

MIDPOINT INTERCHANGE MANAGEMENT AREA

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Introduction

The Sunrise Project would construct a 4.9-mile, limited access facility, the Sunrise Expressway, between the Clackamas area near 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 Midpoint Interchange for the Sunrise Project would be the middle interchange for the new expressway. The new grade-separated interchange would be located north of the junction of State Highways OR 224 and 122nd Avenue. The area is within the existing Clackamas Industrial Area providing access for the distribution and industrial firms adjacent to OR-212/224.

See Midpoint Land Use Analysis for information on household and employment in this Interchange Management Area.

Summary of Operations of the Midpoint Interchange - SDEIS

The analyses for the year 2030 No Build Alternative show that the forecast level of traffic on OR 212/224 would increase substantially. As a result all of the existing intersections along OR 212/224 would experience traffic volumes that exceed their capacity during both the AM and the PM peak hours. Many of the intersections would experience a v/c of more than 1.0 during at least one of the peak hour periods.

Build Alternative 2 would construct a midpoint interchange at approximately SE 122nd, connecting the Sunrise Expressway to OR 212/224. This narrow diamond interchange configuration would add two signalized to the transportation system and substantially modify the existing intersection of 122nd Avenue and OR-212/224. The 2030 traffic forecast for this alternative, shows that the intersections at the interchange will meet overall intersection level-of-service standards (minimum LOS D) in both the AM and PM peak periods. The intersections along OR 212/224 would perform better than they would under the no-build alternative but they would still operate at a failing level of service.

Build Design Option B2 would construct a split diamond interchange with access points on OR 212/224 at 122nd Avenue and 130th Avenue. This Design Option includes a frontage road between the two new partial interchanges. From a traffic operations stand point, it would function similarly to the narrow diamond alternative proposed under Alternative 2.

Build Alternative 3 does not propose to construct a new interchange in this area. The intersections along OR 212/224 would perform better than they would under the no-build alternative but worse than they would under Alternative 2. In addition, they would still operate at a failing level of service.

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

Within the Midpoint 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 (1 st hour v/c) ¹	0.75 v/c ²
Signalized Intersections in Interchange Area (ODOT)	0.99 v/c ¹	0.75 v/c ²
Metro ⁴ - Regional Centers	LOS F (1 st hour) LOS E (2 nd hour)	LOS F (1 st hour) LOS E (2 nd hour)
Outside Regional Centers	LOS E	LOS E
Clackamas County ³ - Regional Centers	LOS E	LOS E
Outside Regional Centers	LOS D	LOS D
<ol style="list-style-type: none"> 1. Existing and no-build requirements outlined in 1999 OHP and based on v/c. 2. Build requirements outlined in 2003 ODOT HDM and based on v/c. 3. Clackamas County operating standards outlined in County Comprehensive Plan: Chapter 5. 4. Metro operating standards outlined in the 2004 RTP: Table 1.2 		

Conclusions - Midpoint Interchange

In the year 2030 No Build alternative, the existing OR 212/OR 224 intersection fails under all operational standards, including delay, queue length, intersection level-of-service and intersection volume/capacity ratio.

Alternative 2, which would provide a Midpoint interchange, has less delay and no queue problems at the interchange ramps, while Alternative 3 without the midpoint interchange would experience some queue length problems during both the AM and PM peak hours.

The Build Alternatives has one Design Options for the midpoint interchange. **Design Option B2** is a split diamond configuration with access to Highway-212/224 at 122nd and 130th Avenue. The option includes a frontage road on the south side of the mainline between 122nd and 130th Avenues.

The future (2030) regional through traffic volumes are the primary determinate of the future LOS for the Midpoint Interchange and for the major intersections with in the Midpoint Interchange Management Area

The primary source of access changes on the state highway system within in the Midpoint Interchange Management Area will be the construction of the Sunrise Project facilities. These new facilities will remove a number of existing access point on the state highways, add a new traffic signal on the state highway and modify most of the other adjacent access points. The resulting access system will provide better access management on the state highway system than the current system of access points.

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 E and is shown in Figure 1.

The Preferred Alternative within the Interchange Management Area consists of the following:

- The Sunrise Expressway is 6-lanes with auxiliary lanes between the Sunrise Expressway / I-205 System *Interchange and the* Midpoint Interchange and between *the* Midpoint Interchange the Rock Creek Junction Interchange
- Alternative 2, the narrow diamond interchange at 122nd Avenue with a connection to OR 212/224 at 122nd Avenue.
- Design Option C-2, the southern-most alignment between the mid-point and Rock Creek interchanges.
- The multi-use path that was planned between I-205 and the Midpoint Area will be extended along OR 212/224 to the Rock Creek interchange based on stakeholder and agency input.

Preferred Alternative System Intersection Performance

The traffic model forecasts for the Preferred Alternative show that it performs slightly better than the SDEIS Build Alternatives with respect to intersection operations in the Midpoint Interchange Management Area. The 135th Avenue and OR 212 / 224 Intersection is the one exception and it performs slightly worse than the SDEIS Build Alternatives. The new ramps end in the interchange management area meet the operational standard as shown in Table 2. The revised intersection at OR 212/224 and OR 212/224 and 122nd Avenue Intersection does not meet the design standards in either of the AM and PM Peak hours.

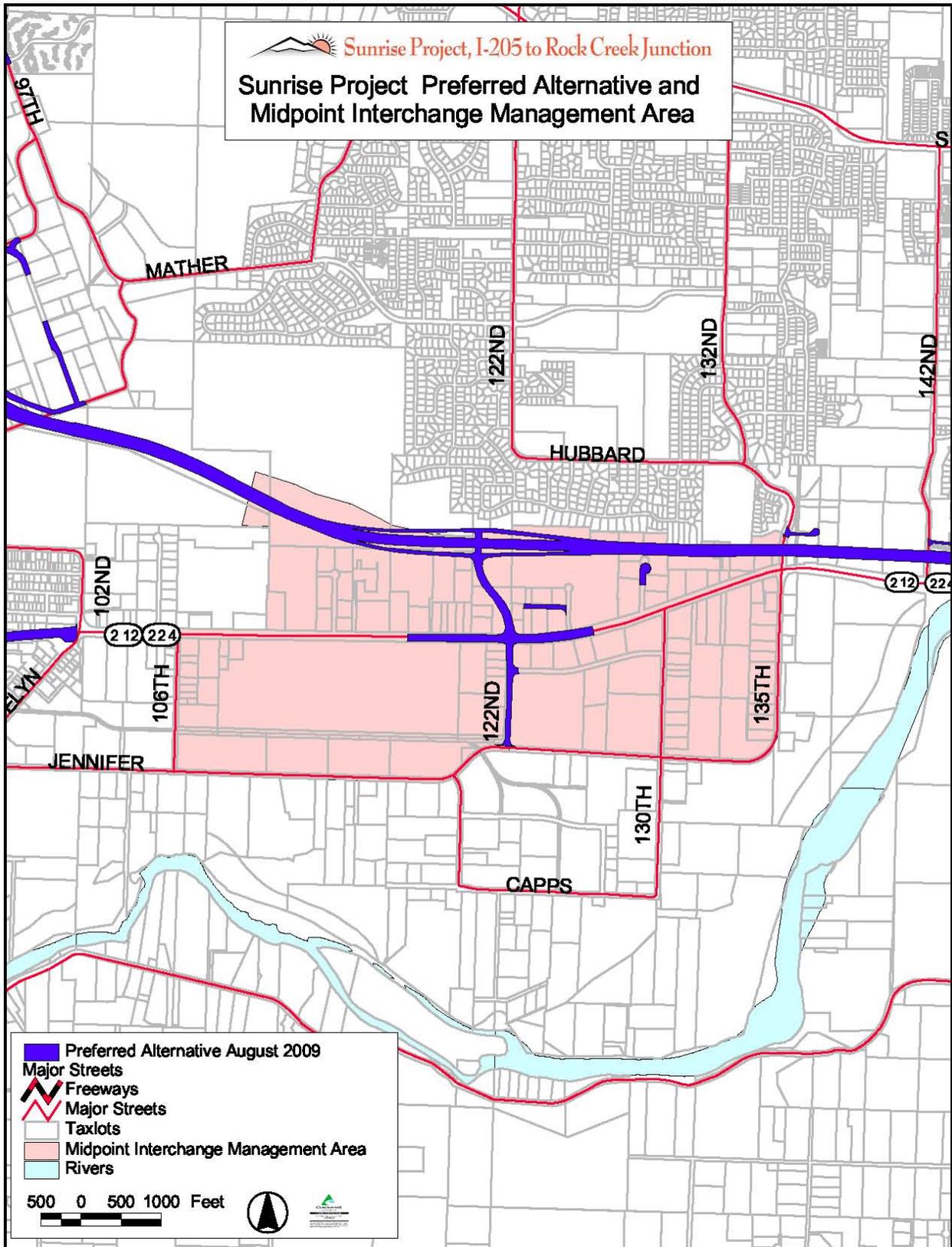
The other existing intersections on OR 212/224 meet the urban mobility standard (0.99 v/c) with the exception of the intersection 135th Avenue and OR 212 / 224. In addition, the intersection of 102nd Avenue and OR 212 / 224, to the west of the interchange management area, is also forecast to not meet the urban mobility standard (0.99 v/c). These two failing intersections create queueing conditions that affect adjacent intersections along OR 212 / 224.

Table 2 Midpoint Junction IAMP Intersection Capacity Analysis

FEIS Intersection	Intersection Name	AM Peak Hour Performance		PM Peak Hour Performance	
		1 st Hour	2 ND Hour	1 st Hour	2 ND Hour
17	OR 212/224 and Fred Meyer Warehouse Intersection (Existing Intersection)	0.77 v/c	0.77 v/c	0.73 v/c	0.80 v/c
18	OR 212/224 and 122 nd Avenue Intersection (Intersection Modified by Project)	0.81 v/c	0.70 v/c	0.84 v/c	0.91 v/c
19	OR 212/224 and 130 th Avenue Intersection (Existing Intersection)	0.75 v/c	0.67 v/c	0.89 v/c	0.92 v/c
20	OR 212/224 and 135 th Avenue Intersection (Existing Intersection)	1.13 v/c	0.94 v/c	0.88 v/c	0.88 v/c
42	Midpoint Interchange – Southern Intersection Narrow Diamond	0.25 v/c	0.24 v/c	0.24 v/c	0.27 v/c
43	Midpoint Interchange – Northern Intersection Narrow Diamond	0.46 v/c	0.43 v/c	0.26 v/c	0.28 v/c

Future Accesses on State Facilities

The Sunrise Project Preferred Alternative will create only minor modifications of the existing local circulation systems in and around the Midpoint Interchange Management Area.



OAR 734 Access Spacing Standards

The Midpoint Interchange Management Area is located at the bottom of the Clackamas Bluff and is nearly completely developed. The residential land to the north of the can not directly access the Midpoint Interchange due to topographical conditions – a 100 foot plus vertical separation between the interchange and the residential area.

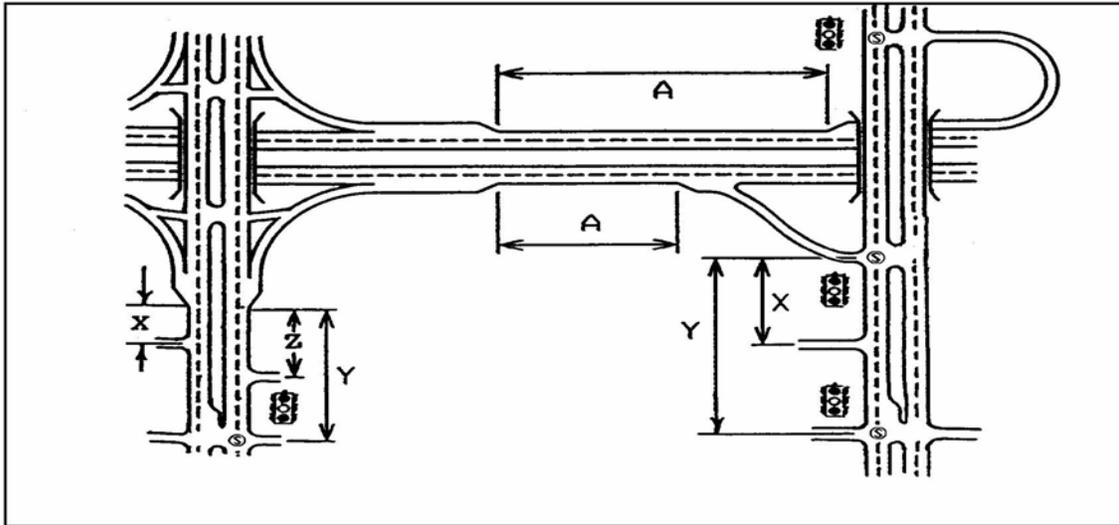
The area meets the definition of a “Fully Developed Urban” interchange management area, with associated spacing standards. (See Table 3) There are no major road facilities planned for the area outside of those that will be built as part of the Sunrise System. All new access to the state highway system will be based on the interchange spacing standards shown below.

Table 3 Minimum Spacing Standards Applicable to Freeway Interchanges with Multi-Lane Crossroads

Type of Area* (OAR 734-051-0125) (OHP Table 19)	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 2 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 Midpoint interchange management area will be the future construction of the Sunrise Project facilities. These new facilities will remove a small number of existing approach road access points (driveways) and modify other approach road points to the existing state highways.

Existing Approach Roads Changes

The following section describes the existing approach road locations within the Midpoint interchange management area and what changes will be made to these access points as a result of the Sunrise Project (see Tables 4 and 5).

The subsequent section describes the future access points that will exist as a result of the Sunrise Project. Due to the amount of existing development in the Interchange Management Area, there are limited opportunities to reduce the number of approach roads within the interchange management area below the level that will exist after Sunrise Project construction completed.

Table 4 Midpoint IAMP Area Existing Approach Road Points -- Driveways

ID Number	Approach Road Type	Approach Road Location	Sunrise Project Impact on Existing Approach Road
1	Private Street	10701 SE Highway 212	No Project Impacts
2	Private Street	10701 SE Highway 212	No Project Impacts
3	Commercial Driveway	11235 SE Highway 212	No Project Impacts
4	Commercial Driveway	11241 SE Highway 212	No Project Impacts
5	Commercial Driveway	11465 SE Highway 212	No Project Impacts
6	Commercial Driveway	11500 SE Highway 212	No Project Impacts
7	Commercial Driveway	11500 SE Highway 212	No Project Impacts
8	Commercial Driveway	10834 SE Highway 212	No Project Impacts
9	Commercial Driveway	10712 SE Highway 212	No Project Impacts
10	Commercial Driveway	10600 SE Highway 212	No Project Impacts
11	Commercial Driveway	10600 SE Highway 212	No Project Impacts
12	Commercial Driveway	10600 SE Highway 212	No Project Impacts
13	Commercial Driveway	11767 SE Highway 212	No Project Impacts
14	Commercial Driveway	11811 SE Highway 212	Minor Modification – ROW and Possible conversion to Right In / Right out by raised median
15	Commercial Driveway	11901 SE Highway 212	Minor Modification – ROW and Possible conversion to Right In / Right out by raised median
16	Commercial Driveway	11951 SE Highway 212	Minor Modification – ROW and Possible conversion to Right In / Right out by raised median
17	Commercial Driveway	12111 SE Highway 212	Minor Modification – ROW and Possible conversion to Right In / Right out by raised median
18	Commercial Driveway	12249 SE Highway 212	Convert to Project Street
19	Commercial Driveway	12275 SE Highway 212	Closed - ROW Purchase
20	Commercial Driveway	12301 SE Highway 212	Closed - ROW Purchase
21	Commercial Driveway	12301 SE Highway 212	Closed - ROW Purchase

ID Number	Approach Road Type	Approach Road Location	Sunrise Project Impact on Existing Approach Road
22	Commercial Driveway	12128 SE Highway 212	Closed - ROW Purchase
23	Commercial Driveway	15927 SE 122nd Avenue	No Project Impacts
24	Commercial Driveway	15981 SE 122nd Avenue	No Project Impacts
25	Commercial Driveway	15981 SE 122nd Avenue	No Project Impacts
26	Commercial Driveway	12300 SE Highway 212	Minor Modification - ROW
27	Commercial Driveway	12250 SE Ford Street	Minor Modification - ROW
28	Commercial Driveway	15981 SE 122nd Avenue	No Project Impacts
29	Commercial Driveway	11500 SE Highway 212	Minor Modification – ROW and Possible conversion to Right In / Right out by raised median
30	Commercial Driveway	16253 SE 122nd Avenue	No Project Impacts
31	Commercial Driveway	12250 SE Ford Street	No Project Impacts
32	Commercial Driveway	16121 SE122nd Avenue	No Project Impacts
33	Commercial Driveway	12601 SE Highway 212	Closed - ROW Purchase
34	Commercial Driveway	12601 SE Highway 212	No Project Impacts
35	Commercial Driveway	12900 SE Highway 212	No Project Impacts
36	Commercial Driveway	12710 SE Highway 212	No Project Impacts
37	Commercial Driveway	12300 SE Highway 212	No Project Impacts
38	Commercial Driveway	13003 SE Highway 212	No Project Impacts
39	Commercial Driveway	13012 SE Highway 212	No Project Impacts
40	Commercial Driveway	15730 SE 130th Avenue	No Project Impacts
41	Commercial Driveway	15975 SE 130th Avenue	No Project Impacts
42	Commercial Driveway	15975 SE 130th Avenue	No Project Impacts
43	Commercial Driveway	15975 SE 130th Avenue	No Project Impacts
44	Commercial Driveway	13111 SE Highway 212	No Project Impacts
45	Commercial Driveway	13273 SE Highway 212	No Project Impacts
46	Commercial Driveway	13488 SE Highway 212	No Project Impacts
47	Commercial Driveway	13019 SE Jennifer Street	No Project Impacts
48	Commercial Driveway	13489 SE Highway 212	Closed - ROW Purchase
49	Commercial Driveway	13499 SE Highway 212	Closed - ROW Purchase
50	Commercial Driveway	13488 SE Highway 212	No Project Impacts
51	Commercial Driveway	15606 SE 135th Avenue	No Project Impacts
52	Private Street	13640 SE Highway 212	No Project Impacts
53	Commercial Driveway	15312 SE Hubbard Road	Closed - ROW Purchase

ID Number	Approach Road Type	Approach Road Location	Sunrise Project Impact on Existing Approach Road
54	Residential Driveway	15319 SE Hubbard Road	Closed - ROW Purchase
55	Commercial Driveway	11500 SE Highway 212	No Project Impacts
56	Commercial Driveway	11500 SE Highway 212	Minor Modification – Possible conversion to Right In / Right out by raised median

Table 5 Midpoint IAMP Area Existing Approach Road Points -- Intersections

ID Number	Approach Road Type	Approach Road Location	Impacts of Sunrise Project
A	Existing Local Street	OR 212 / 224 and 122nd Avenue	Major Modification of an Existing Intersection
B	Existing Local Street	122nd Avenue and Ford Street	Minor Modification of an Existing Intersection
D	Existing Local Street	OR 212 / 224 and 125th Court	Minor Modification of an Existing Intersection

Figure 3 on the following page shows the Existing Local Approach Road locations as listed in Tables 4 and 5.

