

Legend:

- Proposed 97th Avenue Connection
- Existing Lawnfield Road Alignment
- Proposed Tolbert Connection
- Study Area Intersections

Note: Task 1 assumes a Sunrise Corridor SDEIS Alternative 2 (Build with mid-point Interchange) network and Task 3 does assumes a Sunrise Corridor SDEIS Alternative 1 (No-Build) network

FIGURE 5-1

LIA Analysis Study Area

Results

The 97th Avenue/Lawnfield Road connection would allow for large trucks to access I-205 via the Sunnyside/Sunnybrook interchange and bypass the extensive peak period congestion along OR 212/224 that is expected to exist even with the construction of the Sunrise Expressway. Today there is a connection to SE 97th Avenue from Lawnfield Road, but the excessive grades (greater than ten percent) make it a nonviable option for trucks. Particular attention was given to the northbound 97th Avenue to northbound I-205 maneuver because it would cause vehicles to merge across three lanes of traffic in a short distance, in conflict with drivers heading southbound on 97th Avenue wanting to head westbound on Sunnybrook Boulevard, because they have to merge in the opposite direction. This weaving maneuver is graphically depicted in the Current Configuration map in **FIGURE 5-2**.

Previous traffic analysis work in this area on a proposed Eagle Landing Development project and the Sunrise Corridor project had revealed a large difference in future volumes along Sunnyside Road and Sunnybrook Boulevard. Travel demand modeling for the Sunrise Corridor project showed higher east/west volumes along Sunnyside Road, while the models for the Eagle Landing Development project showed higher east/west volumes along Sunnybrook Boulevard. To be conservative, in this analysis the higher Sunrise Corridor project-related volumes were used along Sunnyside Road and the higher Eagle Landing Development project-related volumes were used along Sunnybrook Boulevard.

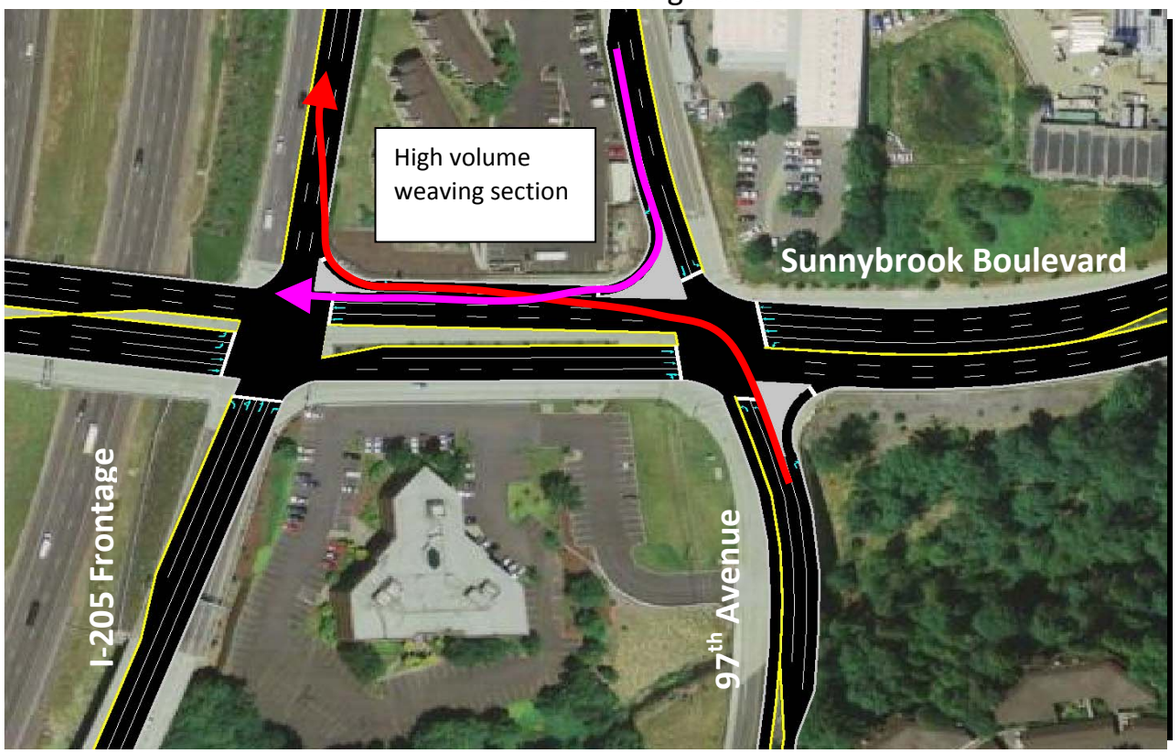
A series of traffic lane configuration and associated signal phasing modifications were assumed, as described below:

1. Conversion of the eastbound left-turn trap lane at Sunnybrook Boulevard and the northbound I-205 ramp terminal to a through lane.
2. Removal of the bulbout of the median on the east side of the intersection of Sunnybrook Boulevard and the I-205 northbound ramp to accommodate three eastbound receiving lanes.
3. Removal of the southbound right-turn island at Sunnybrook Boulevard and 97th Avenue to no longer allow a yield-controlled southbound right turn.

FIGURE 5-2 shows the existing lane configurations and the proposed lane configurations.

Two eastbound lane configurations approaching SE 97th Avenue were analyzed (shown in **FIGURE 5-2**): (1) two eastbound through lanes and a shared through/right-turn lane (existing), and (2) three eastbound through lanes and one dedicated right-turn lane (proposed).

Current 2008 Configuration



Proposed 2030 Configuration

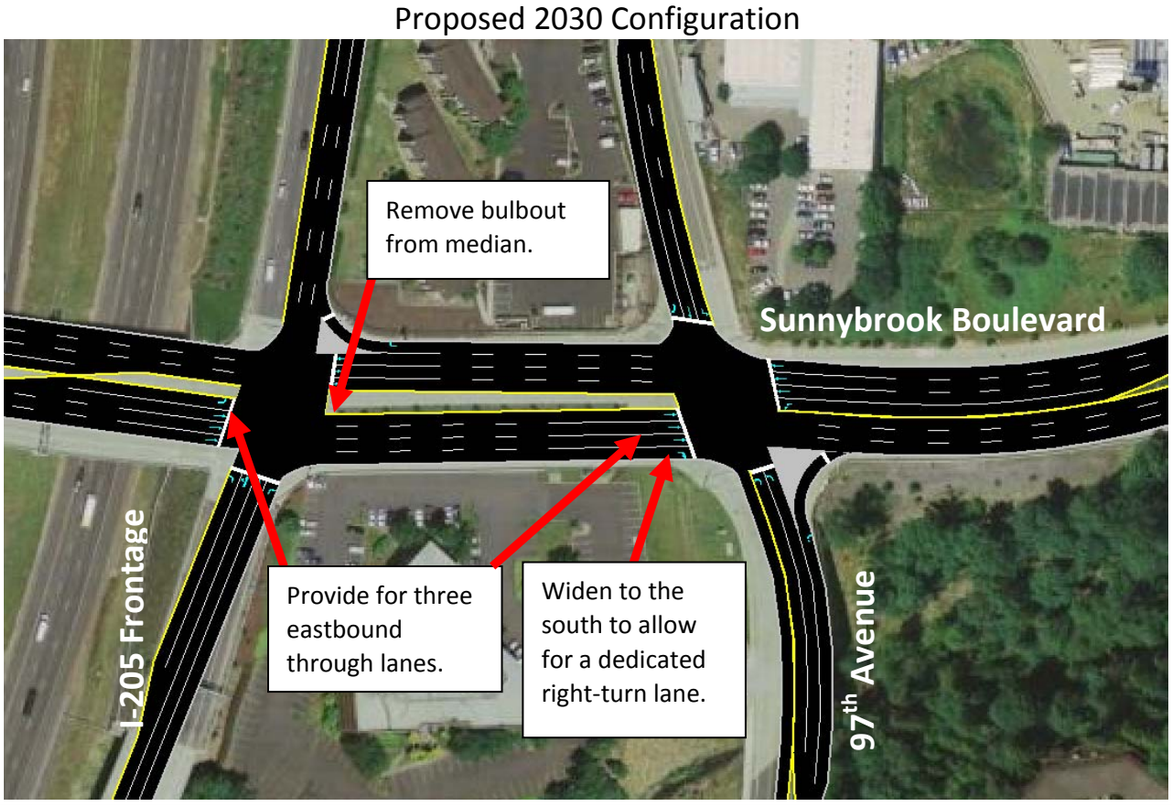


FIGURE 5-2 – LIA Analysis – Existing and Proposed Sunnybrook Boulevard Lane Configurations

Table 5-1 depicts the overall intersection LOS, V/C ratio, and delay associated with the 97th Avenue at Sunnybrook Boulevard intersection. The southbound right turn at the intersection of 97th Avenue at Sunnybrook Boulevard, with no right turns allowed on red, was also analyzed, but it resulted in high delays and a high V/C ratio.