Future Approach Roads Changes with the Sunrise Project

The Sunrise Project Preferred Alternative has little direct impact on the local circulation systems in and around the Midpoint Interchange Management Area. Nearly all of the Sunrise Project improvements are located along the northern edge of the Interchange Management Area, with the exception of the new arterial connection from the Sunrise Expressway to OR 212 / 224 at 122nd Avenue. This 1,000 foot long arterial will provide the opportunity to purchase access control rights along the first 1,000 feet of this road south of the interchange. This area will provide a majority of the area with required access spacing limitations within 1,320' of ramp terminals for this interchange.

The future road approaches are listed in Tables 6 and 7 and shown in Figure 4.

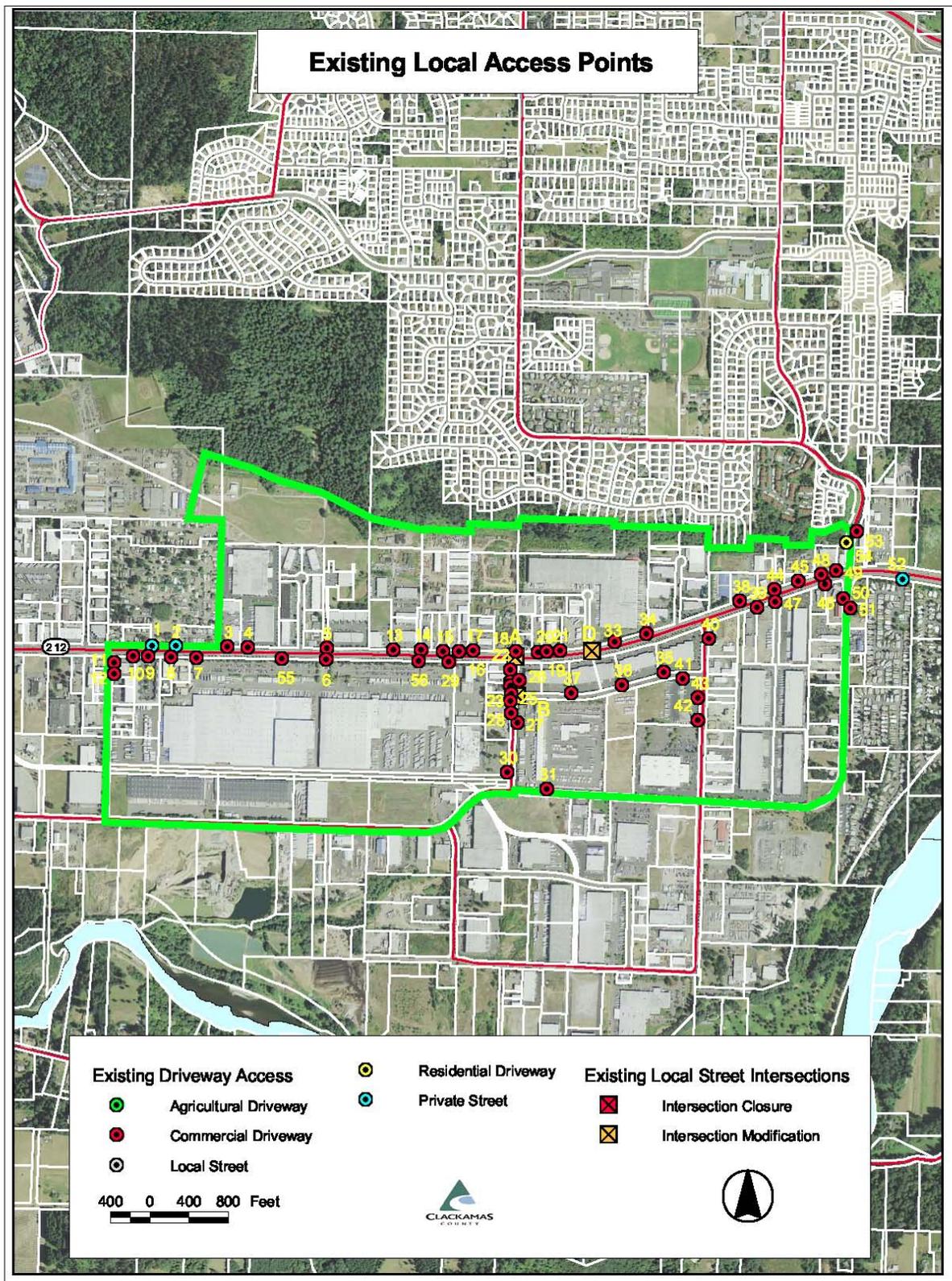


Figure 3 Existing Local Approach Road Points- Prior to Sunrise Project

Table 6 Midpoint IAMP Area Future Approach Road Points - Driveways

ID Number	Approach Road Type	Approach Road Location	Sunrise Project Impact on Existing Approach Road
14	Commercial Driveway	11811 SE Highway 212	Minor Modification – ROW and Possible conversion to Right In / Right out by raised median
15	Commercial Driveway	11901 SE Highway 212	Minor Modification – ROW and Possible conversion to Right In / Right out by raised median
16	Commercial Driveway	11951 SE Highway 212	Minor Modification – ROW and Possible conversion to Right In / Right out by raised median
17	Commercial Driveway	12111 SE Highway 212	Minor Modification – ROW and Possible conversion to Right In / Right out by raised median
18	Commercial Driveway	12249 SE Highway 212	Convert to Project Street
19	Commercial Driveway	12275 SE Highway 212	Closed - ROW Purchase
20	Commercial Driveway	12301 SE Highway 212	Closed - ROW Purchase
21	Commercial Driveway	12301 SE Highway 212	Closed - ROW Purchase
22	Commercial Driveway	12128 SE Highway 212	Closed - ROW Purchase
26	Commercial Driveway	12300 SE Highway 212	Minor Modification - ROW
27	Commercial Driveway	12250 SE Ford Street	Minor Modification - ROW
29	Commercial Driveway	11500 SE Highway 212	Minor Modification – ROW and Possible conversion to Right In / Right out by raised median
33	Commercial Driveway	12601 SE Highway 212	Closed - ROW Purchase
48	Commercial Driveway	13489 SE Highway 212	Closed - ROW Purchase
49	Commercial Driveway	13499 SE Highway 212	Closed - ROW Purchase
53	Commercial Driveway	15312 SE Hubbard Road	Closed - ROW Purchase
54	Residential Driveway	15319 SE Hubbard Road	Closed - ROW Purchase
56	Commercial Driveway	11500 SE Highway 212	Minor Modification – Possible conversion to Right In / Right out by raised median

Table 7 Midpoint IAMP Area Future Approach Road Points - Local Streets

ID Number	Approach Road Type	Approach Road Location	Impacts of Sunrise Project
A	Existing Local Street	OR 212 / 224 and 122nd Avenue	Major Modification of an Existing Intersection
B	Existing Local Street	122nd Avenue and Ford Street	Minor Modification of an Existing Intersection
C	New Local Street	125th Court and New Local Street	New Connection to a Local Street
D	Existing Local Street	OR 212 / 224 and 125th Court	Minor Modification of an Existing Intersection Possible conversion to Right In / Right out by raised median
E	New Local Street	Hubbard Road and New Local Street	New Connection to a Local Street

New Land Development and Access to the Local Circulation System

Within the Midpoint 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

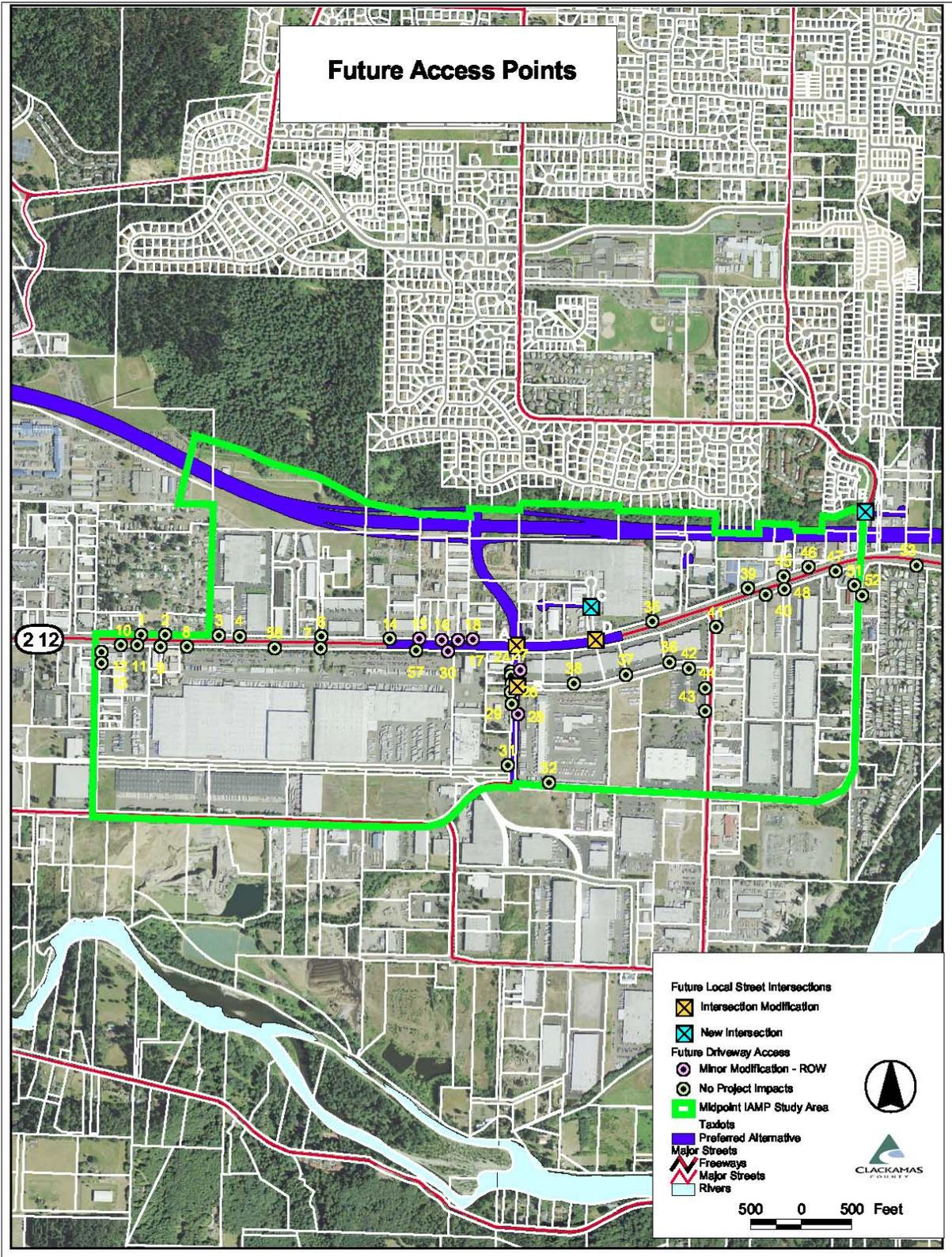
Access Management Issues

The process of building the Sunrise Project improvements will remove a number of 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 construction of the new intersection at OR 212 / 224 and 122nd Avenue will create safety concerns that will require some additional access restrictions along OR 212 / 224. The intersection configuration will include a west approach that has dual left turn lanes to allow access to the Midpoint Interchange and an east approach that prohibits left turns to southbound 122nd Avenue. This configuration is necessary to maintain as much operational capacity as possible. Raised median islands will be installed on both the east and west approaches to 122nd Avenue. The exact limits of the median islands have yet to be determined and will be part of the final design of this intersection. At their maximum, the median islands would be located on either side of the 122nd Avenue intersection from the vicinity of the 125th Court / OR 212 / 224 intersection to the signalized Fred Meyer Distribution Center / OR 212 / 224 intersection.

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 4 Future Local Street Intersections



Local Government Access Spacing Standards

Local government access spacing standards are generally less restrictive than 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 8 as follows:

Table 8 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

Happy Valley access spacing standards are found in the Happy Valley Transportation System Plan and are shown in Table 9 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 9. 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 9 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

Existing Transportation Facilities

Roadways are designated by jurisdictions with specific “functional classifications” to indicate the mobility and accessibility functions that they serve. The functional classification also signifies the design needed for existing or anticipated traffic volumes, speeds and multi-modal uses for that roadway. Clackamas County uses 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). The Oregon Department of Transportation (ODOT) also applies functional classifications to the state highway system. **Figure 5** shows the Existing Network and road Functional Classification.

The Oregon Highway Plan designates OR 212 / 224 - from I-205 to 172nd Avenue –as a Statewide Highway, National Highway System (NHS) and Freight Route. SE 122nd Avenue is a county collector south of OR-212/224 that will connect to the new midpoint interchange access road that links up to OR-212/224. 135th Avenue east of the midpoint interchange is classified as a minor arterial. Jennifer St and 135th are a minor arterial located south of Hwy-212/224.

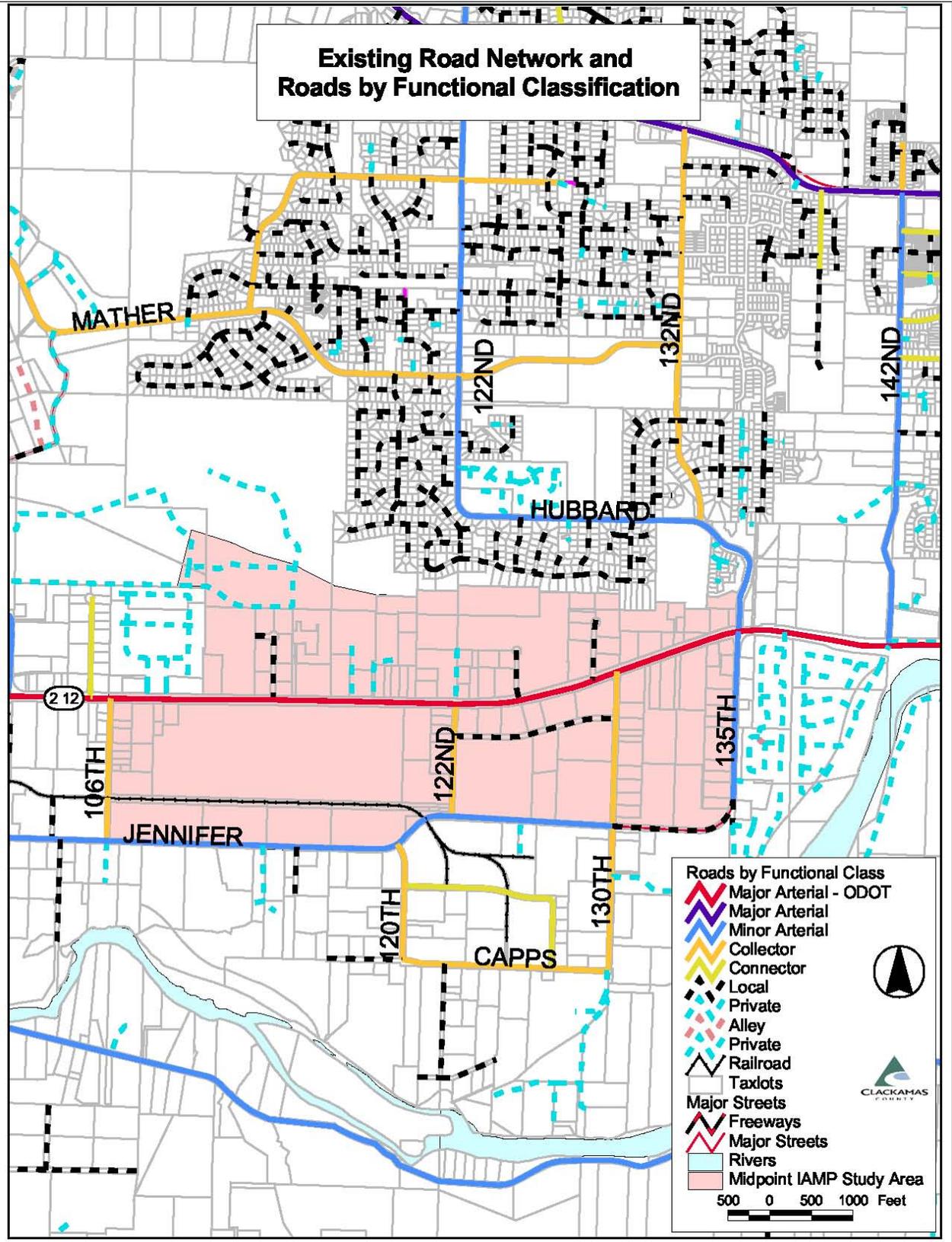
Existing Traffic Volumes and System Operations

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

Road Jurisdiction, Average Daily Traffic (ADT), and Level of Service

The road network is planned, constructed and maintained through cooperation of public and private interests, including state, county, cities and private owners. In the Management area, the state of Oregon, Clackamas County and City of Happy Valley all contribute to this road system. **Figure 6** shows the area’s road network and jurisdictions’ ownerships, including private and local roads. Also on this figure are the Average Daily Traffic (ADT) volumes (an average of the 24-hour traffic volume by direction) on sections of roadway. The percentage of the ADT that is heavy truck traffic also is noted.

Figure 5 Existing Network And Road Functional Classification



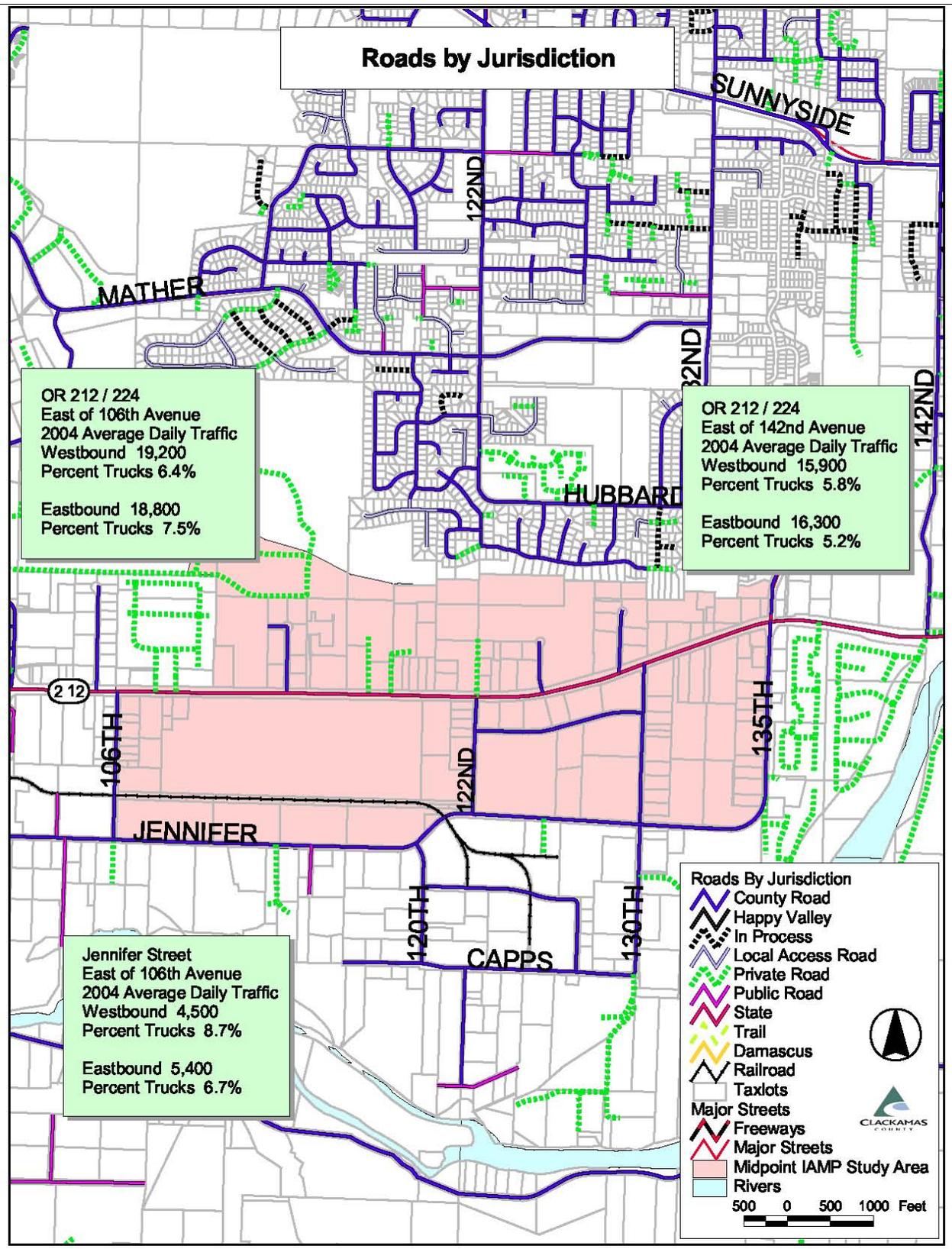


Figure 6 Roads by Jurisdiction and Existing ADT

The ADT by direction, percentage heavy truck traffic and total traffic are listed next in **Table 10**.

TABLE 10 EXISTING CONDITIONS – 2004, AVERAGE DAILY TRAFFIC AND PERCENTAGE TRUCKS

AVERAGE DAILY TRAFFIC (2004) (PERCENTAGE HEAVY TRUCKS)			
Direction	OR 212/224, East of 106 Avenue	OR 212/224, East of 142nd Avenue	Jennifer St East of 106th Avenue
Eastbound	18,800 (7.5% trucks)	16,300 (5.2% trucks)	5,400 (6.7 % trucks)
Westbound	19,200 (6.4% trucks)	15,900 (5.8% trucks)	4,500 (8.7% trucks)
TOTAL	38,000 (6.9% trucks)	32,200 (5.5% trucks)	9,900 (7.5% trucks)

An arterial level-of-service (LOS) is determined to show the overall functioning of the roadway sections.

Figure 7 and **Figure 8** show the road segments with congestion and the arterial LOS for these segments during the AM and PM peak hours respectively.

Analysis showed that during the AM peak period, congestion is found for only at OR 212/224/135th intersection in the Management area. Westbound lanes of OR 212/224 are congested around SE 135th Avenue to SE 142nd Avenue west of this Interchange Management area. This highway segment has LOS F.

The PM peak period does experience congestion on OR 212/224 at the OR212/224/135th Avenue intersection.

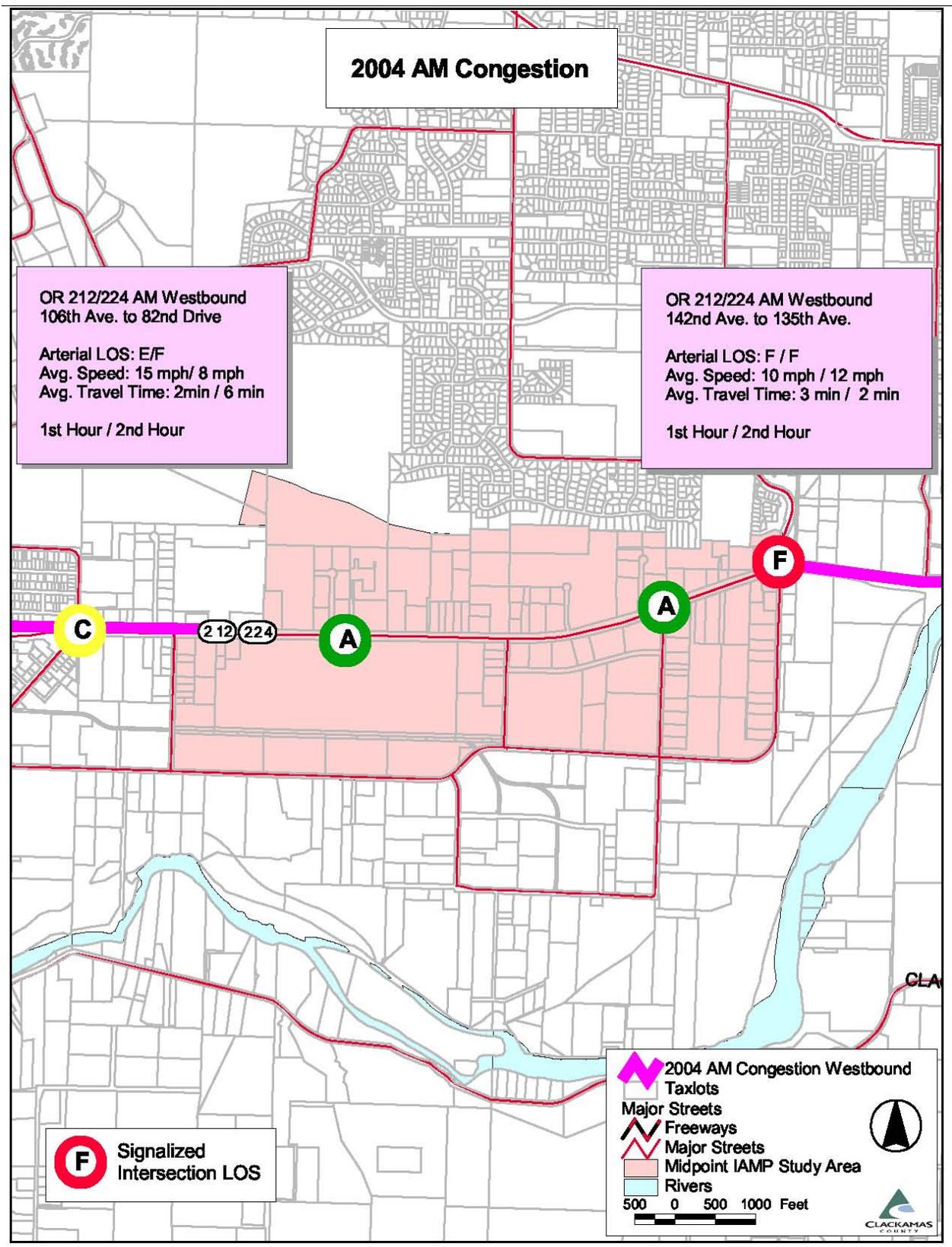


Figure 7 Existing AM Congestion 2004

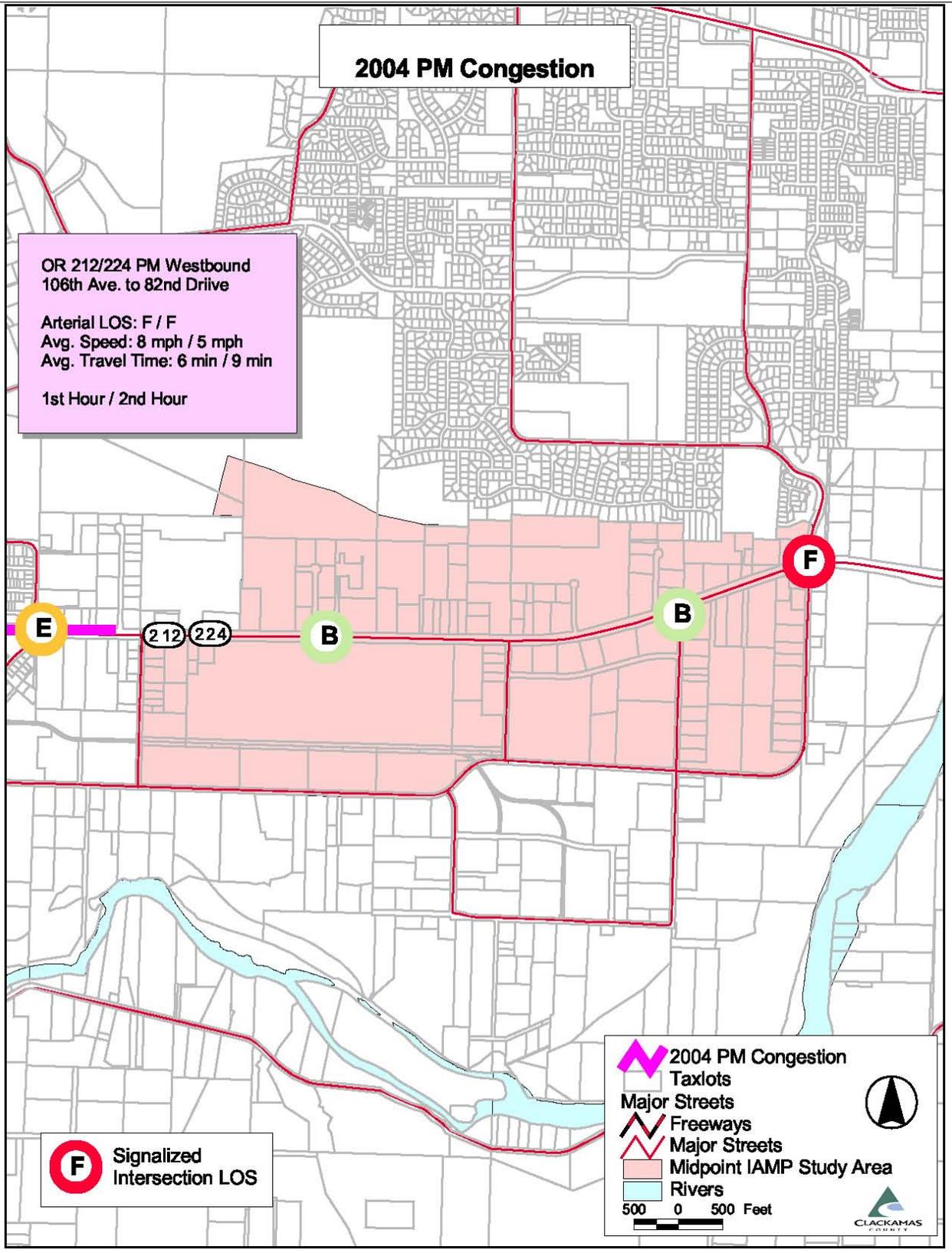


Figure 8 Existing PM Congestion 2004

Intersection Configurations and Operations Analyses

For ease of comparing intersection operations between Existing Conditions and the Alternatives, details about the intersections (including lane delay and queuing, and intersection level-of-service and volume-to-capacity ratios) are described in “Intersection Operations” and summarized in **Table 17**.

The basic configurations in the existing intersections are as follows:

- **The Midpoint interchange** is a new diamond interchange accessing Hwy-212/224 by a new road that intersects Hwy-212/224 at 122nd Avenue. This road is 4 travel lanes plus turn lanes at 122nd Avenue.
- **122nd/Hwy-212/224 is currently a T intersection** that will be changed to a 4 legged intersection with the construction of the Midpoint interchange access connection. A traffic signal will be added with turn lanes.
- **130th/Hwy-212/224 is a signalized T intersection.** 130th has two travel lanes and a left turn lane. Hwy-212/224 is a 4 lane arterial with a left turn lane at 130th.
- **135th/Hwy-212/224 is a signalized intersection.** 135th has one travel lane, right turn lanes and left turn lanes. Hwy-212/224 is a 4 lane arterial with a left turn lanes at 135th.

Traffic Control

The existing network does not have medians or turn restrictions.

Crash Locations and Types

The Midpoint Interchange Management Area included one of the seven sub-corridors that were used to analyze safety in the Sunrise Corridor. The applicable corridors are as follows:

- Clackamas Highway (from the Fred Meyer Distribution Center, just east of SE 106th, to Rock Creek Junction);

The analysis included a review of Planning Research Corporation crash listings (1998 to 2002) provided by ODOT, Safety Priority Index System (SPIS) data from ODOT, Clackamas County SPIS data, and calculated crash rates. The results showed that the one sub-corridors had crash rates lower than comparable statewide facilities. **Figure 9** shows the corridor safety summaries for the Midpoint Area.

The crash rates for intersections in the Midpoint Interchange Management Area were each less than 0.9, so additional analyses were not performed.

- SPIS Crash rate was 0.22 at OR 212/224 @ 152nd Avenue;

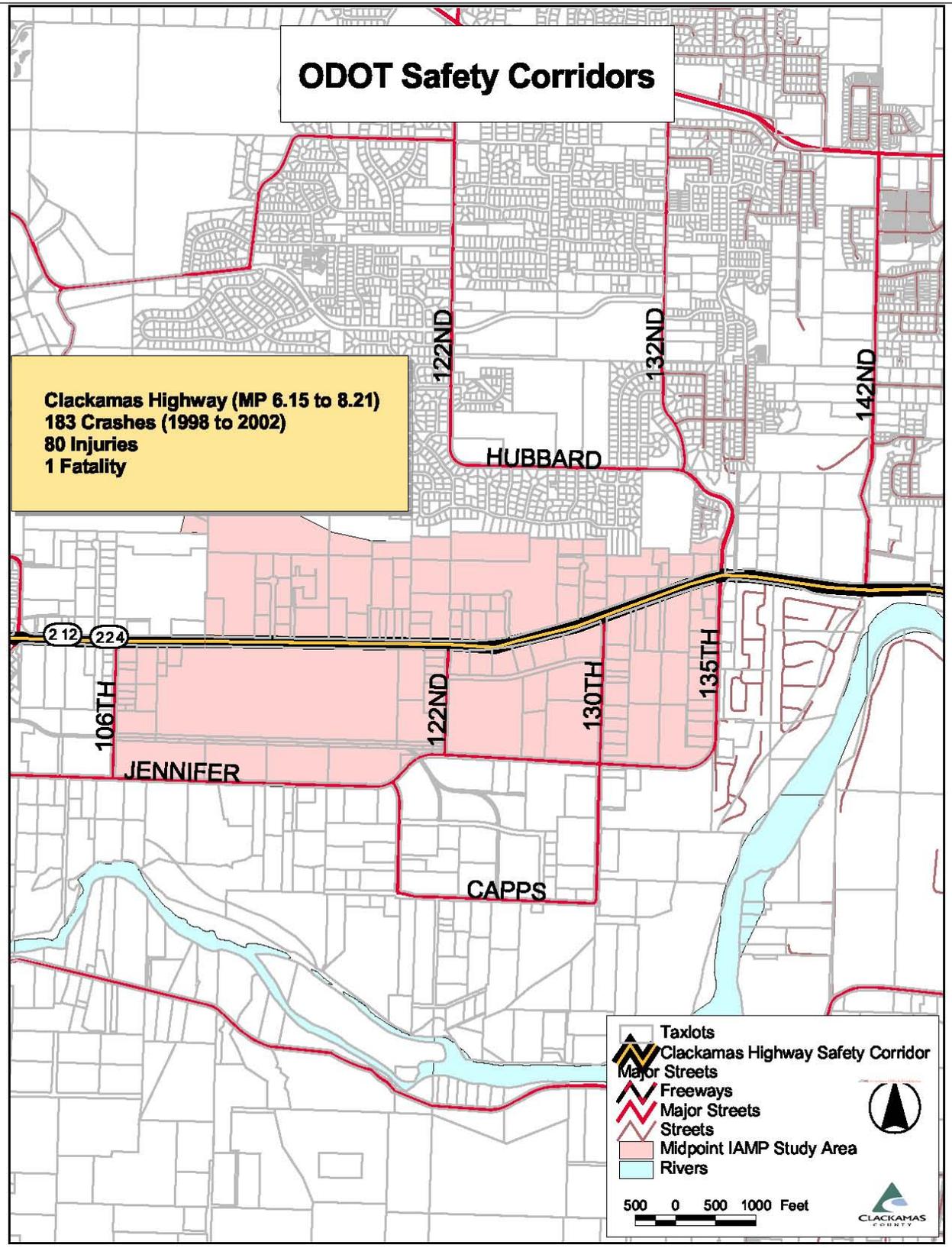


Figure 9 ODOT Safety Corridors

Effect of Traffic Operations on the Facilities System

The existing OR 212/224 corridor transportation system currently experiences unacceptable levels of congestion and delay during peak travel periods, which adversely affect system reliability, efficiency, safety, and performance.

Westbound congestion on OR 212/224 occurs as a result of the 135th Avenue and OR 212 / 224 intersection operating at a failing level of service during the AM peak period. The west end of the Midpoint interchange management area is impacted by AM peak hour congestion stretching to the east from the 82nd Drive and OR 212 / 224 intersection.

During the PM peak hours, traffic eastbound on OR 212 experiences congestion due to the failing intersection at the intersection of 135th Avenue and OR 212 / 224. The queuing problems associated with the 82nd Drive and OR 212 / 224 intersection continue to be problem for west bound traffic during the PM peak period.

Transit Services

TriMet Bus Route 31 serves the Midpoint Interchange Management Area with service between downtown Portland and the City of Estacada via OR 212/224 and OR 224. Route 31 is a regional bus route with service on weekdays and weekends. It has a 20-minute headways during the weekday morning commute and 30-minute headways the rest of the day. Weekend service provides 30-minute headways on Saturdays, from 7 AM to 6 PM, and 60-minute headways Saturday evenings and Sundays. The route accesses the Clackamas Town Center Transit Center, the Milwaukie Transit Center, and park-and-ride lots at the Clackamas Town Center, Carver and City of Estacada.

Just east of the Midpoint Interchange Management Area, TriMet Bus Route 156 operates along a section of OR 212/224, with service connecting the Highway to Sunnyside Road along SE 152nd Avenue. This route overlaps with Route 31 on OR 212/224 between SE 152nd Avenue and SE 135th Avenue; it operates on 60-minute headways on weekdays and weekends.

Bike and Pedestrian Networks

OR 212/224 has bicycle lanes with riding conditions rated as “fair” due to the high volume of truck traffic, road debris and high traffic speeds.

Bicycle counts taken at Midpoint Junction in May 2004 found no bicyclists during the AM peak (6:00 – 9:00 AM), while 33 bicyclists were counted during the PM peak (3:30 – 4:30 PM). The technical analysis found that the bicycle counts compare favorably with PM Peak hour bicycle counts at intersections around Portland.

The walking conditions for sidewalks along OR 212/224 also are rated as “fair” due to the high volume of truck traffic, high traffic speeds, and traffic noise. Pedestrian counts were taken at Midpoint Junction in May 2004; during the AM peak, 14 pedestrians were counted and during the PM peak there were 23 pedestrians.