Table 5-1: LIA Analysis – Task 1 Operations – 97th Ave. at Sunnybrook Boulevard

	LOS	V/C	Avg. Delay
Existing Lane Configurations – without the 97th Ave. Realignment	C	0.93	27 sec.
Existing Lane Configurations – With the 97th Ave. Realignment	D	1.01	54 sec.
Proposed Lane Configurations – With the 97th Ave. Realignment	C	0.88	24 sec.

Source: David Evans and Associates, Inc.

Summary of Findings

The 97th Avenue realignment is not expected to cause any associated or nearby intersections to operate unacceptably when accompanied by three eastbound through lanes on Sunnybrook Boulevard as well as an additional eastbound right turn lane at the intersection of 97th Avenue at Sunnybrook Boulevard. This realignment will also allow for improved accessibility between I-205 and the LIA with the construction of the Sunrise Corridor project.

Task 2: Year 2030 LIA Operations Analysis Assuming a Sunrise No-Build

In this task, an analysis of a package of transportation system improvements within the LIA vicinity was performed that, in the absence of a Sunrise Corridor project, could be implemented to improve local circulation and access to the regional transportation system. The analysis represents PM peak hour operations only.

The projects identified by Clackamas County staff to be potentially implemented consist of:

- Connect 102nd Avenue/Industrial Way and 98th Court to Lawnfield Road (CIP project numbers 101 and 102);
- Grade separate Lawnfield Road over UPRR Tracks with connection to the intersection of 82nd Drive at the I-205 northbound ramp (Potential addition to the county's CIP in the event the Sunrise Expressway is not built);
- Beyond planned widening of 82nd Drive between OR 212/224 and I-205 to five lanes, implement some additional level of targeted lane additions and/or intersection signalization along this stretch of 82nd Drive (planned widening of 82nd Drive is incorporated into CIP project numbers 99 and 100, and this study also serves to better understand the requirements for these CIP projects);
- Extend Tolbert Road from 82nd Drive east with grade separation over the Union Pacific Railroad line with connection to Industrial Way (CIP project number 103) (note: traffic analysis was conducted with and without this project to understand system effects);
- Widen Mather Road to three lanes between Industrial Way and 98th Court (CIP project number 104); and
- Make access improvements along 102nd Avenue to widen and add sidewalks, bike lanes, and turn lanes (CIP project number 105).

The study area for task 2 consisted of the following eight intersections:

1. 82nd Drive at Lawnfield Road,
2. Industrial Way at Lawnfield Road,
3. 98th Court at Lawnfield Road,
4. 82nd Drive at Jannsen Road,

5. 82nd Drive at Tolbert Road,
6. 82nd Drive at Clackamas Road,
7. 82nd Drive at OR 212/224, and
8. 102nd Avenue at OR 212/224.

Two distinct scenarios exist for task 2. Scenario 1 involves transportation system analysis assuming no Tolbert Road extension described above, and Scenario 2 assumes completion of the Tolbert Road extension project.

Access Differences

Under Scenario 1, the only access to/from 82nd Drive from the LIA is via Lawnfield Road. Under Scenario 2, the Lawnfield Road access remains and an additional access road is constructed over the Union Pacific Railroad tracks between Industrial Way and 82nd Drive at Tolbert Road (shown in **FIGURE 5-1**). This additional access road between the LIA and 82nd Drive provides large trucks with an alternative to the heavily congested OR 212/224 corridor when attempting to gain access to I-205 southbound.

Lawnfield Road Operations

By 2030 under both Scenario 1 and Scenario 2, the stop-controlled intersections of Lawnfield Road at Industrial Way and Lawnfield Road at 98th Court are expected to exceed Clackamas County traffic operations standards. A preliminary study to assess the feasibility of signalizing both of these intersections resulted in a necessary five-lane cross section of Lawnfield Road. A feasible and less costly second option was also studied and carried forward through the rest of the task 2 studies. This second option utilizes single-lane roundabouts at the two above-mentioned intersections. The roundabout option leads to a three-lane cross section along Lawnfield Road.

With and without the Tolbert Road connection, the Lawnfield Road at Industrial Way and the Lawnfield Road at 98th Avenue roundabouts are expected to operate with a V/C ratio of 0.88 and overall LOS A, based on Sidra analysis. **FIGURE 5-3** conceptually depicts the proposed Lawnfield Road lane configurations. There is no difference in the roundabout lane configurations between Scenarios 1 and 2. The remainder of task 2 was conducted assuming the inclusion of the roundabouts shown in **FIGURE 5-3**.

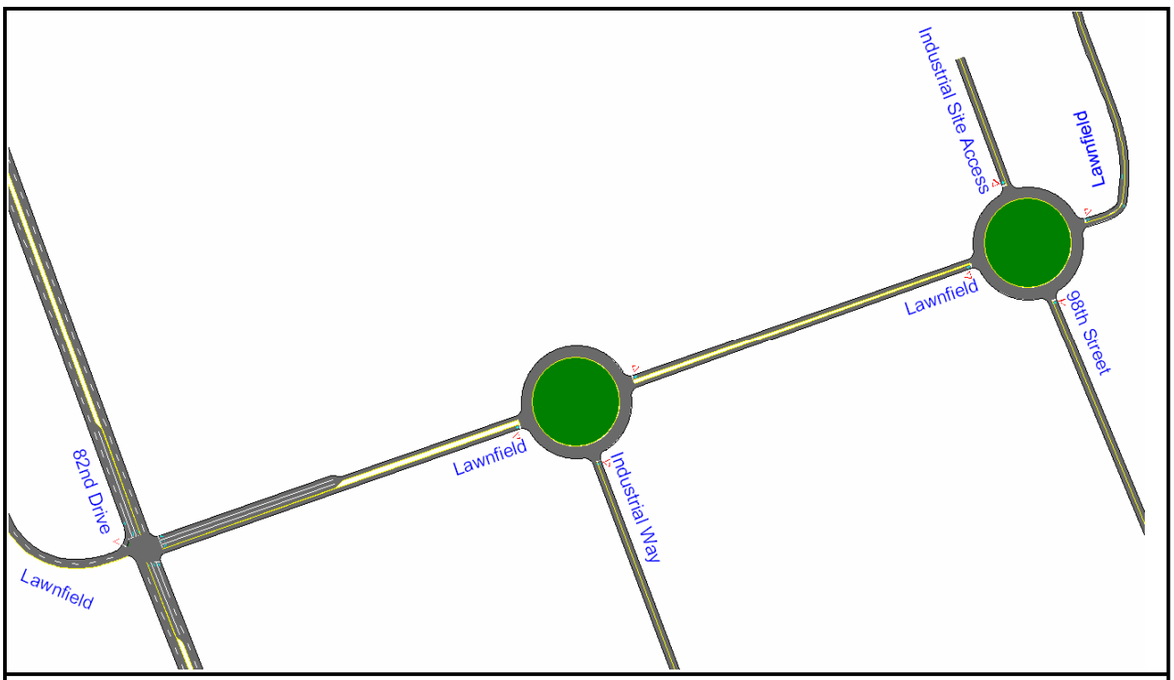


FIGURE 5-3 – LIA Analysis – Lane Configurations for Lawnfield Road

FIGURE 5-4 depicts the turning movement volumes as well as the delay, LOS, and V/C ratios for the proposed

roundabouts along Lawnfield Road. **Table 5-2** summarizes the queue lengths associated with each of the proposed roundabouts. The longest expected queue lengths are 375 feet, or roughly 15 vehicles. The queues associated with these roundabouts do not negatively affect any adjacent intersections.

Signal Warrant Analysis Along 82nd Drive

A preliminary planning-level signal warrant analysis was completed for the intersections of 82nd Drive at Jannsen Road, 82nd Drive at Tolbert Road, and 82nd Drive at Clackamas Road. All three intersections, under both scenarios, met warrants 1 (minimum vehicular volume), 2 (eight-hour volumes), 8 (combination of warrants), 9 (four-hour volumes) and 11 (peak hour volume), with the exception of Jannsen Road under scenario 1, which only met warrants 2, 9, and 11.

Note: Decisions to install traffic signals in the future would need to be based on a more thorough engineering study that would use longer duration traffic data.

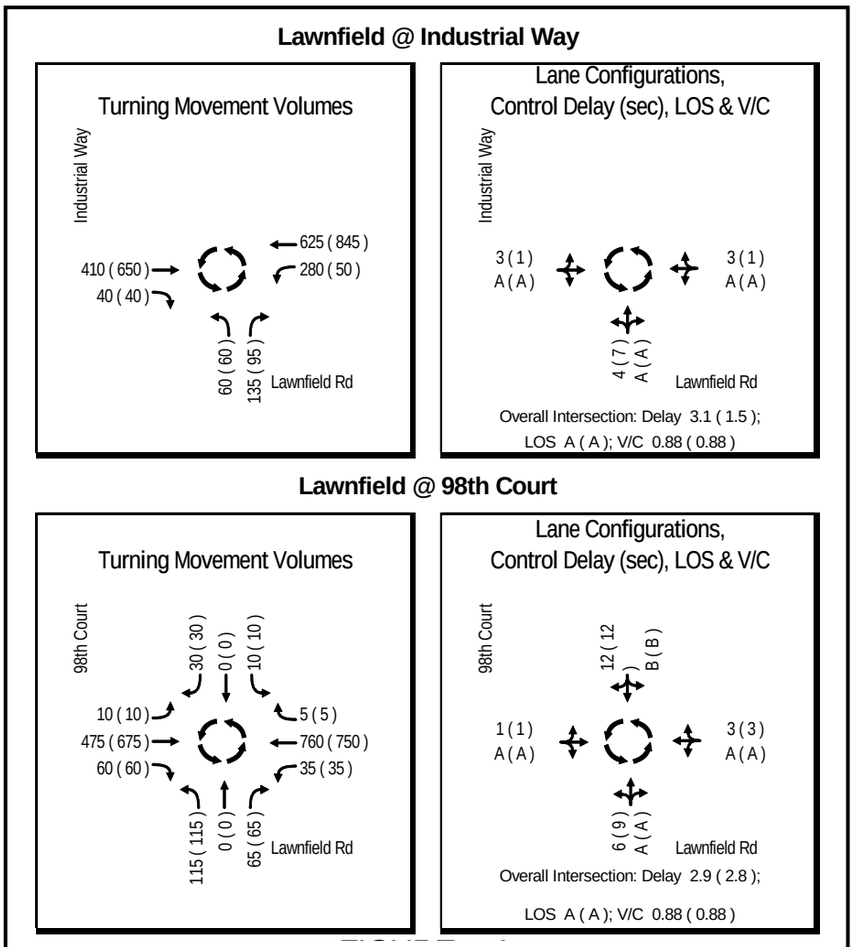


***FIGURE 5-4 – LIA Analysis – Lawnfield Road Volumes and Operations** With Tolbert Connection (Without Tolbert Connection)*

Table 5-2: LIA Analysis –Queue Lengths by Movement (Feet)

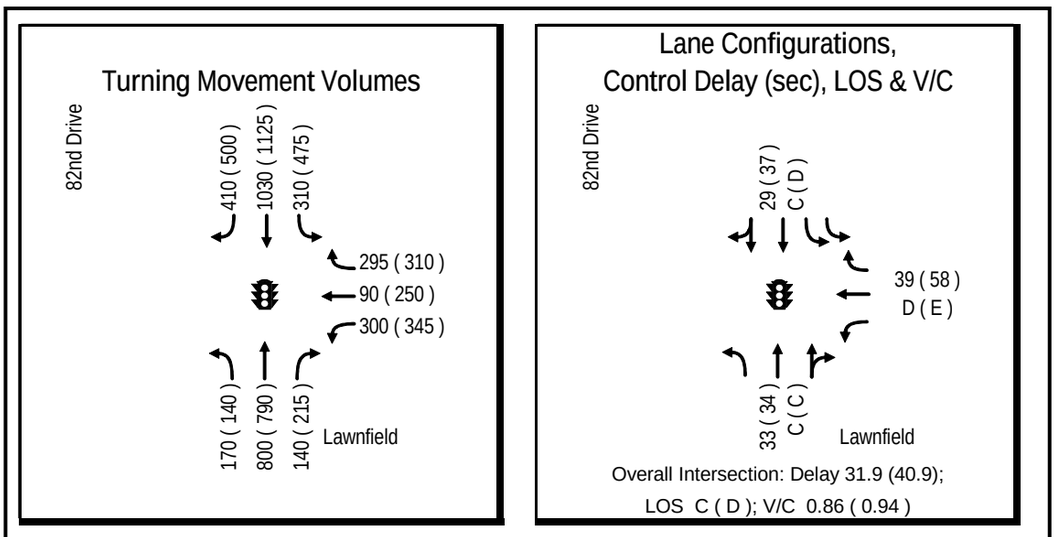
Intersection	Movement	With Tolbert	Without Tolbert
Lawnfield @ Industrial Way	EBLTR	150	150
	WBLTR	375	375
	NBLTR	50	50
Lawnfield @ 98th Court	EBLTR	100	175
	WBLTR	350	350
	NBLTR	50	75
	SBLTR	50	50

Source: David Evans and Associates, Inc.

Lawnfield Road at 82nd Drive Intersection

FIGURE 5-5 depicts the turning movement volumes, delay, LOS, and V/C ratio for the intersection of Lawnfield Road at 82nd Drive. **FIGURE 5-6** depicts the lane configurations at this intersection for both Scenarios 1 and 2 that are necessary to meet Clackamas County standards. Scenario 1 requires dual southbound left turns from 82nd Drive to Lawnfield Road to allow the high number of vehicles making this movement. **Table 5-3** depicts the queue lengths associated with each movement at the 82nd Drive/Lawnfield Road intersection. The westbound left-turn queue extends out of the available storage length and blocks the through and right-turn lanes in Scenario 1. Under both Scenarios 1 and 2, the northbound left turn from 82nd Drive to the I-205 northbound ramp queue would exceed its available storage length by 25 feet (one car length) during the PM peak hour. The southbound left-turn queue would exceed its available storage length queue by 50 feet in Scenario 2.

In Scenarios 1 and 2, this intersection operates at LOS D and C with V/C ratios of 0.94 and 0.86, respectively. Without the Tolbert extension, there is a higher volume of southbound left-turning vehicles from 82nd Drive onto Lawnfield Road, as well as a higher number of westbound through and left-turning vehicles exiting the LIA. Scenario 2 offers better operations than Scenario 1 because it has lower volumes on critical movements.

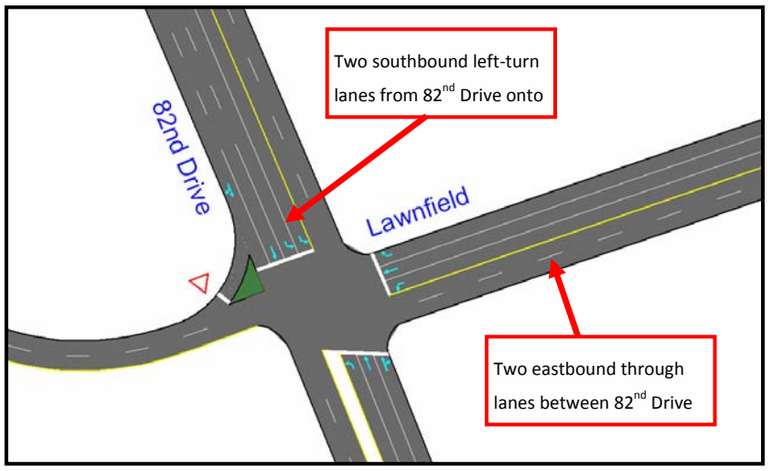


Dual southbound left-turn lanes are only requred under the no Tolbert connection scenario

FIGURE 5-5 – LIA Analysis – Lawnfield Road at 82nd Drive Volumes and Operations

With Tolbert Connection (Without Tolbert Connection)

Scenario 1



Scenario 2

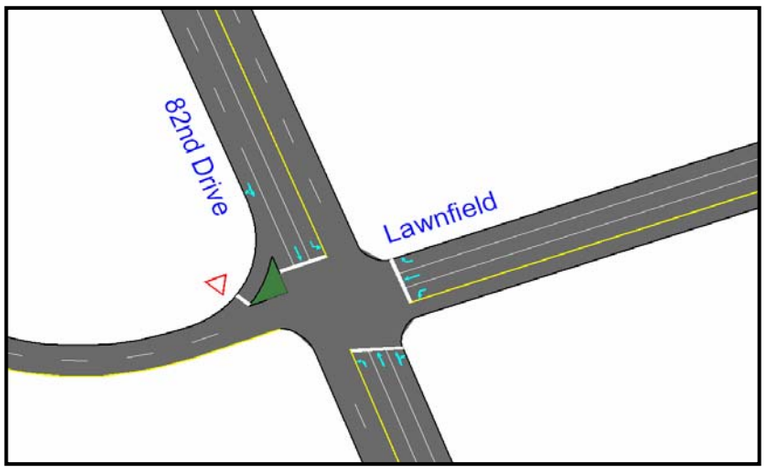


FIGURE 5-6 – LIA Analysis – Lane Configurations for 82nd Drive at Lawnfield Road under Scenarios 1 and 2

Table 5-3: LIA Analysis – Queue Lengths by Movement (Feet)

Intersection	Movement	With Tolbert	Without Tolbert	Available Storage
Lawnfield @ 82nd Drive	WBL	425	600	500
	WBT	400	950	-
	WBR	200	275	500
	NBL	225	225	200
	NBT	375	425	-
	NBR	375	425	-
	SBL	350	300	300
	SBT	575	775	-
	SBR	575	775	-

Source: SimTraffic for queue lengths and DEA field study for available storage lengths

Tolbert Road at 82nd Drive Intersection

FIGURE 5-7 depicts the lane configurations at the intersection of 82nd Drive at Tolbert Road for both Scenario 1 and Scenario 2. Scenario 2 requires dual westbound-to-southbound left-turn lanes to accommodate the high number of vehicles making this turn.