Alternative 1: Year 2030 No-Build

Alternative 1 - Transportation Facilities

The 2030 No Build Alternative assumes the same road network that currently forms the Existing system plus the addition of programmed facilities. There are no planned improvements within the Midpoint Interchange Management Area. The No build does assume several projects within the Sunrise Project Study Area that either is expected to be constructed within the 5 years or serve the exception lands south of the Clackamas River. See **Figure 10** showing the Sunrise Project Alternative 1 and Other Assumed Transportation Facilities within the Midpoint Interchange Management Area.

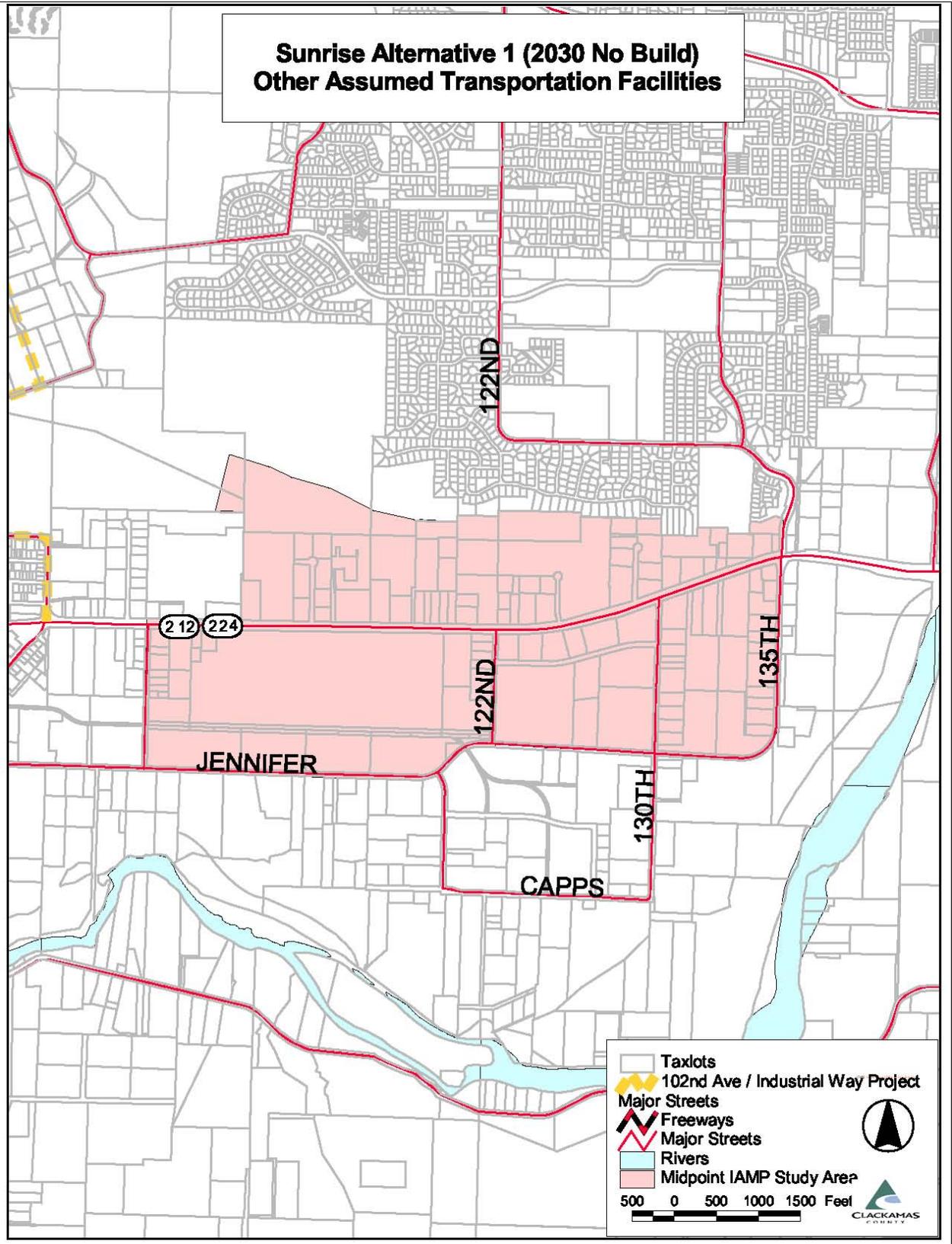


Figure 10 Sunrise Alternative 1 and Other Assumed Facilities

Alternative 1 - Traffic Forecast and System Operations

Arterial Forecast and Level of Service

To develop traffic forecasts, the regional Metro traffic model was calibrated to year 2005 conditions and then used to forecast year 2030 conditions. Forecasts of arterial, average daily traffic volumes, percentage truck traffic, and arterial level-of-service for the No Build road network are shown on **Table 11 and on Figure 11**. The table also shows the percentage change in volumes from Existing Conditions to the future No Build.

TABLE 11 ALTERNATIVE 1 – NO BUILD YEAR 2030

ALTERNATIVE 1 - AVERAGE DAILY TRAFFIC FORECAST 2030 , (PERCENTAGE TRUCKS) ARTERIAL LOS			
Direction	OR 212/224, east of 102 nd Avenue	Jennifer Street east of 106 th Avenue	OR 212/224, east of 142 nd Avenue
Eastbound	26,700 (15% trucks)	6,200 (10% trucks)	33,700 (7.1% trucks)
Westbound	25,800 (13% trucks)	6,400 (9.2% trucks)	32,400 (5.3% trucks)
TOTAL	52,500 (14% trucks)	12,600 (9.8% trucks)	66,100 (6.2% trucks)
LOS - AM peak hour	LOS F	Secondary Congestion	LOS C
LOS - PM peak hour	LOS F	Secondary Congestion	LOS F

The 2030 No Build Alternative assumes the same intersection configurations as Existing conditions with the addition of the planned improvements listed previously. In 2030, the intersection along OR 212 / 224 generally operate at failing levels of service. Although some of these intersections are outside the Midpoint Interchange Management area, their traffic operations, queueing and congestion impacts traffic within the Management area. **Figure 12** and **Figure 13** show projected congestion and arterial level-of-service for the AM Peak and PM Peak periods under the No Build alternative.

The 2030 traffic analysis forecast that OR 212/224 would have westbound congestion at 82nd Drive and at 135th Avenue during the AM peak which would impact traffic operations along OR 212 / 224.

See Intersection Operations Diagrams and **Table 17** for details about intersection operations, including lane delay, lane queue, intersection LOS, and intersection V/C ratio.

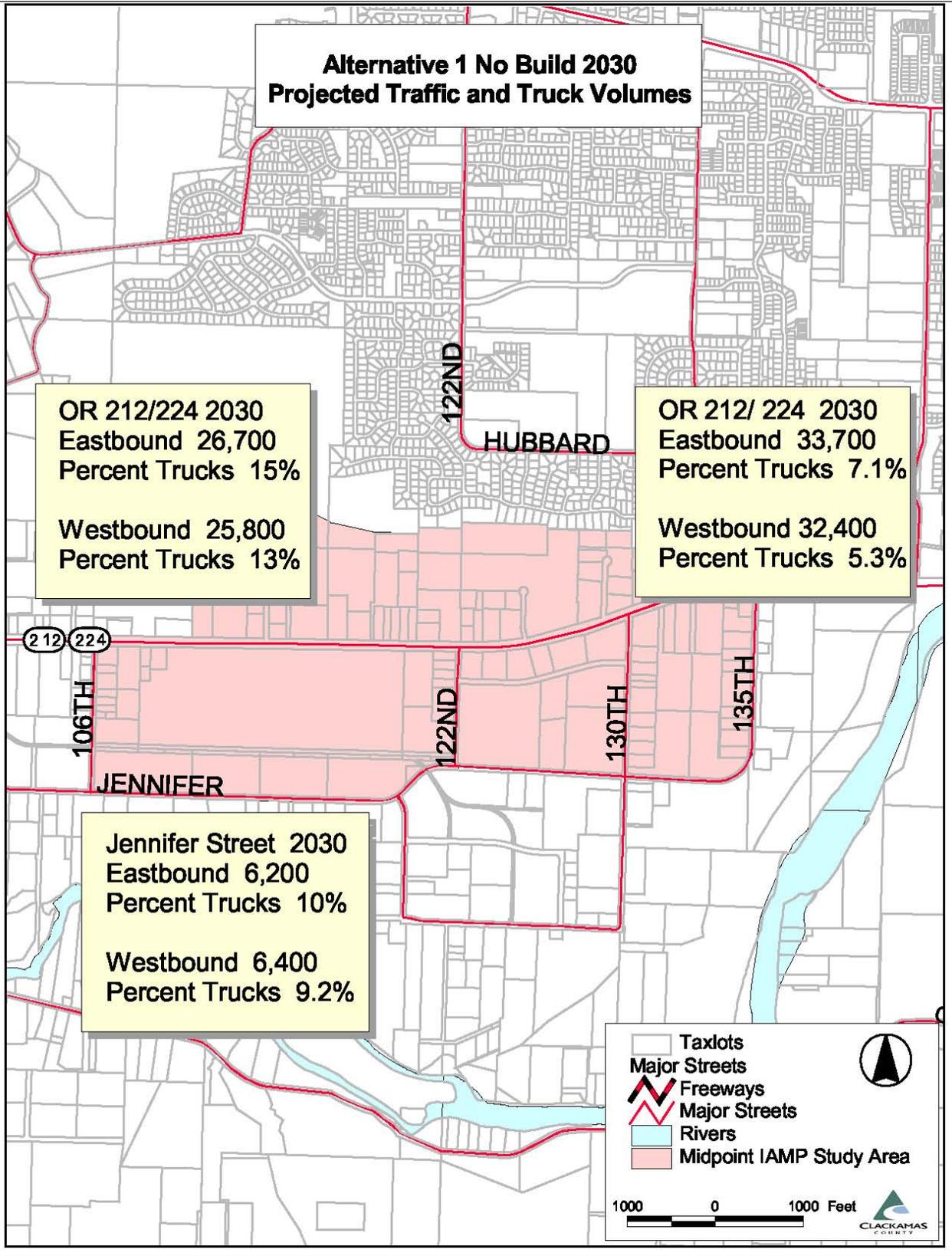


Figure 11 Alternative 1 and Project 2030 ADT and Truck Traffic

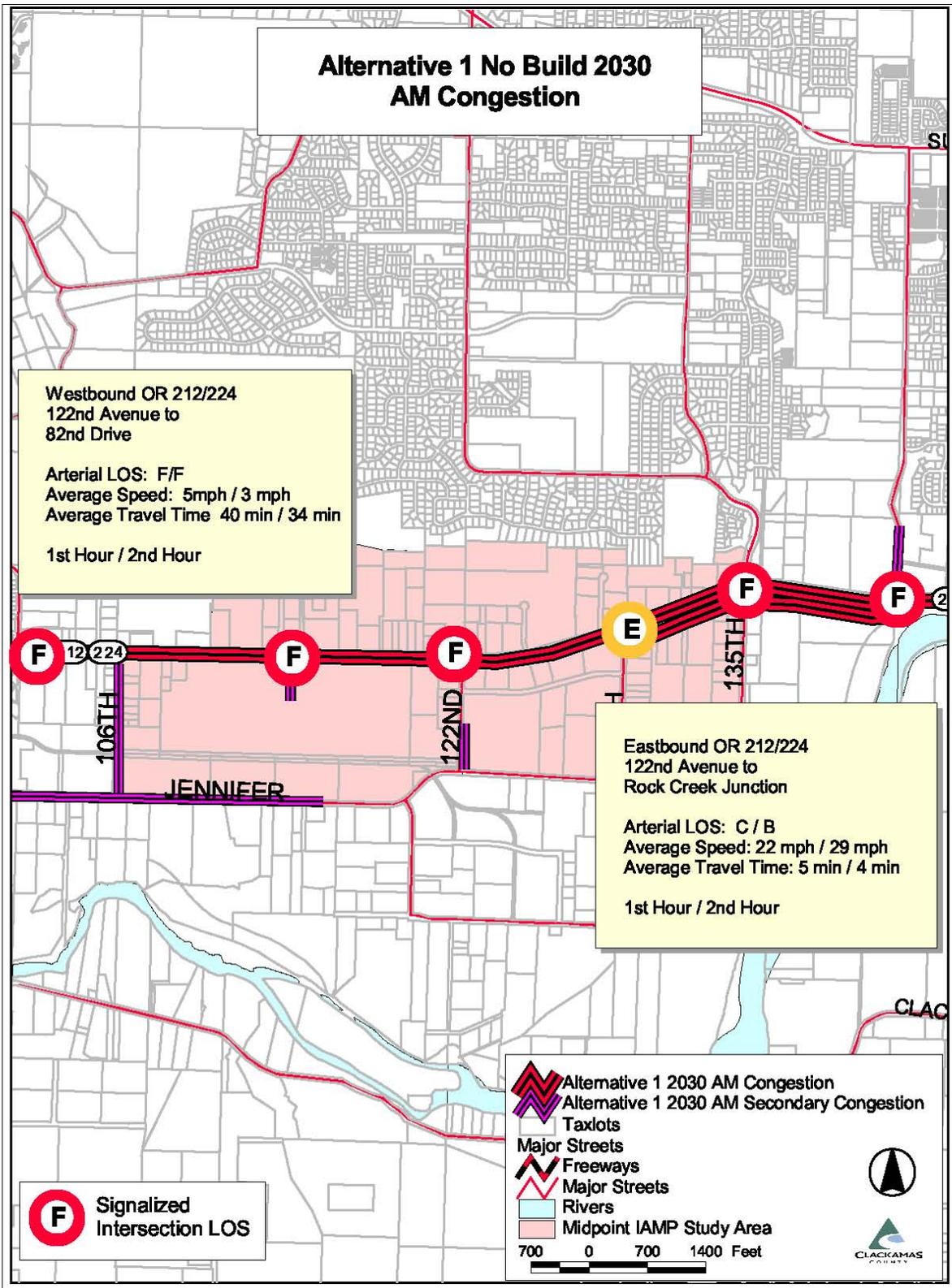


Figure 12 Alternative 1 2030 AM Congestion

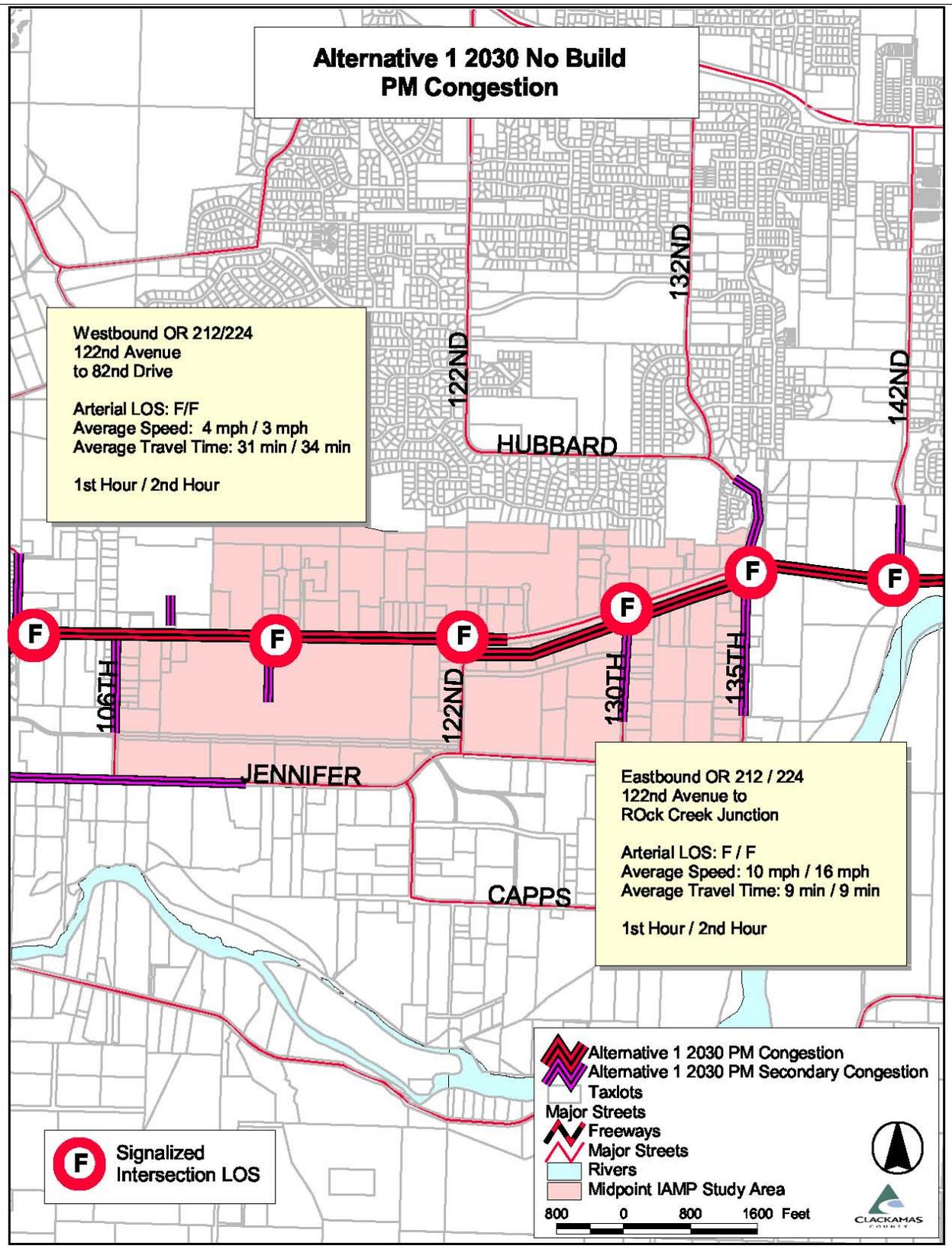


Figure 13 Alternatives 1 2030 PM Congestion

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 would not address safety problems exacerbated by increased congestion along OR 212/224. 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.

The intersections reviewed for the Midpoint Interchange Management Area (OR 212/224 @ 122nd, Midpoint Junction and OR 212/224/135th, all would have LOS F during both the AM and PM peak hours. 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 in Alternative 1 - identified in Metro’s RTP and include primarily modest increases in service hours.”

Alternative 1 - Bike and Pedestrian

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.”

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

Transportation Facilities

Alternative 2 would provide a continuous, six-lane, limited access expressway from Johnson Road to the west of I-205 to the midpoint interchange near SE 122nd Avenue and then on to the east to Rock Creek Junction Interchange. The Expressway would also have auxiliary lanes between the I-205 System Interchange and the Midpoint Interchange and between the Midpoint Interchange and the Rock Creek Junction Interchange.

The Alternative 2 Midpoint Interchange would be a narrow diamond interchange located to the north of 122nd Avenue near 122nd Avenue. It would be connected to OR 212 / 224 by a 5 lane arterial access road.

Figure 14 illustrates the road network assumed for Alternative 2

Design Option B-2, **shown in Figure 15**, would be a split diamond interchange located north of the Hwy-212/224 connecting to hwy-212/224 at 122nd and 130th. The interchange has a frontage road on south side of the mainline connecting the two interchange sections.