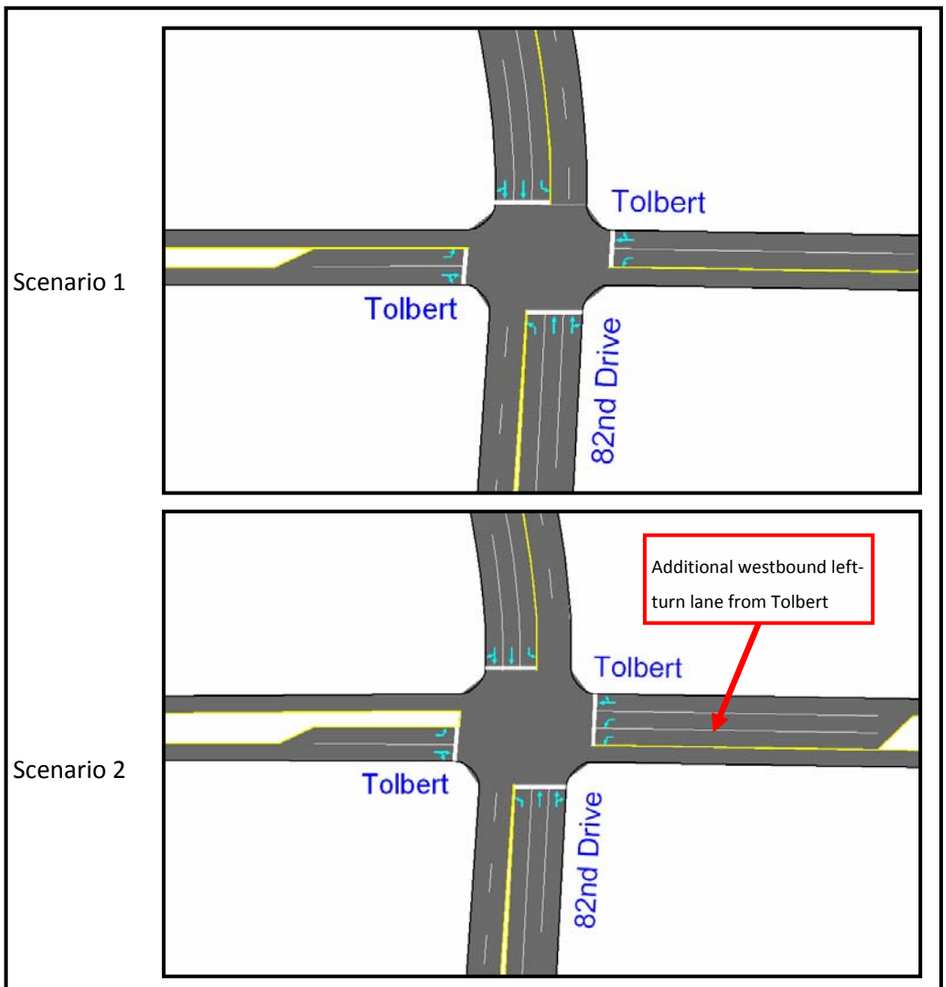
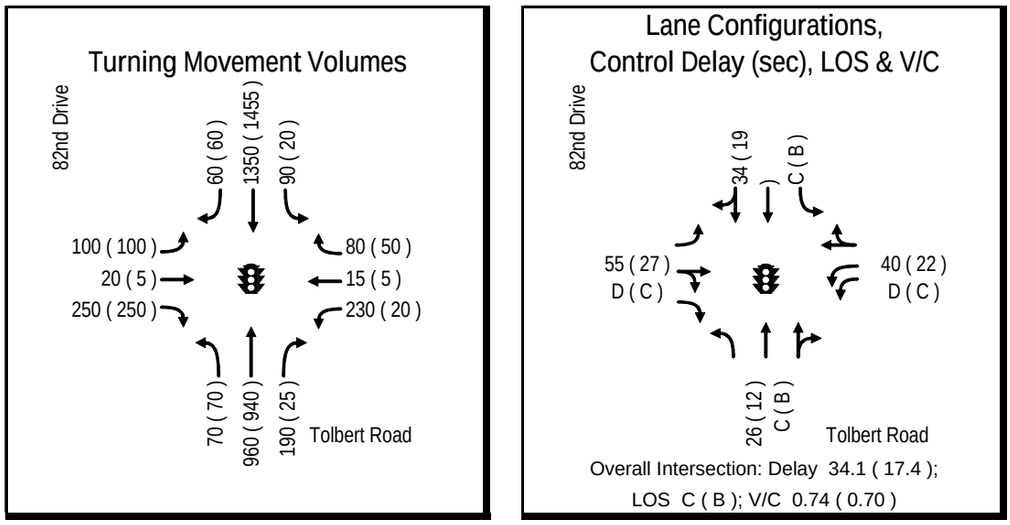


FIGURE 5-7 – LIA Analysis – Lane Configurations for Tolbert Road at 82nd Drive under Scenarios 1 and 2

In Scenarios 1 and 2, this intersection operates at LOS B and C, respectively, with V/C ratios of 0.70 and 0.74, respectively. Without the Tolbert extension, there is a lower volume of northbound right turns and southbound left turns from 82nd Drive onto Tolbert Road, as well as a higher number of westbound left,

through, and right turning vehicles exiting the LIA. Both Scenario 1 and Scenario 2 offer acceptable traffic operations. **FIGURE 5-8** depicts the turning movement volumes, delay, LOS, and V/C ratio for the intersection of Tolbert Road at 82nd Drive. **Table 5-4** depicts the queue lengths associated with each movement at the 82nd Drive/Tolbert Road intersection. The eastbound left-turn queue at the intersection of Tolbert Road and 82nd Drive would back into the adjacent through lane by one or two vehicles. This would impact traffic flow within the adjacent eastbound through-right turn lane. In Scenario 2, the southbound through lanes queue to 700 feet, sporadically influencing the upstream intersection of Jannsen Road at 82nd Drive.



Dual westbound left-turn lanes are only requred under the with Tolbert connection scenario

FIGURE 5-8 – LIA Analysis – Tolbert Road at 82nd Drive – Volumes and Operations *With Tolbert Connection (Without Tolbert Connection)*

Table 5-4: LIA Analysis – Queue Lengths by

Intersection	Movement	With Tolbert	Without Tolbert	Available Storage
Lawnfield @ Tolbert Road	EBL	150	125	100
	EBTR	500	225	-
	WBL	150	75	200
	WBTR	100	75	-
	NBL	150	100	200
	NBT	400	225	-
	NBTR	425	250	-
	SBL	200	75	200
	SBT	700	450	-
	SBTR	700	425	-

Source: SimTraffic for queue lengths and DEA field study for available storage lengths

102nd Avenue at OR 212/224

FIGURE 5-9 depicts the lane configurations at the intersection of 102nd Avenue at OR 212/224. The Tolbert Road extension has no effect on the configuration of this intersection. The eastbound right turn to Evelyn Street southbound is a channelized right turn.

OR 212/224 is planned to be widened to have three westbound through lanes at the intersection of 102nd Avenue at OR 212/224 (CIP project number 105). These improvements are graphically depicted in **FIGURE 5-9**. The southbound approach is also planned to incorporate dual left turns and a shared through-right lane.

Even with the above enhancements, this intersection is expected to operate at LOS F with a V/C ratio of 1.17 and an average per vehicle delay of 92 seconds without the Tolbert Road extension. When the Tolbert Road extension is assumed, there are fewer vehicles making the eastbound left turn from OR 212/224 onto northbound 102nd Avenue. The southbound lefts, however, increase with the Tolbert Road extension. Under Scenario 2, this intersection operates at LOS E with a V/C of 1.05 and an average per vehicle delay of 55 seconds. The average delay for the intersection decreases from 92 seconds under Scenario 1 to 55 seconds under Scenario 2, a more than 40 percent reduction. Scenario 2 operates more efficiently than Scenario 1. **FIGURE 5-10** depicts the turning movement volumes, delay, LOS, and V/C ratio for the intersection of OR 212/224 at 82nd Drive. **Table 5-5** depicts the queue lengths associated with each movement at the above-mentioned intersection. Under Scenario 2, the westbound and southbound queue lengths would be about half as long as they are under Scenario 1.

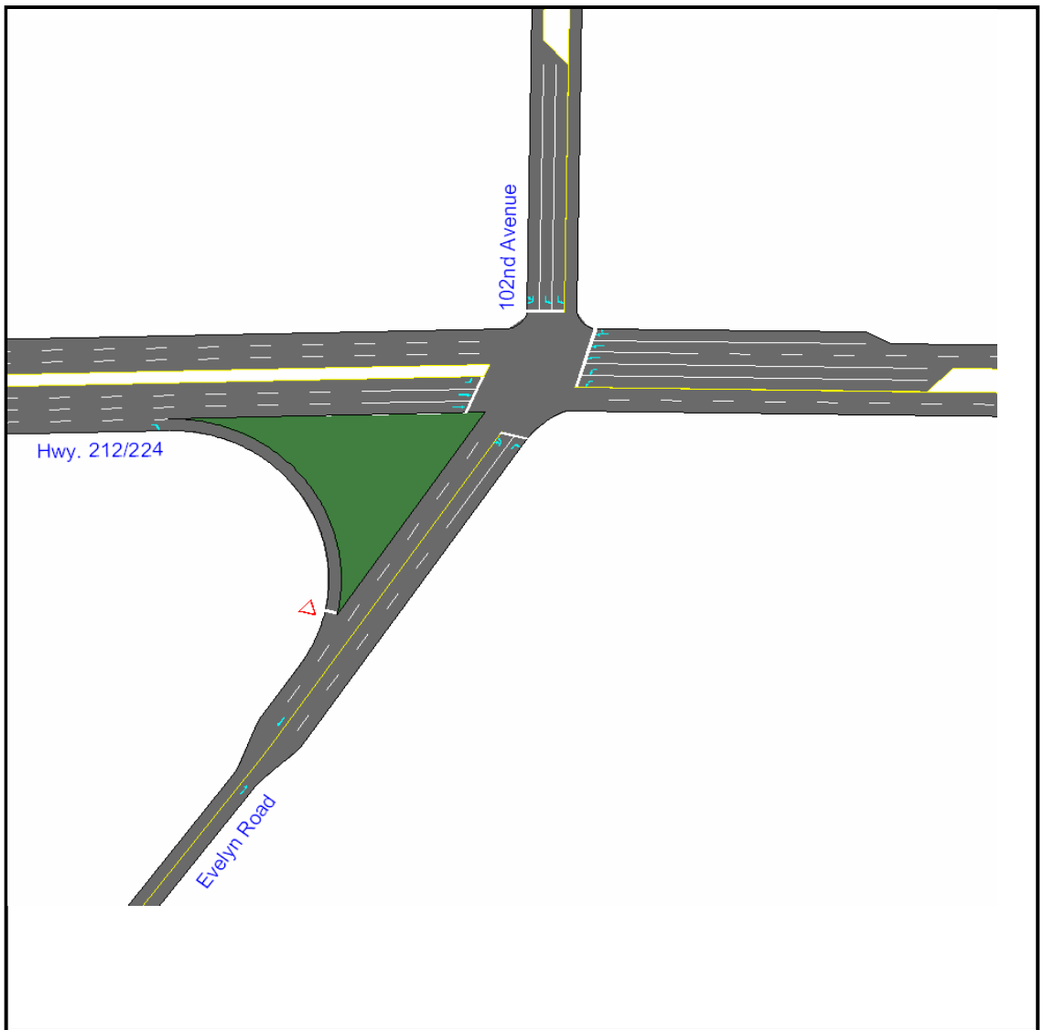


FIGURE 5-9 – LIA Analysis – Lane Configurations for 102nd Ave. at OR 212/224

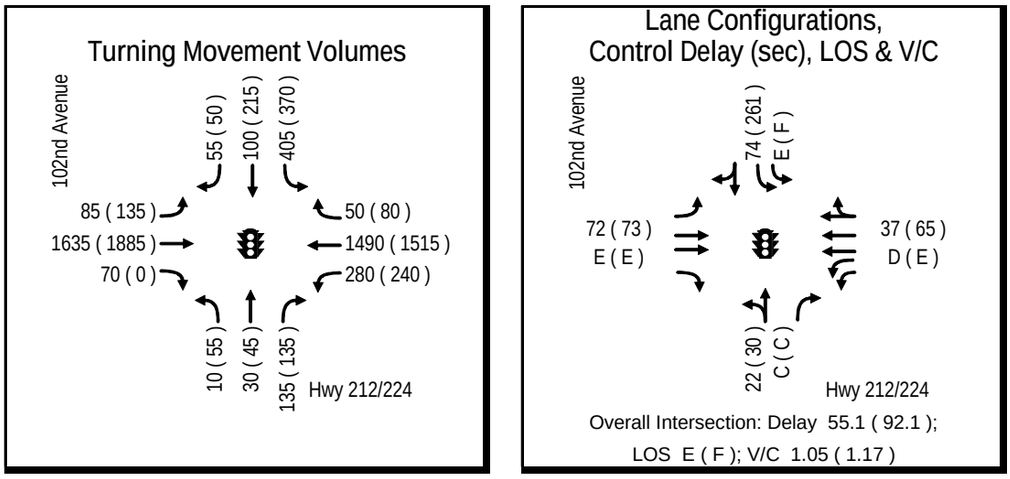


FIGURE 5-10 – LIA Analysis – OR 212/224 at 102nd Ave. – Volumes and Operations

With Tolbert Connection (Without Tolbert Connection)

Table 5-5: LIA Analysis – Queue Lengths by M

Intersection	Movement	With Tolbert	Without Tolbert	Available Storage
OR 212/224 at 102nd Ave.	EBL	>1,000	>1,000	~950
	EBT	>1,000	>1,000	-
	EBR	400	250	550
	WBL	325	450	320
	WBT	550	925	-
	WBTR	350	475	-
	NBLT	100	200	-
	NBR	125	150	-
	SBL	450	875	200
	SBTR	375	>1,000	-

Source: SimTraffic for queue lengths and DEA field study for available storage lengths

Task 2 – Overall Operations:

Table 5-6 depicts travel time differences between Lawnfield Road at 98th Avenue and 82nd Drive at OR 212/224. Trips in both directions along 82nd Drive and Lawnfield Road have faster travel times under Scenario 2. The travel routes are depicted in **FIGURE 5-11**.

Table 5-6: LIA Analysis – Task 2 Travel

	Scenario 1	**Scenario 2**
To Lawnfield Industrial Area	3 min 30 sec	3 min 10 sec
From Lawnfield Industrial Area	4 min 15 sec	4 min

Source: SimTraffic for queue lengths and DEA field study for available storage lengths

Table 5-7 summarizes the overall intersection operational results for both Scenarios 1 and 2.

Table 5-7: LIA Analysis – Task 2 Operations Summary

	Scenario 1		**Scenario 2**	
	LOS	**V/C**	**LOS**	**V/C**
98th Court at Lawnfield Road	A	0.88	A	0.88
Industrial Way at Lawnfield Road	A	0.88	A	0.88
82nd Drive at Lawnfield Road	D	0.94	C	0.86
82nd Drive at Jannsen Road	A	0.63	B	0.70
82nd Drive at Tolbert Road	B	0.70	C	0.74
82nd Drive at Clackamas Road	B	0.85	B	0.85
82nd Drive at OR 212/224	F	1.05	F	1.09
102nd Ave. at OR 212/224	F	1.17	E	1.05

Source: SimTraffic for queue lengths and DEA field study for available storage lengths

Task 2 – Summary of Findings

The intersections of Lawnfield Road at Industrial Way and at 98th Court should be converted to roundabouts in order to meet Clackamas County standards in the year 2030. The Tolbert Road extension from 82nd Drive to the east, grade separated over the Union Pacific Railroad tracks, to Industrial Way could cause some degradation in operations at the intersection of 82nd Drive at OR 212/224, which would be offset by an improvement in operations at the intersections of 102nd Avenue at OR 212/224 and 82nd Drive at Lawnfield Road.

The Tolbert Road extension would improve travel times between the LIA and OR 212/224 by an average of eight percent; it would provide increased circulation to/from and within the LIA and create an alternate and faster route to southbound I-205, allowing drivers to avoid the heavily congested OR 212/224 corridor.

West End Preferred Alternative Memorandum

DAVID EVANS AND ASSOCIATES INC.