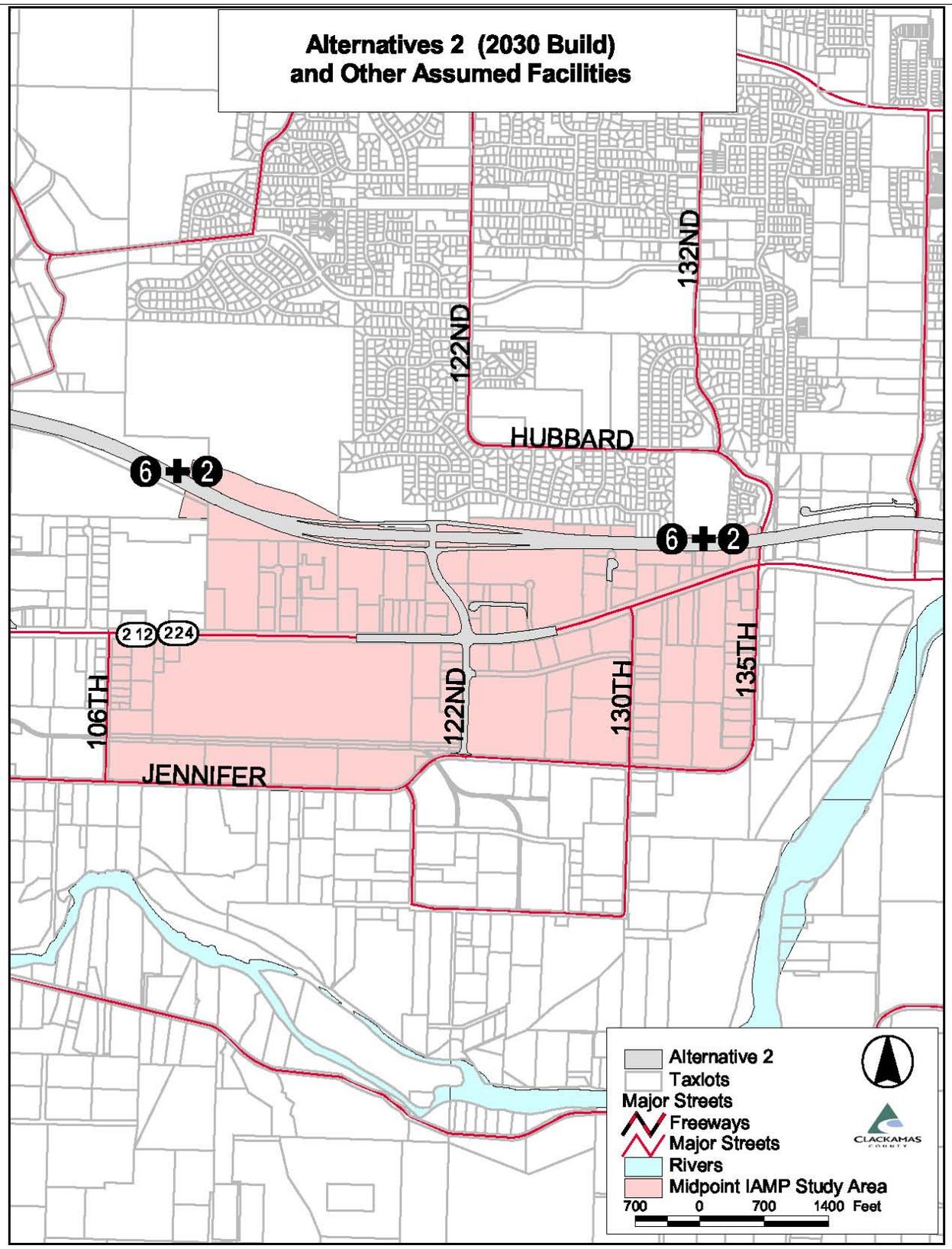


Figure 14 Alternatives 2 and Other Assumed Facilities

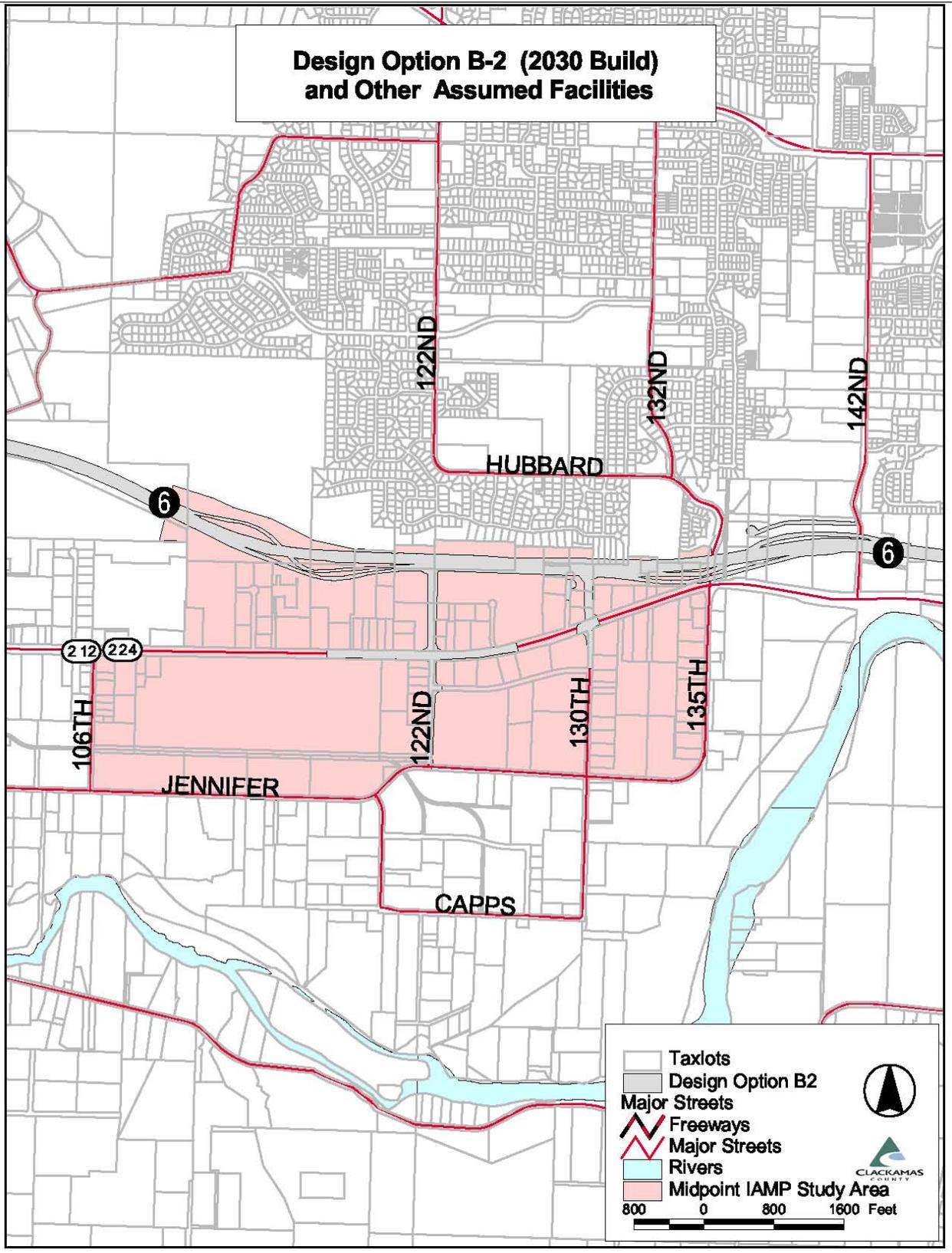


Figure 15 Design Option B-2 and Other Assumed Facilities

Alternative 2: Traffic Forecast and System Operations

Arterial Forecast and Level of Service

Traffic forecasts for year 2030 were analyzed for the Alternative 2 road network. Traffic forecasts, percentage heavy trucks, and arterial level-of-service are listed in Table 12, with the forecasts and truck percentages shown on Figure 16

TABLE 12 ALTERNATIVE 2 – YEAR 2030

AVERAGE DAILY TRAFFIC FORECAST, 2030 (PERCENTAGE TRUCKS) ARTERIAL LOS				
Direction	OR 212/224, east of 102nd Avenue	Jennifer Street east of 106th Avenue	OR 212/224, east of 135th Avenue	Expressway, west of 142nd Avenue
Eastbound	18,900 (3.2% trucks)	3,000 (16% trucks)	13,300 (1.3% trucks)	49,700 (5.8% trucks)
Westbound	21,800 (9.6% trucks)	3,500 (13% trucks)	15,800 (1.5% trucks)	43,800 (5.8% trucks)
TOTAL	40,700 (6.6% trucks)	6,500 (15% trucks)	29,100 (1.4% trucks)	93,500 (5.8% trucks)
LOS - AM peak hours	LOS F	Secondary Congestion	LOS E	No congestion
LOS - PM peak hours	LOS F	Secondary Congestion	LOS C	No congestion

During the peak hours, the analysis shows congestion on OR 212/224 for westbound traffic. This congestion starts at the 82nd Drive / OR 212 / 224 intersection (which is failing), queues back through the 102nd Avenue / OR 212 / 224 intersection and then continues to queue eastward through the Midpoint Interchange Management Area. The 135th Avenue / OR 212 Intersection is also failing and its queues back up further to the east. During the peak periods there is also some secondary congestion on local arterial as a result of the difficulty of getting on to OR 212 / 224 in it congested state.

During the peak periods, none of the expressway segments had congestion because the auxiliary lanes were able to accommodate the off and on movements at the interchanges.

Figure 17 and **Figure 18** show projected congestion and arterial level-of-service for the AM peak and PM peak periods.

Alternative 2: Intersection Level of Service and Operations

As described previously, all of the intersection along OR 212 / 224 in Build Alternative 2 would operate at a failing level of service in the AM Peak Hour. In the PM Peak Hour only the intersections at 122nd and OR 212 / 224 and the Fred Meyer Distribution Center and OR 212 / 224 would operate at a failing level of service.

Details about the intersections are described in “Intersection Operations” and summarized in **Table 17**.

Alternative2: Access densities and types

See previous discussion under of Future Access.

Alternative 2: Traffic Control

The interchange would not have medians or turn restrictions because no direct access would be allowed to either the interchange or the arterial running between the interchange and OR 212 / 224.

OR 212 / 224 would probably need raised medians on either side of the 122nd Avenue between 125th Court / OR 212 / 224 intersection and the Fred Meyer Distribution Center / OR 2121 / 224 Intersection .in order to insure the safe operation of the 122nd Avenue Intersection. Additional analysis of this safety issue should be undertaken as part of the final design.

Alternative 2: Effect of Operations on the Facilities System

Alternative 2 would provide the most east-west travel capacity of the three 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 Expressway, reducing travel volumes on parallel roads and allowing the highway to better serve local travel needs in the industrial area.

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: Transit

The build alternative would allow more frequent service between Damascus and Gresham, more frequent service between Airport Way and Damascus, and new express bus service along the proposed Sunrise Project y between the Clackamas Transit Center and Damascus Town Center. Current regional plans identify Sunnyside Road as the east-west high capacity transit route within the larger area around the Sunrise Project.

Alternative 2: Bike and Pedestrian

The build alternative would provide a new multi-use path that parallels the proposed Sunrise Expressway until it connects with OR 212 / 224 at SE 122nd Avenue, then it follows OR 212 / 224 to the existing Rock Creek Junction Intersection.