MEMORANDUM

DATE: September 10, 2009

TO: ODOT and Clackamas County Sunrise Project PMT Members

FROM: Mike Baker P.E., Scott Harmon P.E., & Josh Anderson E.I.T.

SUBJECT: Traffic Performance of Revised Sunrise Project West End Design PROJECT: Sunrise Corridor Project, I205 to Rock Creek Junction

Purpose of this Memorandum

This memorandum compares transportation system performance associated with potential roadway facility refinements for the Sunrise Project around the project's west end along Milwaukie Expressway between I205 and Webster Road. The refinements offer an incremental level of facility improvement above what was studied under the SDEIS Build Alternatives. Traffic analysis considers performance in years: 2020, 2025, and 2030.

As studied in the Sunrise SDEIS, the segment of Milwaukie Expressway between I205 and Webster Road was shown to experience morning and evening congestion in year 2030. Of particular concern to ODOT, was the potential for this congestion to back up toward and adversely influence traffic flow along I205. Staff was asked to evaluate the potential to alleviate this congestion by adding a third westbound lane along Milwaukie Expressway between I205 and approximately ¼ mile west of Webster Road, as shown in Figure 1.

Transportation Performance Summary

The analysis indicates that the addition of a third westbound lane along Milwaukie Expressway would improve transportation system performance, relative to SDEIS assumptions, in this project area through year 2030. While design exceptions for some signalized intersections would still be needed due to substandard performance, the determination of satisfactory performance is based on the finding that the third westbound lane would alleviate concern that traffic back ups along nearby I205 offramps might adversely affect I205 performance and create safety concerns.

Transportation Performance Results

Figures 2 through 4 summarize SDEIS and refinement level performance considering congestionrelated queuing, intersection volumetocapacity ratios, and number of failing intersections for years 2020, 2025, and 2030. The results were generated using the Sunrise Project SimTraffic microsimulation model. The results account for a jump in corridor travel demand in 2020 associated with opening of the full Sunrise project.

Enhanced transportation system performance associated with the refined design is primarily the result of the third westbound lane. Additionally, traffic signal system coordination was assumed and analyzed to favor the flow of

southbound I205 offramp traffic traveling westbound through Webster Road. The additional capacity provided by the third westbound lane creates sufficient opportunity to retime signals along Milwaukie Expressway to favor this

Table 1: Potential Design Exception Locations for 2030

Intersection	2030 SDEIS Lane Configs (AM Peak)	2030 SDEIS Lane Configs (PM Peak)	2030 Enhanced SDEIS Lane Configs (AM Peak)	2030 Enhanced SDEIS Lane Configs (PM Peak)
Webster @ OR224	1.07	1.38	1.02	1.38
Pheasant @ OR224	0.83	0.83	MEETS	0.84
Johnson @ OR 224	0.94	1.11	0.99	1.01
I-205 SB @ OR224	0.82	MEETS	0.81	MEETS
I-205 NB @ OR 224	MEETS	0.86	MEETS	0.87
Deer Creek Ln @ 82nd Ave	MEETS	0.79	MEETS	0.79

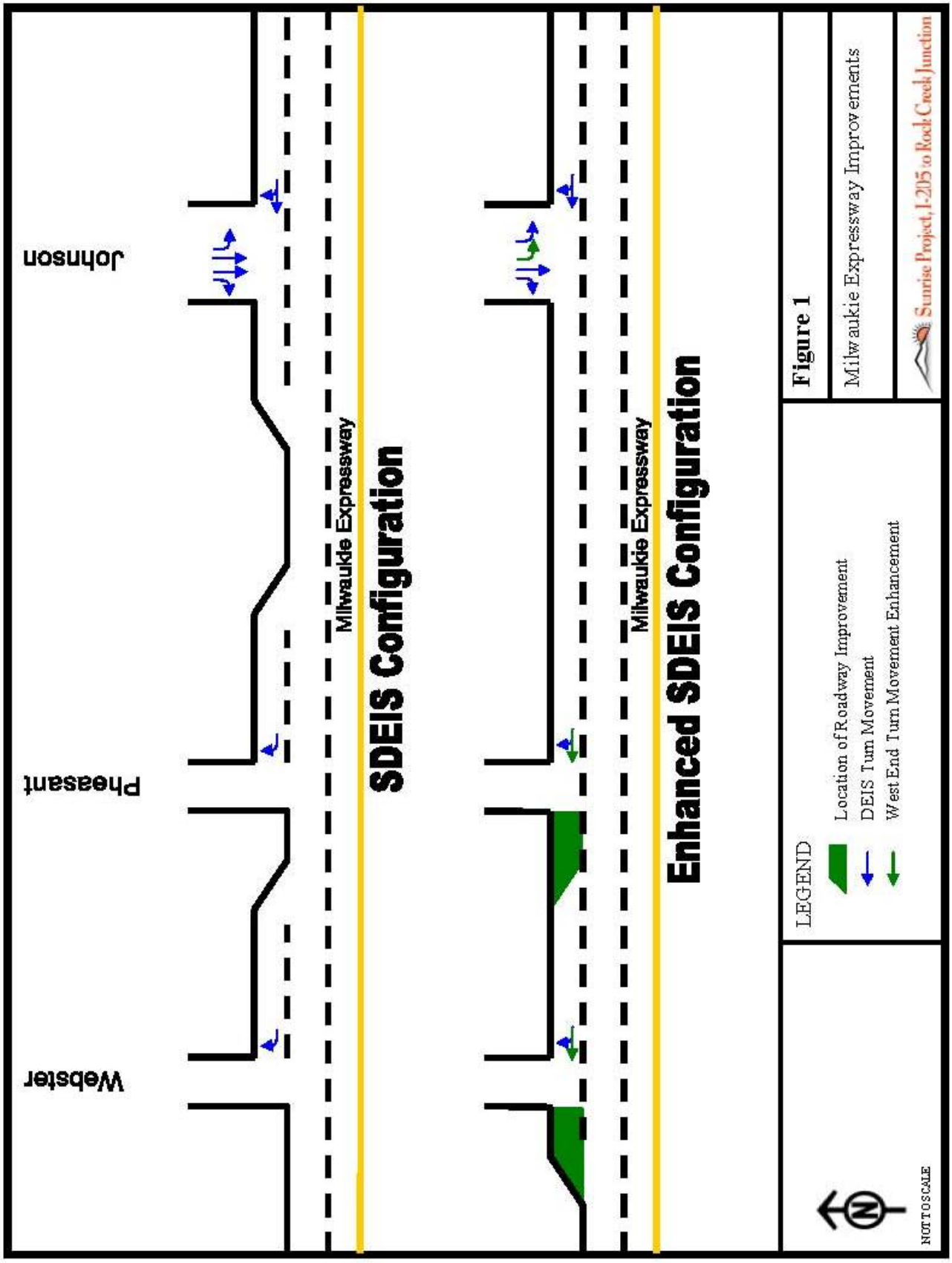
important traffic movement, and limits the southbound I205 offramp to Milwaukie Expressway queue to 400 feet (within the available storage of 940 feet).

ODOT and Clackamas County Sunrise Project PMT Members September 10, 2009 Page 2

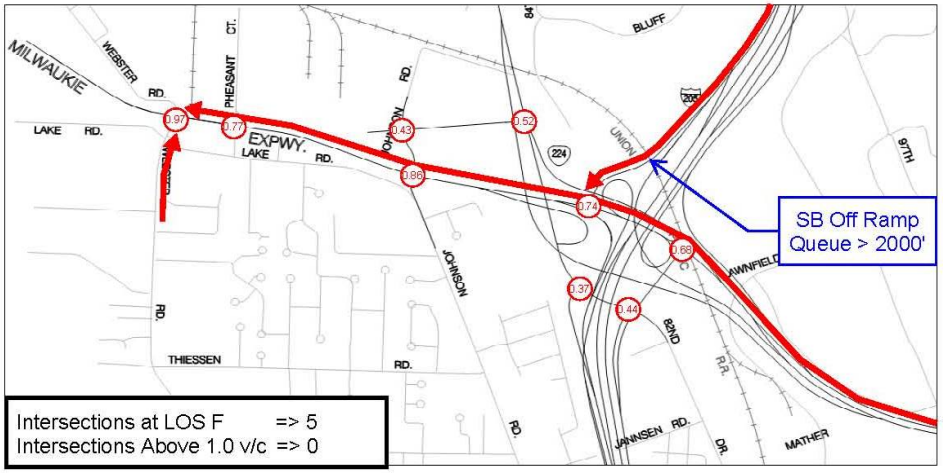
Design Exceptions

The following table depicts intersections expected to fail to meet ODOT standards in year 2030. ODOT's Highway Design Manual requires a v/c ratio of no greater than 0.75 for the design year. The intersections listed in Table 1, below, fail to meet that design criteria.

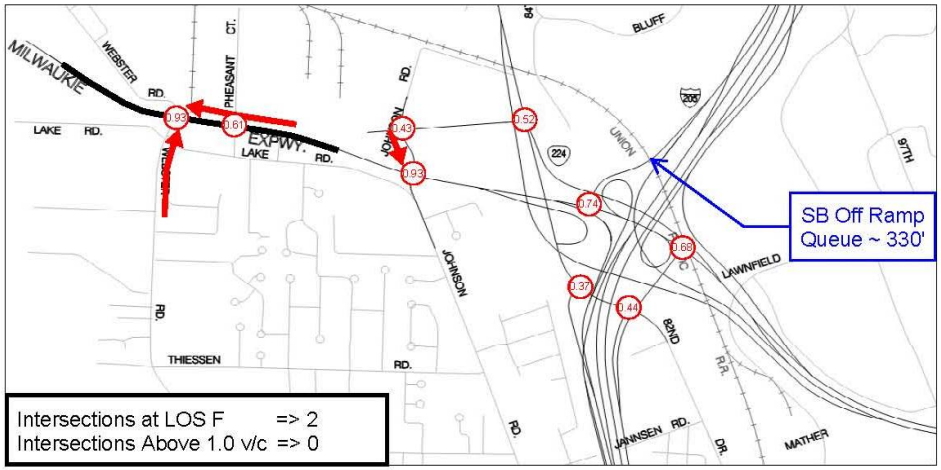
Source: DEA Synchro Model


Webster
Pheasant
Johnson
Milwaukie Expressway
SDEIS Configuration
Milwaukie Expressway
Enhanced SDEIS Configuration
LEGEND
Location of Roadway Improvement
DEIS Turn Movement
West End Turn Movement Enhancement
NOT TO SCALE
Figure 1
Milwaukie Expressway Improvements
Sunrise Project, I-205 to Rock Creek Junction

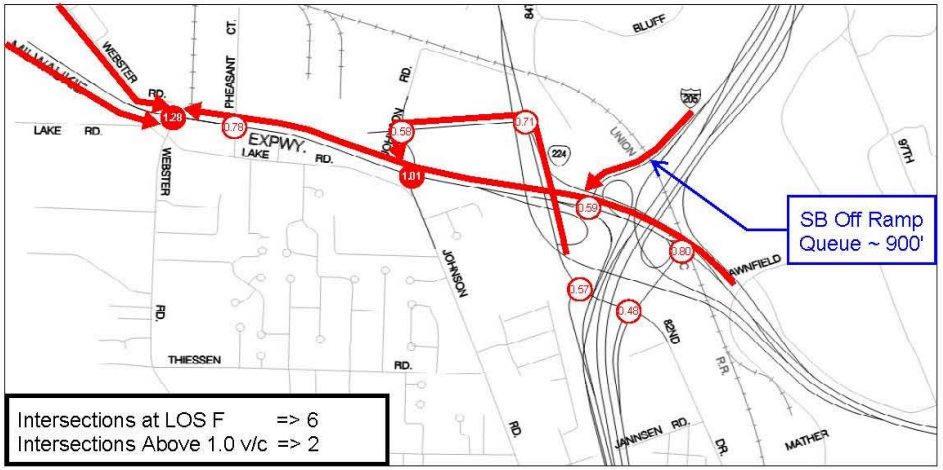
SDEIS Lane Configurations - AM Peak Hour



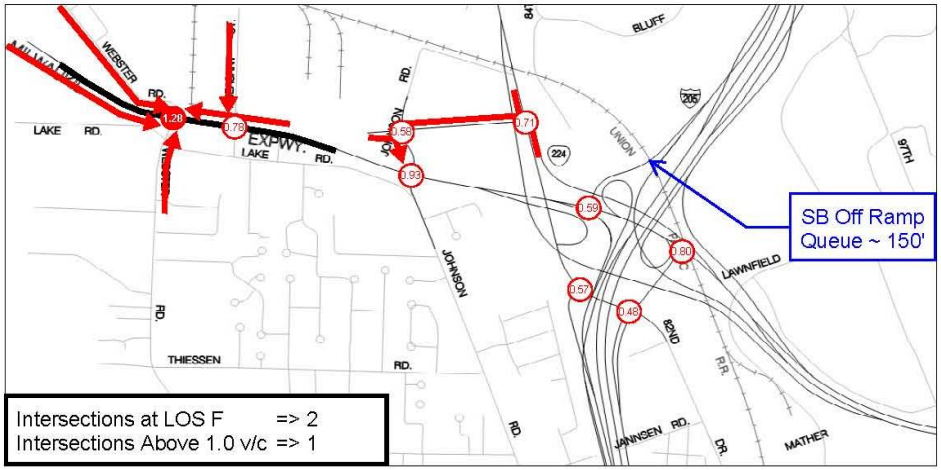
Enhanced SDEIS Lane Configurations - AM Peak Hour



SDEIS Lane Configurations - PM Peak Hour



Enhanced SDEIS Lane Configurations - PM Peak Hour



NOT TO SCALE

LEGEND

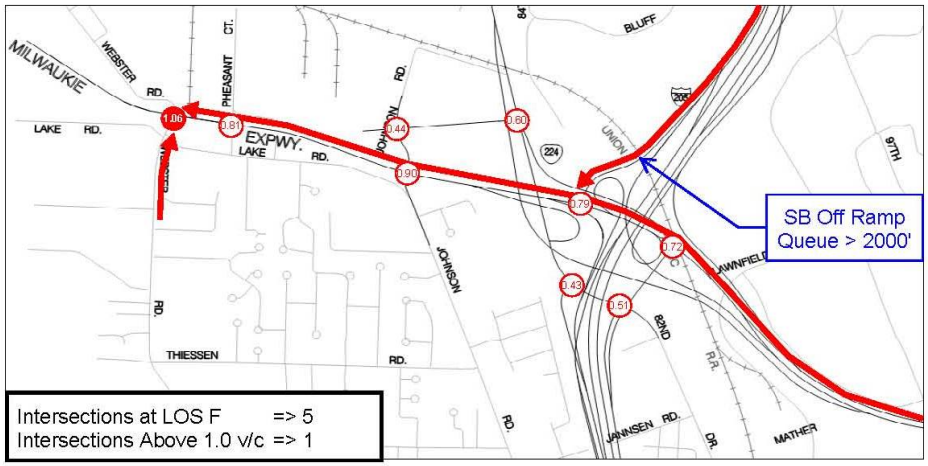
- Location and Extent of Queuing
- (x.xx) Volume to Capacity (v/c) Ratio
- Roadway Enhancement above that of the Preferred Alternative

FIGURE 2

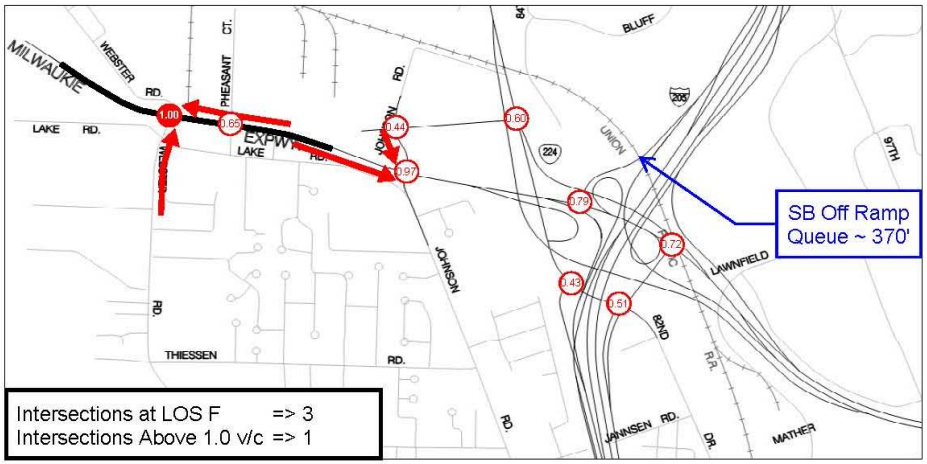
Year 2020 West End Traffic Operations

Sunrise Project, I-205 to Rock Creek Junction

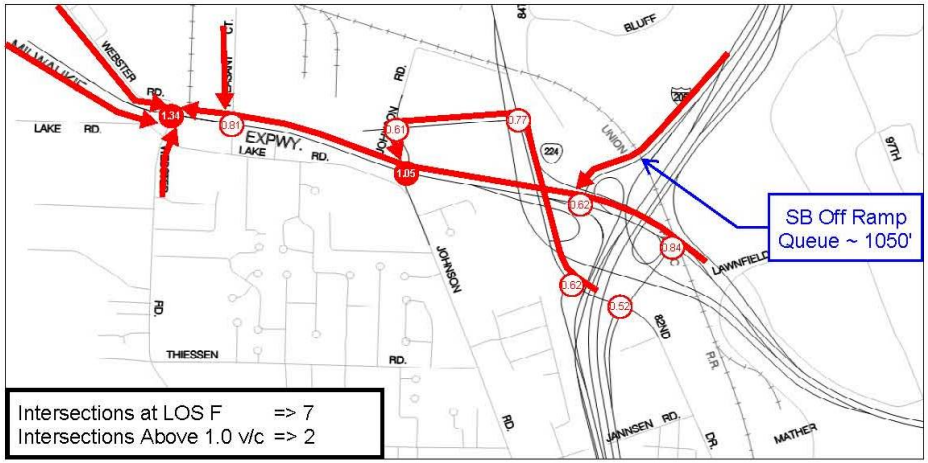
SDEIS Lane Configurations - AM Peak Hour