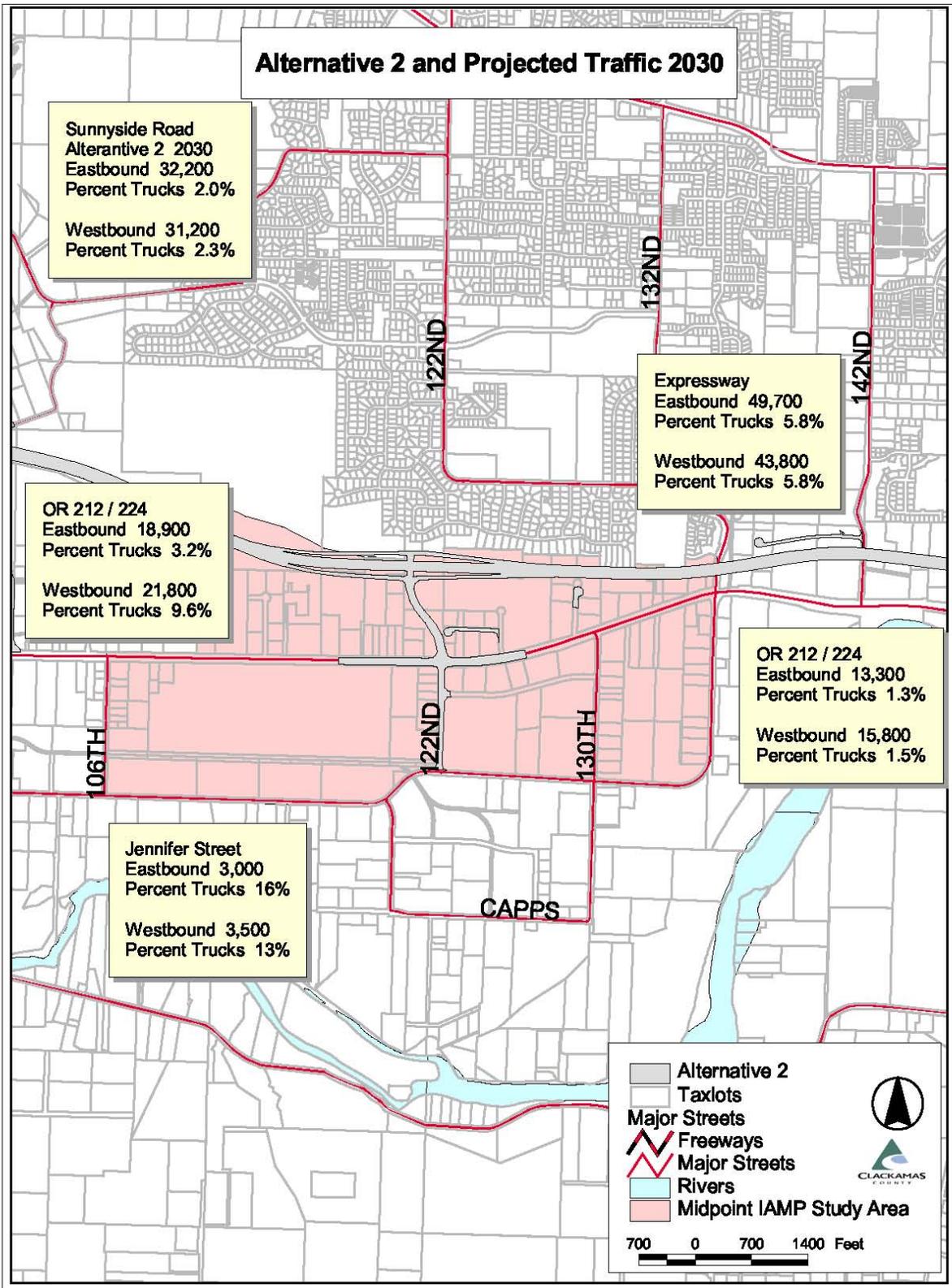


Figure 16 Alternative 2 2030 ADT and Truck Traffic

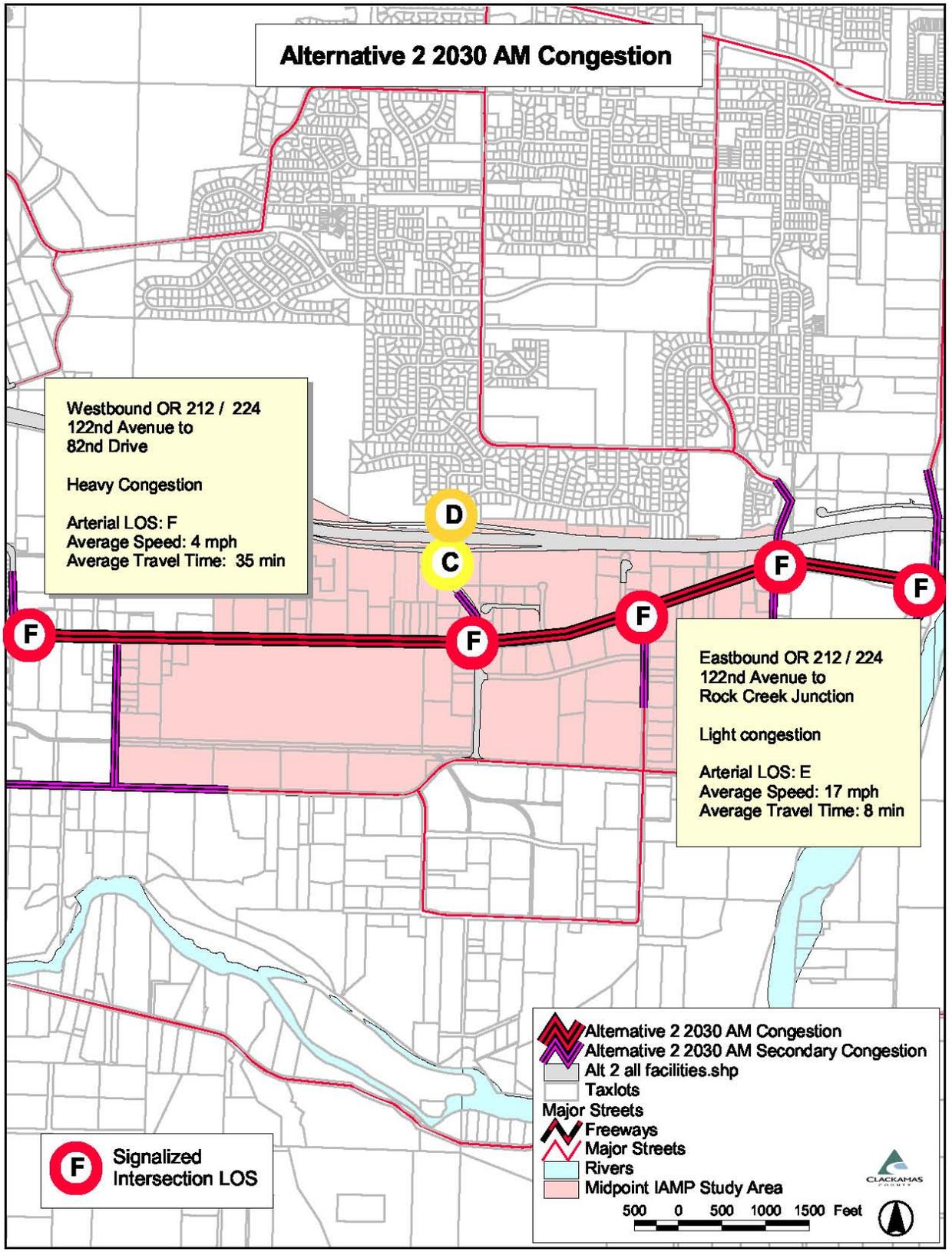


Figure 17 Alternative 2 2030 AM Congestion

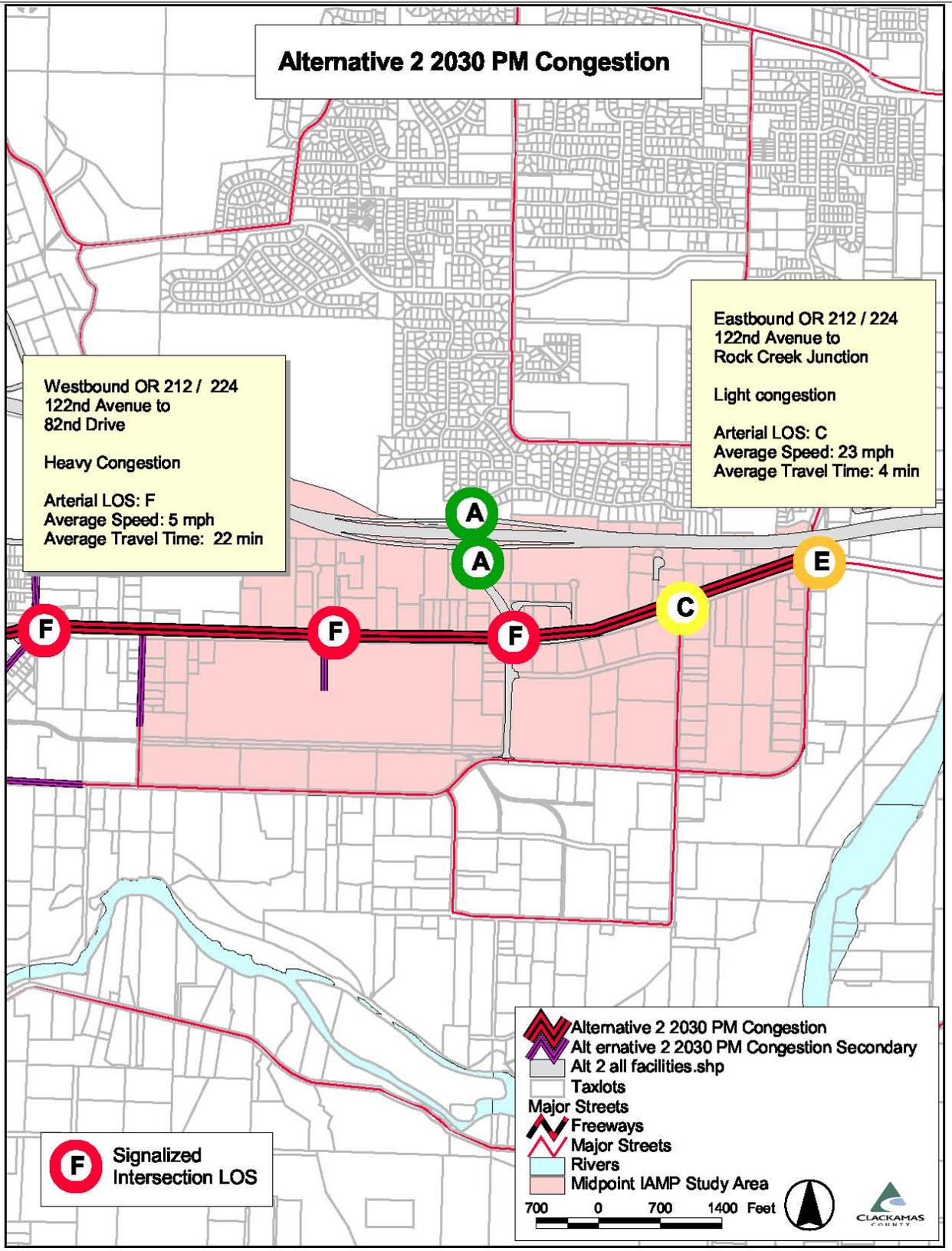


Figure 18 Alternative 2 2030 PM Congestion

Alternative 3: Year 2030 Build with No Midpoint Interchange

Transportation Facilities

Alternative 3 would provide a continuous, six-lane, limited access expressway from Midpoint Junction on the east to I-205 on the west as in Alternative 2, but Alternative 3 would not have a midpoint interchange near SE 122nd Avenue. Alternative 3 improvements are shown in **Figure 19**.

Alternative 3: Traffic and System Operations

Arterial Forecast and Level of Service

Year 2030 traffic forecasts were analyzed for the Alternative 3 road network and the ADT, percentage trucks, arterials LOS and the percentage change in ADT between the Build alternatives are listed on **Table 12**. The ADT and Truck Usage for Alternative 3 are shown in **Figure 20**.

TABLE 12 ALTERNATIVE 3 – YEAR 2030

AVERAGE DAILY TRAFFIC FORECAST, (PERCENTAGE TRUCKS) PERCENTAGE CHANGE IN VOLUME BETWEEN BUILD ALTERNATIVES ARTERIALS LOS				
Direction	OR 212/224, east of 102nd Avenue	Jennifer Street east of 106th Avenue	OR 212/224, east of 135th Avenue	Expressway, west of 142nd Avenue
Eastbound	20,300 (8.2% trucks)	4,100 (17% trucks)	14,700 (1.3% trucks)	49,700 (5.8% trucks)
Westbound	26,600 (9.4% trucks)	4,450 9.9% trucks)	17,100 (3.5% trucks)	43,800 (5.8% trucks)
TOTAL	42,900 (8.8% trucks)	8,550 (13% trucks)	31,800 (2.5% trucks)	93,500 (5.8% trucks)
% Change in Total Volume, Alt 2 to Alt 3	+ 5%	+ 32%	+ 9%	+ 2%
LOS - AM peak hours	LOS F	Secondary Congestion	LOS C	No Congestion
LOS – PM peak hours	LOS F	Secondary Congestion	LOS C	No Congestion

The analysis shows that the full length of OR 212/224 is congested for westbound traffic during the AM peak hours. Congestion would continue along OR 212 east of the Junction and in the jug handle for northbound traffic. Secondary congestion also would continue at SE 152nd Avenue. See **Figure 21**.

In the PM peak period, westbound congestion would begin east of SE 142nd Avenue. OR 212 and OR 224 did not show congestion. See **Figure 22**.

Alternative 3: Intersection Level of Service and Operations

Alternative 3 would have somewhat higher traffic volumes than under Alternative 2, which cause lower lane LOS at intersections.

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” and summarized in **Table 17**.

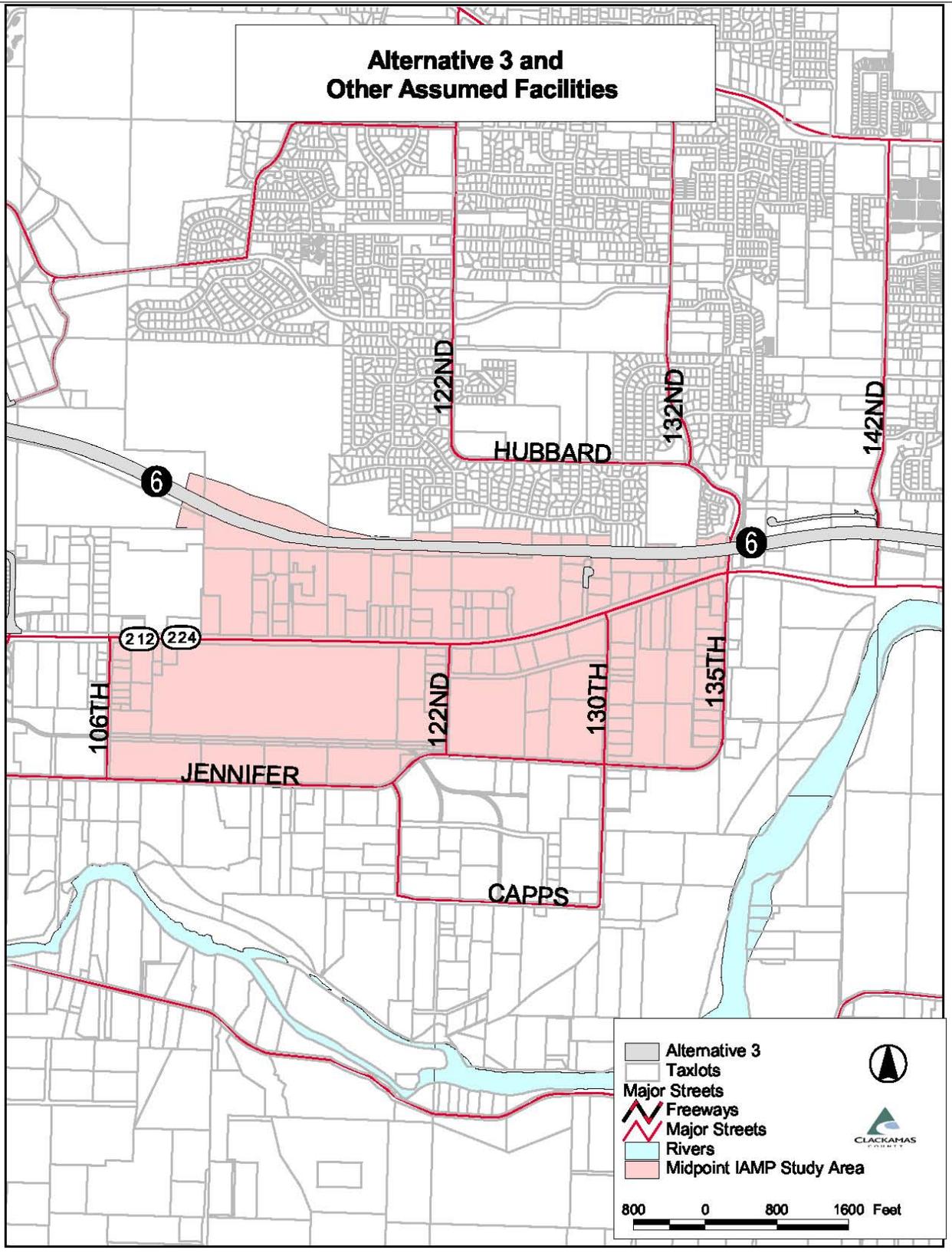


Figure 19 Alternatives 3 and Other Assumed Facilities

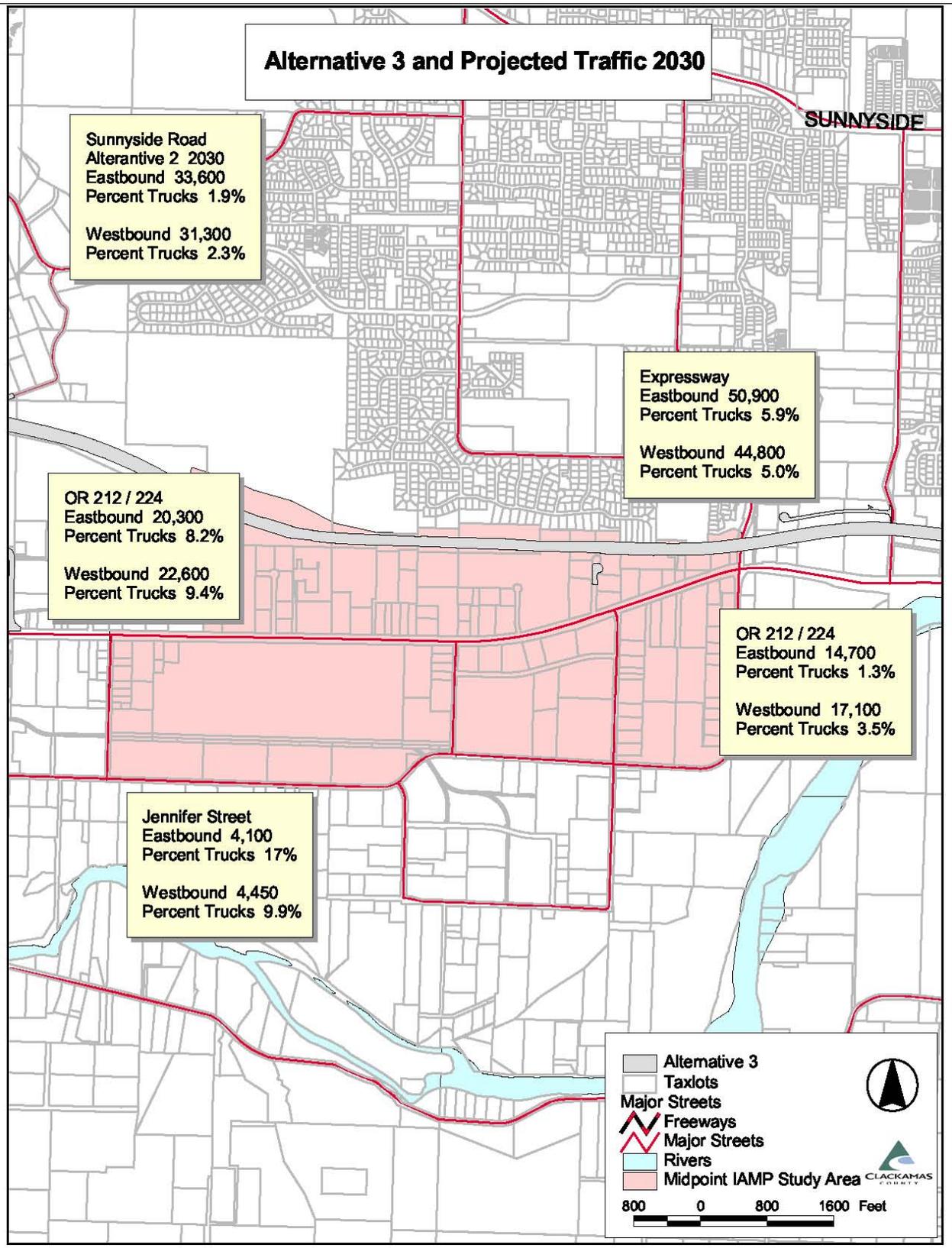


Figure 20 Alternative 3 2030 ADT and Truck Traffic

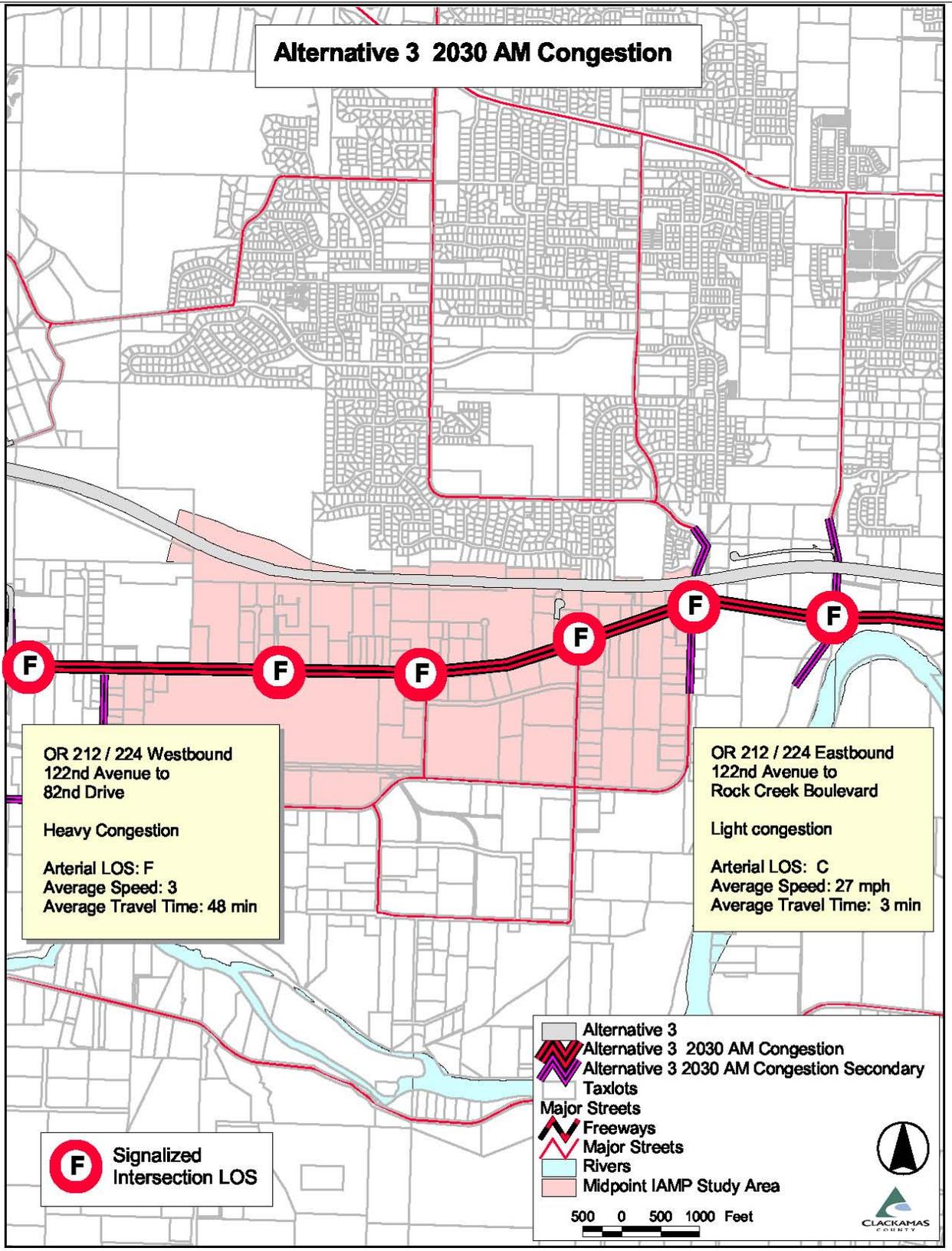


Figure 21 Alternative 3 2030 AM Congestion

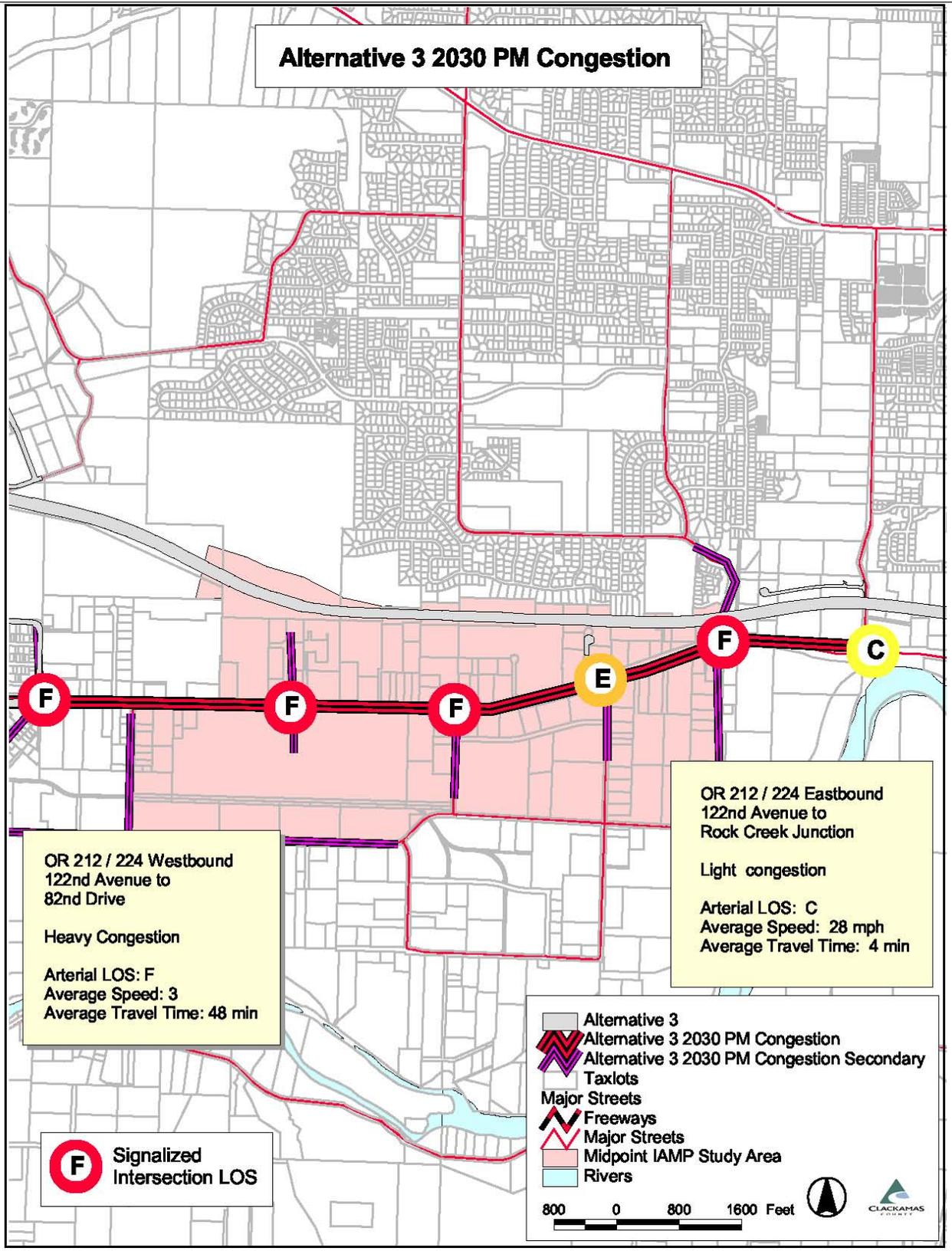


Figure 22 Alternative 3 2030 PM Congestion

Alternative 3: Effect of Traffic Operations on the Facilities System

Alternative 3 would not have the Midpoint Interchange, causing somewhat higher lane volumes than in Alternative 2 to enter/exit the Expressway at the other two Sunrise Midpoint interchanges. .