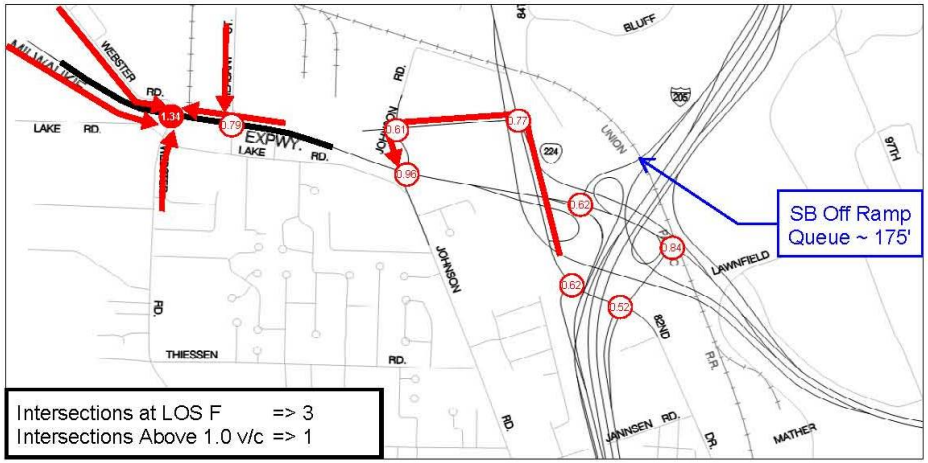
Enhanced SDEIS Lane Configurations - AM Peak Hour



SDEIS Lane Configurations - PM Peak Hour



Enhanced SDEIS Lane Configurations - PM Peak Hour



NOT TO SCALE

LEGEND

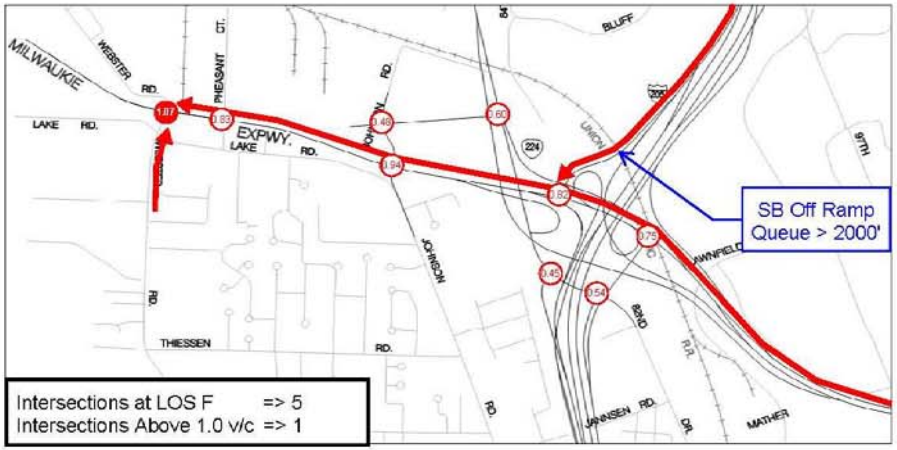
- Location and Extent of Queuing
- Volume to Capacity (v/c) Ratio
- Roadway Enhancement above that of the Preferred Alternative

FIGURE 3

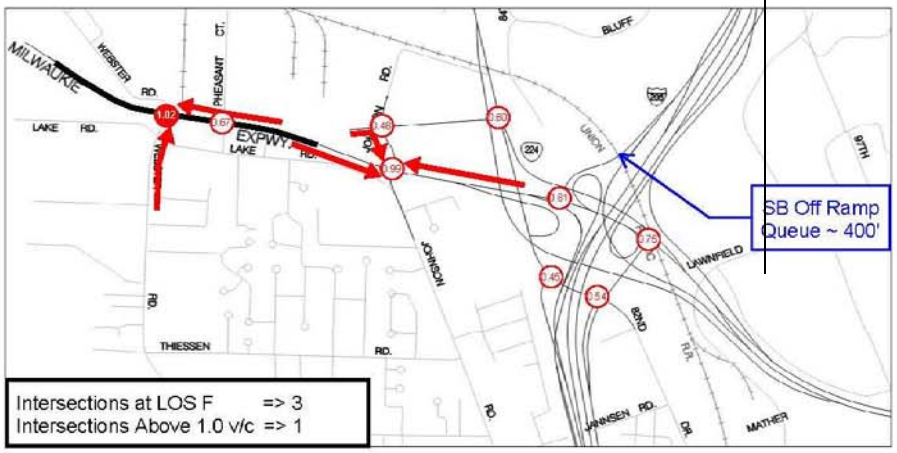
Year 2025 West End Traffic Operations

Sunrise Project, I-205 to Rock Creek Junction

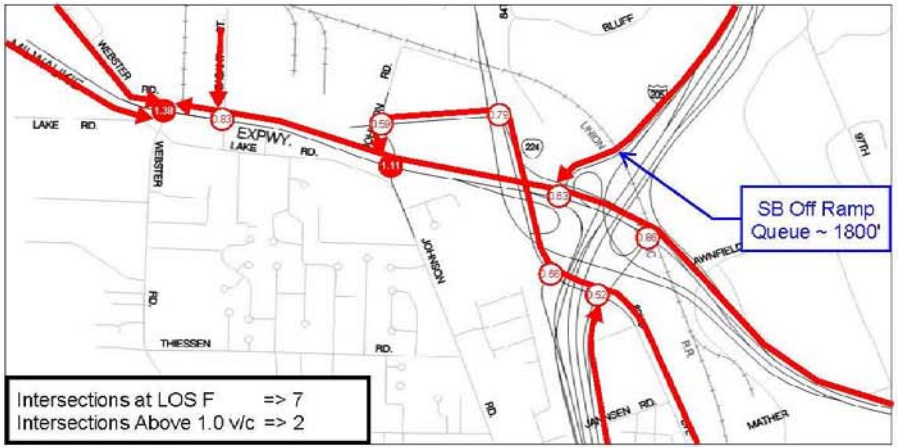
SDEIS Lane Configurations - AM Peak Hour



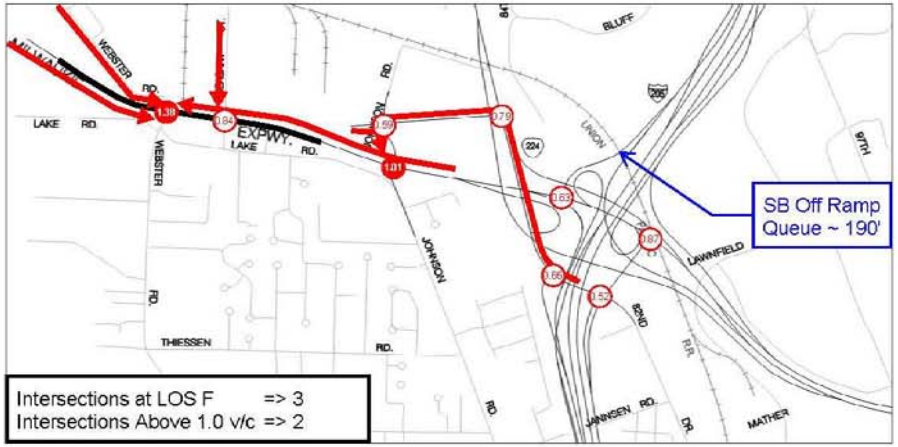
Enhanced SDEIS Lane Configurations - AM Peak Hour



SDEIS Lane Configurations - PM Peak Hour



Enhanced SDEIS Lane Configurations - PM Peak Hour



NOT TO SCALE

LEGEND

- Location and Extent of Queuing
- Volume to Capacity (v/c) Ratio
- Roadway Enhancement above that of the Preferred Alternative

FIGURE 4

Year 2030 West End Traffic Operations

Sunrise Project, I-205 to Rock Creek Junction