Alternative 3 would have slightly higher traffic volume and more intersection delay along OR 212 / 224 than Alternative 2. However it would operate better than the No Build alternative. Alternative 3 would have slightly less capacity than in Alternative 2 and a slightly higher total of vehicle hours of delay.

Alternative 3: Transit

The build alternative would allow more frequent service between Damascus and Gresham, more frequent service between Airport Way and Damascus, and new express bus service along the proposed Sunrise Project y between the Clackamas Transit Center and Damascus Town Center. Current regional plans identify Sunnyside Road as the east-west high capacity transit route within the larger area around the Sunrise Project.

Alternative 3: Bike and Pedestrian Networks

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.

Sunrise Project Design Exceptions

Table 1 summarizes the OHP and HDM criteria thresholds for the appropriate study period along freeway facilities, as well as summarizing Clackamas County arterial and collector thresholds.

The design of the Sunrise Project Preferred Alternative has been a challenging task because of the constrained nature of the urban setting that the project passes through. As a result of these constraints, including topography, high travel demand in the corridor, and undersized connecting facilities, the Sunrise Project Preferred Alternative will require several design exceptions for the entirety of the project to either the new construction design standards or the mobility standards. The reconstructed intersection of 122nd Avenue at OR 212 / 224 is forecast to not meet the construction standards for 3 of the 4 forecast peak hour periods as shown in Table 13. In addition, the existing intersection of 135th Avenue and OR 212 / 224 will exceed the urban mobility standard during the AM peak hour as shown in Table 14.

Table 13 Operational Capacity Design Exceptions New or Revised Intersections

Intersection	Design Standard	Potential 2030 Design Exceptions (v/c ratio)
Locations	(v/c ratio) Criteria	Preferred Alternative
# 18 - OR 212/224 and 122 nd Avenue Intersection	0.75	0.81 v/c - AM 1 st Hour 0.84 v/c – PM 1 st Hour 0.91 v/c –PM 2 nd Hour

Table 14 Operational Capacity Design Exceptions Existing Intersections

Intersection	Mobility	Potential 2030 Design Exceptions (v/c ratio)
Locations	(v/c ratio) Criteria	Preferred Alternative
# 20 - OR 212/224 and 135 th Avenue Intersection	0.99	1.13 v/c 0 - AM 1st Hour

OAR 734 sets an access spacing standard for the distance to first intersections where left turns are allowed of 1,320 feet. The intersection of 122nd Avenue and OR 212 / 224 is only 1,000 feet from the ramp end of the Midpoint Interchange. Accordingly an access spacing deviation will be required for this intersection as shown in Table 15.

Table 15 Sunrise Project Access Spacing Deviation for Midpoint Interchange

Access Location	Type of Area¹	Distance Standard (Y)	Access Distance
OR 212/224 and 122 nd Avenue Intersection	Fully Developed Urban	1,320'	1,000'

Forecast Queue Storage Problems

The travel forecasting process produced estimates of intersection queuing for the Sunrise Project intersections. There are no cases where traffic queues are forecast to extend onto the Sunrise Expressway mainline in 2030. However there are 3 intersections in the interchange management area where the projected intersection queues exceed the planned available queue storage. These intersections are Sunrise Project Intersection # 18, #19 and #20 as shown in Table 16.

Table 16 Over Capacity Queues, Year 2030

Preferred Alternative Intersection # / Location	Movement	Storage Length	Preferred Alternative Over capacity queue periods
# 18 OR 212/224 and 122 nd Avenue Intersection	SBL	300 ft.	PM peak
# 19 OR 212/224 and 130 th Avenue Intersection	WBL	200 ft.	AM and PM Peak
# 20 OR 212/224 and 135 th Avenue Intersection	EBL	500	AM and PM Peak
	EBT	1,500	AM Peak
	EBT	1,500	AM Peak
	EBR	150	PM Peak
	WBT	1,725	AM Peak
	WBTR	1,725	AM Peak
	NBL	100	PM Peak
	NBT	800	AM and PM Peak
	NBR	100	AM and PM Peak
	SBL	200	AM and PM Peak
	SBTR	700	AM and PM Peak

Sunrise Design Refinements

During the SDEIS process local access issues were reviewed by the public and the staff of the local jurisdictions. No significant design refinements were identified as part of that process.

Intersection Operations Diagrams (SDEIS)

Existing Transportation System and the 2030 Alternatives (SDEIS)

The results of the intersection analyses allow comparisons of existing operations to future operations under each Alternative. Information includes lane delay and queue, intersection LOS and V/C ratios, and lane LOS and volumes for the AM peak hours and PM peak hours. The operational standards were listed previously in Table 1.

This section is organized by grouping two intersections with highlights 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.

Following the descriptions and figures is Table 17 that provides a summary of intersection operations for Existing Conditions and future Alternatives; the data include lane delay, lane queue, intersection LOS and intersection V/C ratios.

Intersection Operations in the Midpoint Interchange Management Area

Intersection 15: OR 212/224 @ 102nd

Intersection 15 is located west of the Interchange Management Area on OR 212/224. At present, the OR 212/224 @ SE 122nd Avenue intersection rated an overall LOS D in the AM peak period and LOS E in the PM peak period.

Forecasted problems under the No Build alternative include both lane congestion and overall LOS F for both the AM and PM peak periods.

Alternatives 2 and 3 show LOS F during the in both AM and PM peak based with numerous individuals movement operating at LOS F and a substantial amount of delay.

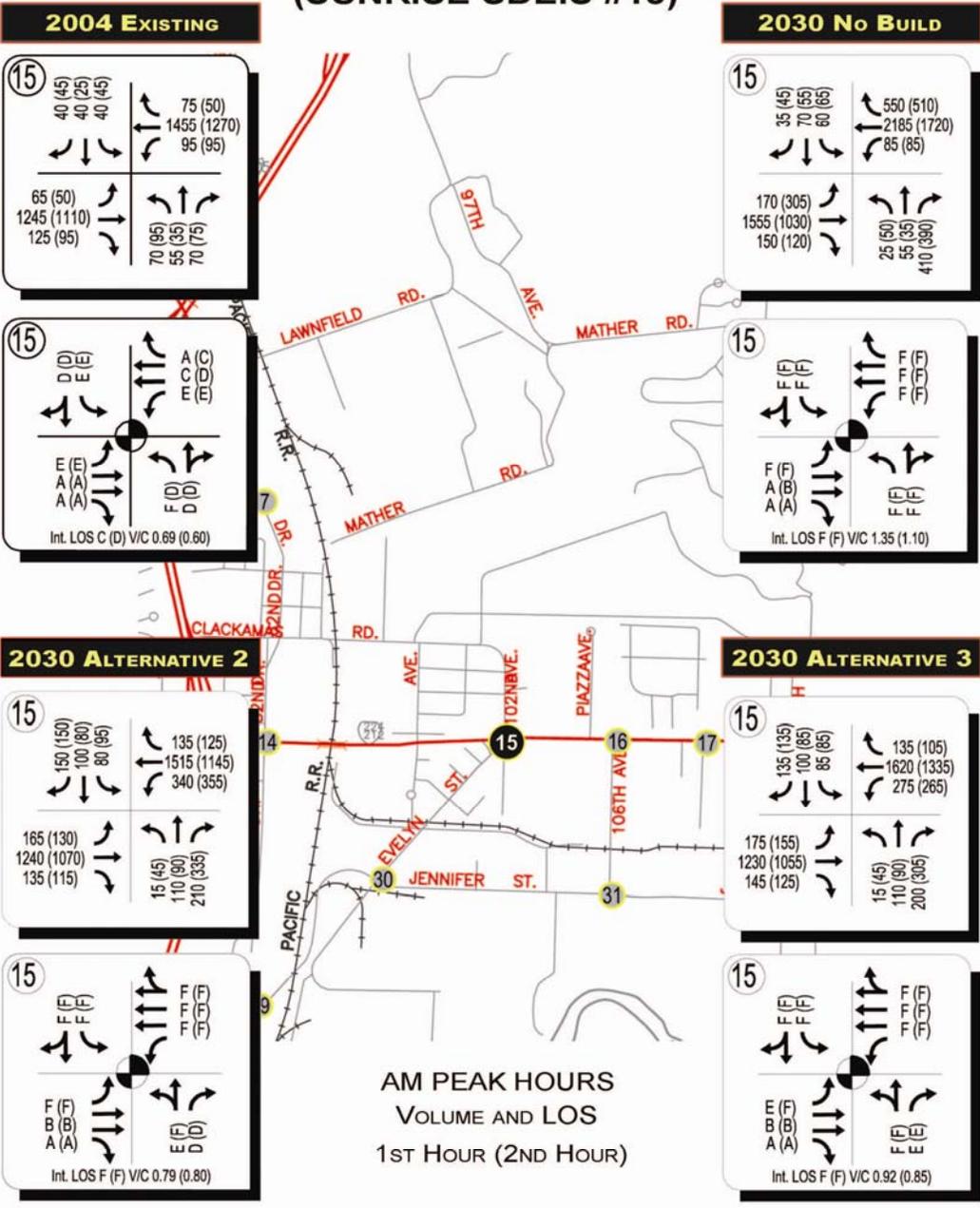
Intersection 17: OR 212/224 @ Fred Meyer Warehouse

At present Intersection 17, OR 212/224 @ Fred Meyer Warehouse, has LOS B for both the AM and PM peak with some left turn capacity problems on OR 212/224.

Forecasted problems under the No Build alternative include both lane congestion and overall LOS F for both the AM and PM peak periods.

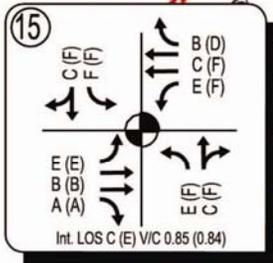
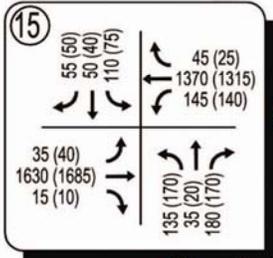
Alternatives 2 and 3 show LOS F during the in both AM and PM peak based with numerous individuals movement operating at LOS F and a substantial amount of delay.

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

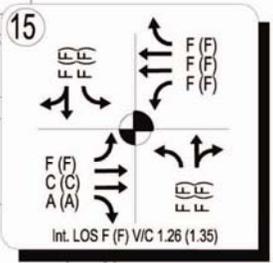
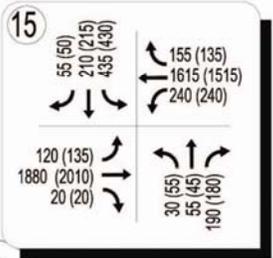


102ND AVE / HIGHWAY 212/224 INTERSECTION (SUNRISE SDEIS #15PM)

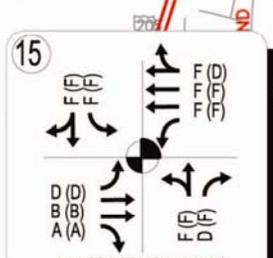
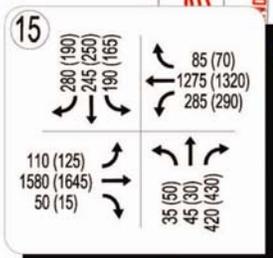
2004 EXISTING



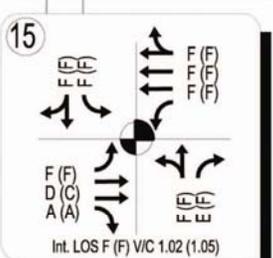
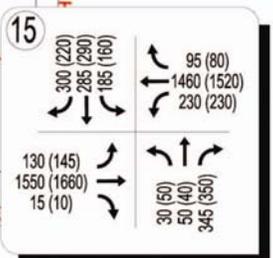
2030 No BUILD



2030 ALTERNATIVE 2



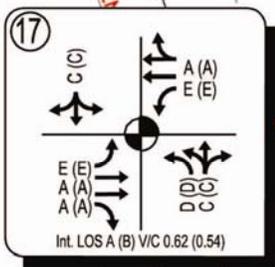
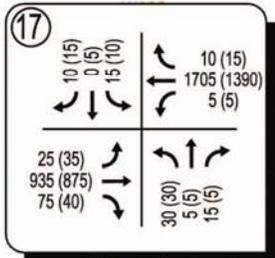
2030 ALTERNATIVE 3



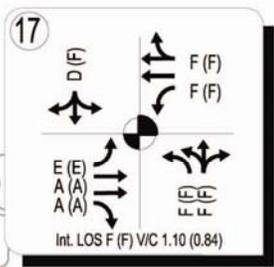
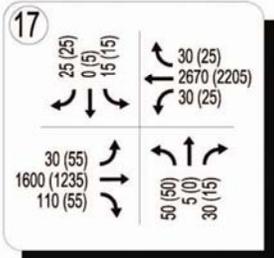
PM PEAK HOURS
VOLUME AND LOS
1ST HOUR (2ND HOUR)

FRED MEYER WAREHOUSE / HIGHWAY 212/224 INTERSECTION (SUNRISE SDEIS #17)

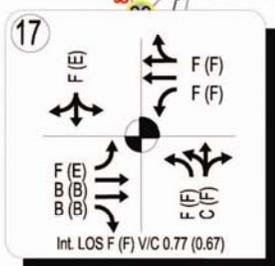
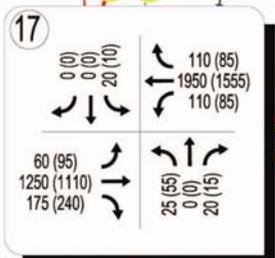
2004 EXISTING



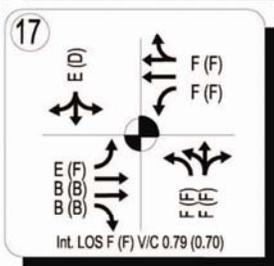
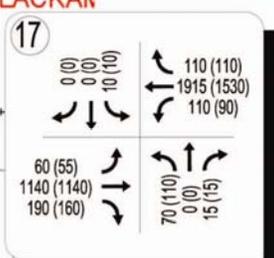
2030 No BUILD



2030 ALTERNATIVE 2



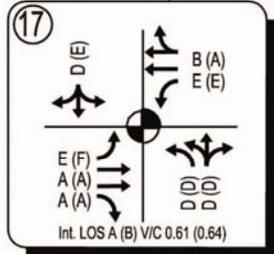
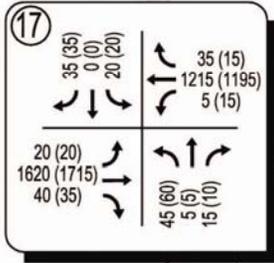
2030 ALTERNATIVE 3



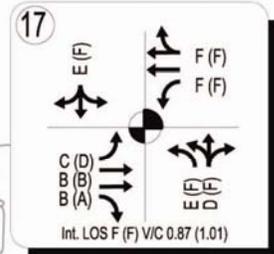
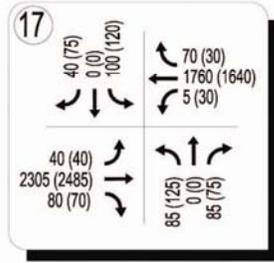
AM PEAK HOURS
VOLUME AND LOS
1ST HOUR (2ND HOUR)

FRED MEYER WAREHOUSE / HIGHWAY 212/224 INTERSECTION (SUNRISE SDEIS #17PM)

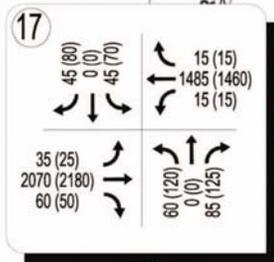
2004 EXISTING



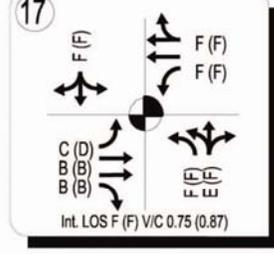
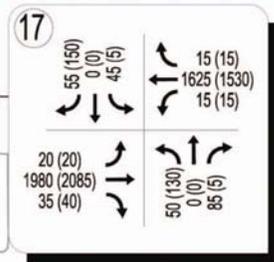
2030 No BUILD



2030 ALTERNATIVE 2



2030 ALTERNATIVE 3



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

At

Intersection 18: OR 212 /224 @ 122nd Avenue

At present Intersection 18, OR 212/224 @ 122nd Avenue is a T intersection and, has LOS B for both the AM and PM peak hours.

Forecasted problems under the No Build alternative include both lane congestion and overall LOS F for both the AM and PM peak periods.

Alternatives 2 and 3 show LOS F during the in both AM and PM peak based with numerous individuals movement operating at LOS F and a substantial amount of delay.

Intersection 19: OR 212 /224 @ 130th Avenue

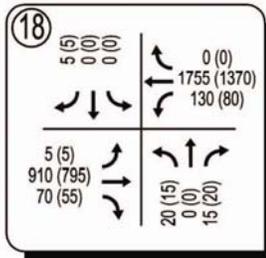
At present Intersection 19, OR 212/224 @ 130th Avenue is a T intersection, and not signalized. ,It has some PM peak with some left turn capacity problems on OR 212/224.

Forecasted problems under the No Build alternative include both lane congestion and overall LOS F for both the AM and PM peak periods.

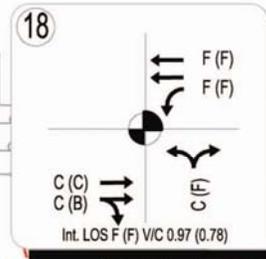
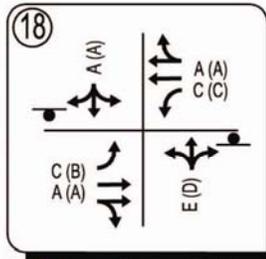
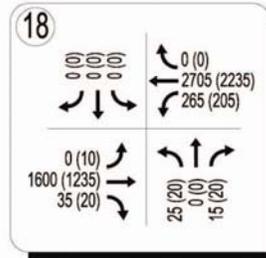
Alternatives 2 and 3 show LOS F during the in both AM and PM peak based with numerous individuals movement operating at LOS F and a substantial amount of delay.

122ND AVE / HIGHWAY 212/224 INTERSECTION (SUNRISE SDEIS #18)

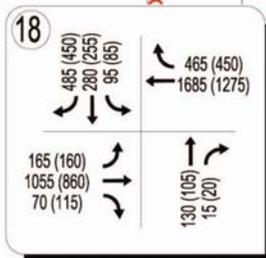
2004 EXISTING



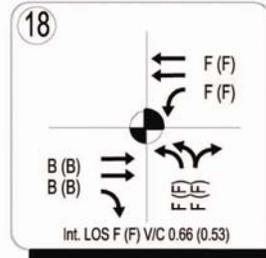
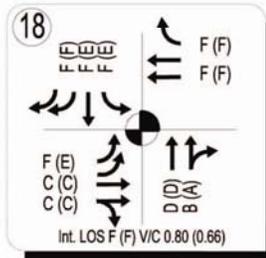
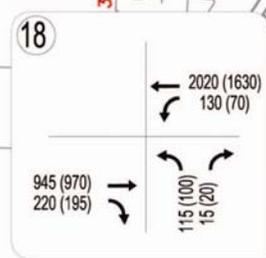
2030 No BUILD



2030 ALTERNATIVE 2



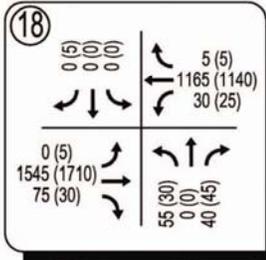
2030 ALTERNATIVE 3



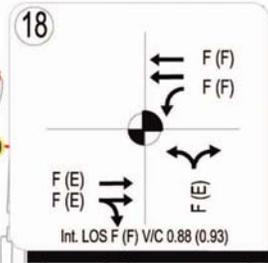
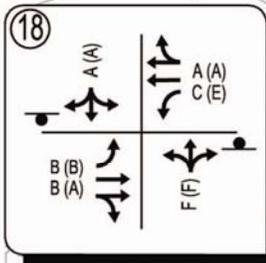
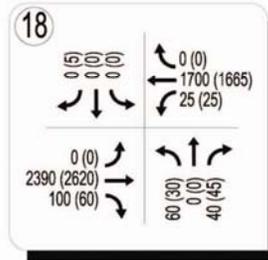
AM PEAK HOURS
VOLUME AND LOS
1ST HOUR (2ND HOUR)

122ND AVE /HIGHWAY 212/224 INTERSECTION (SUNRISE SDEIS #18PM)

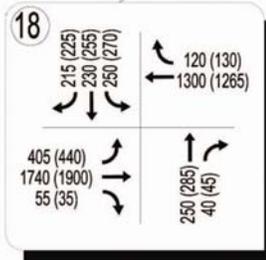
2004 EXISTING



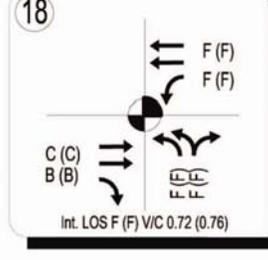
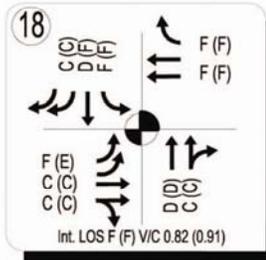
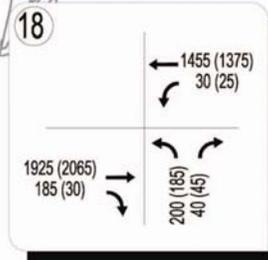
2030 No BUILD



2030 ALTERNATIVE 2



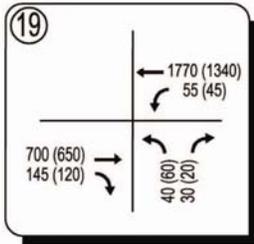
2030 ALTERNATIVE 3



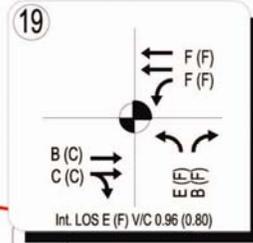
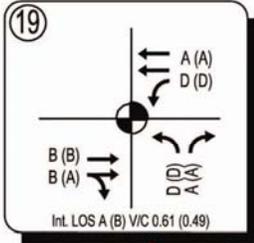
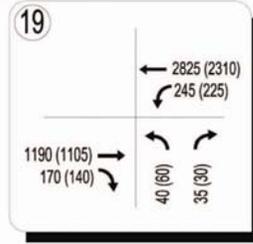
PM PEAK HOURS
VOLUME AND LOS
1ST HOUR (2ND HOUR)

130TH AVE / HIGHWAY 212/224 INTERSECTION (SUNRISE SDEIS #19)

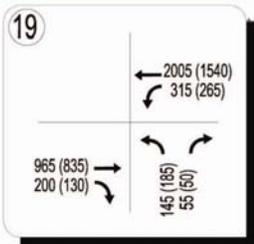
2004 EXISTING



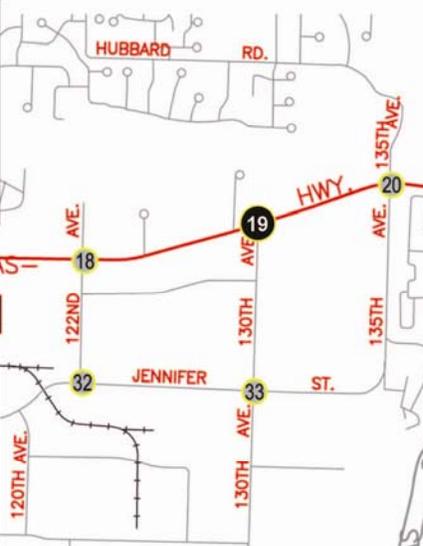
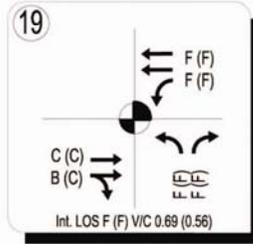
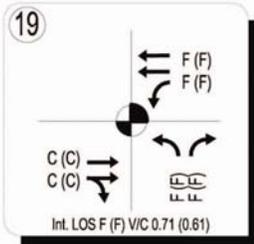
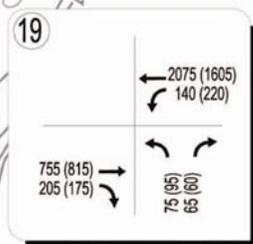
2030 No BUILD



2030 ALTERNATIVE 2

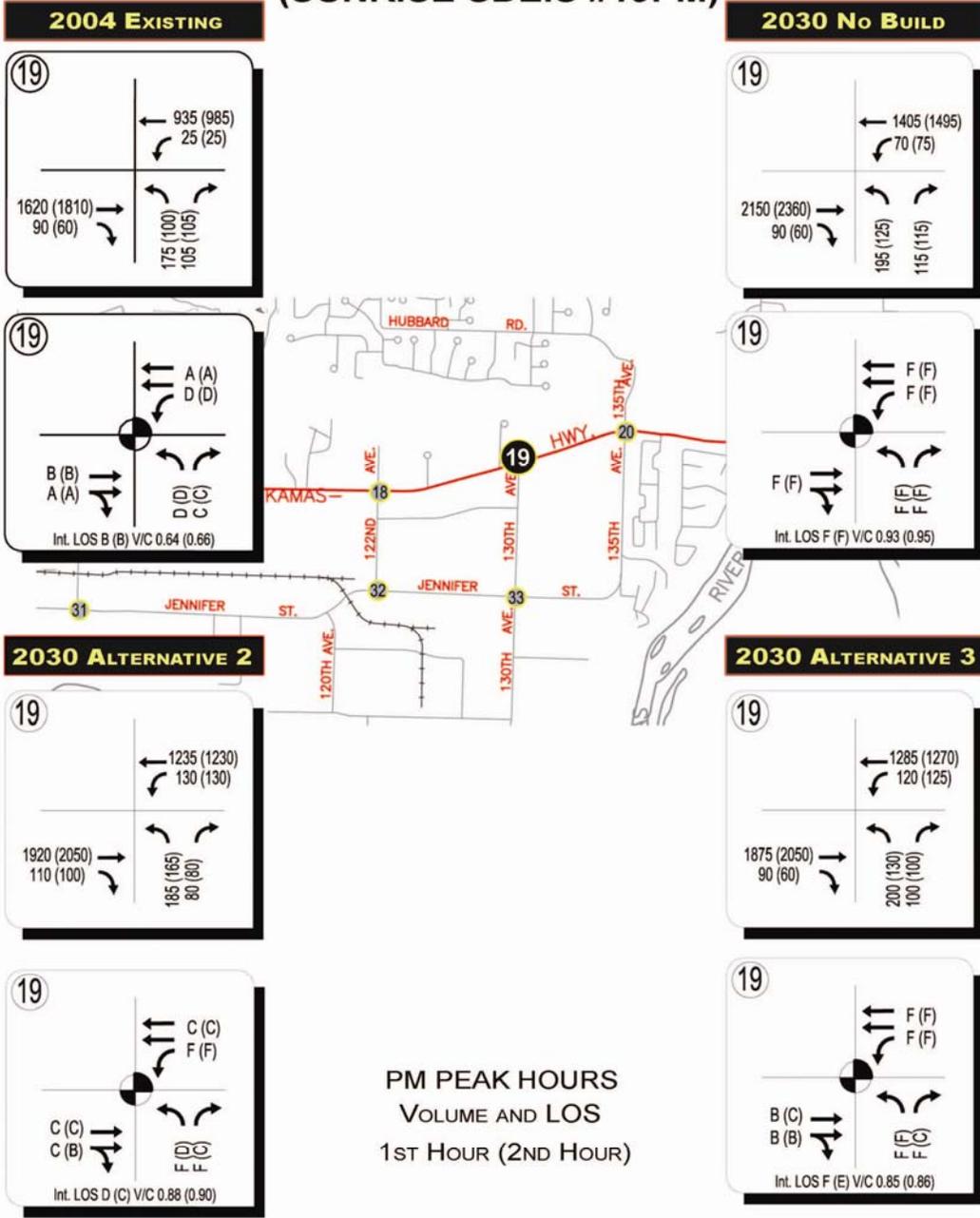


2030 ALTERNATIVE 3



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

130TH AVE / HIGHWAY 212/224 INTERSECTION (SUNRISE SDEIS #19PM)



Intersection 20: OR 212 /224 @ 135th Avenue

At present Intersection 20, OR 212/224 @ 135th Avenue, has LOS F for both the AM and PM peak with some left turn capacity and other capacity problems on OR 212/224.

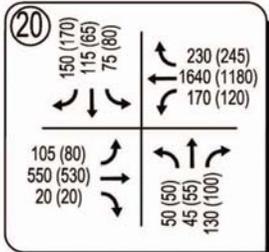
Forecasted problems under the No Build alternative include both lane congestion and overall LOS F for both the AM and PM peak periods.

Alternatives 2 is forecast at LOS E in the AM peak and LOS F during the PM peak hour based with numerous individuals movement operating at LOS F and a substantial amount of delay.

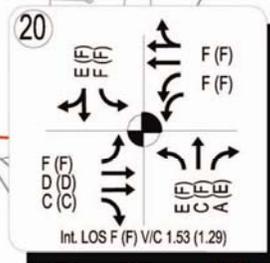
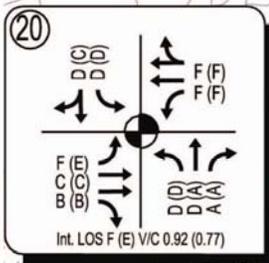
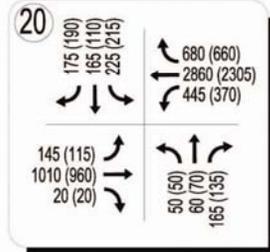
Alternatives 3 is forecast at LOS F during both the AM and PM peak hours based with numerous individuals movement operating at LOS F and a substantial amount of delay.

135TH AVE / HIGHWAY 212/224 INTERSECTION (SUNRISE SDEIS #20)

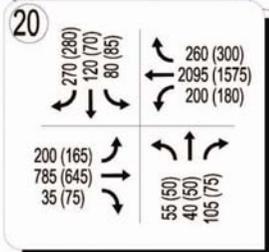
2004 EXISTING



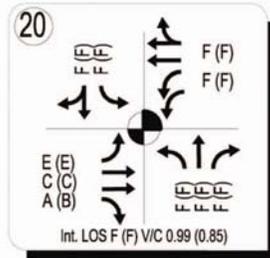
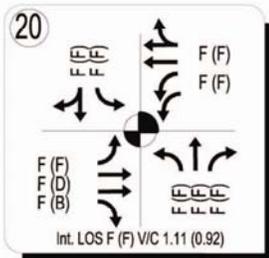
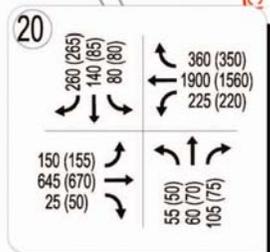
2030 No BUILD



2030 ALTERNATIVE 2



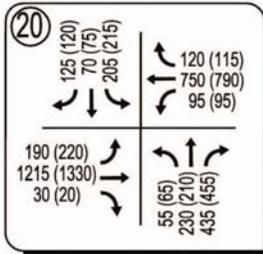
2030 ALTERNATIVE 3



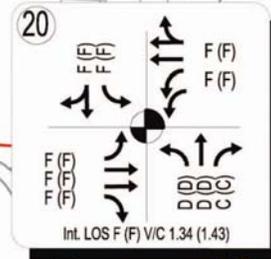
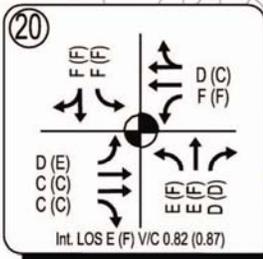
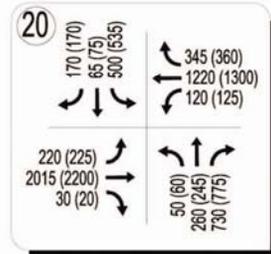
AM PEAK HOURS
VOLUME AND LOS
1ST HOUR (2ND HOUR)

135TH AVE / HIGHWAY 212/224 INTERSECTION (SUNRISE SDEIS #20PM)

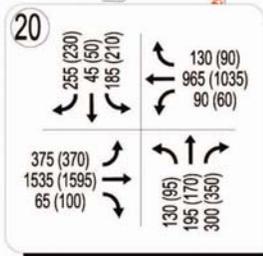
2004 EXISTING



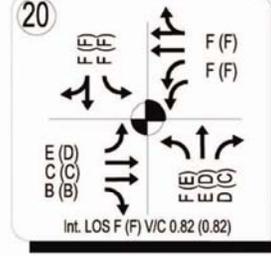
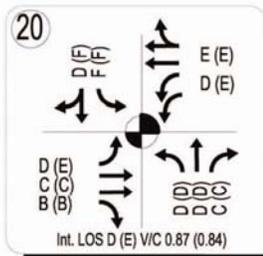
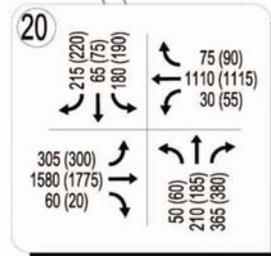
2030 No BUILD



2030 ALTERNATIVE 2



2030 ALTERNATIVE 3



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

Narrow Diamond Interchange Intersections

Intersection 42

At present Intersection 42 does not exist. It will be part of the Narrow Diamond Interchange that is included in Alternative 2 and the Preferred Alternative.

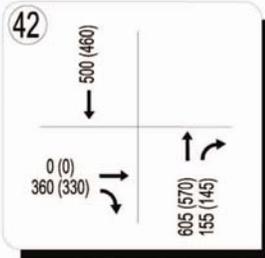
Intersection 43

At present Intersection 43 does not exist. It will be part of the Narrow Diamond Interchange that is included in Alternative 2 and the Preferred Alternative.

SUNRISE WB OF AT MIDPOINT INTERSECTION (SUNRISE SDEIS #42)



2030 ALTERNATIVE 2

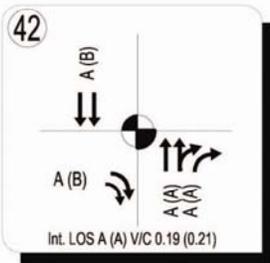
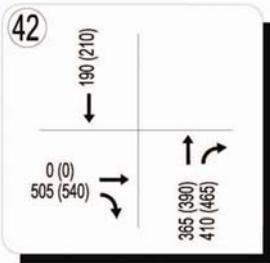


AM PEAK HOURS
VOLUME AND LOS
1ST HOUR (2ND HOUR)

SUNRISE EB OFF AT MIDPOINT INTERSECTION (SUNRISE SDEIS #42PM)



2030 ALTERNATIVE 2

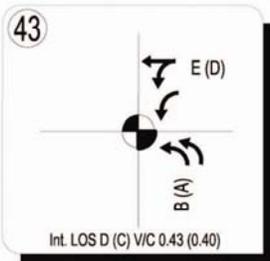
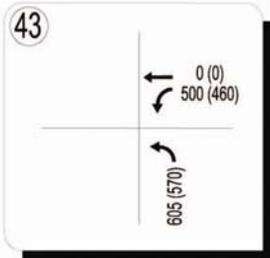


PM PEAK HOURS
VOLUME AND LOS
1ST HOUR (2ND HOUR)

SUNRISE EB OF AT MIDPOINT INTERSECTION (SUNRISE SDEIS #43)

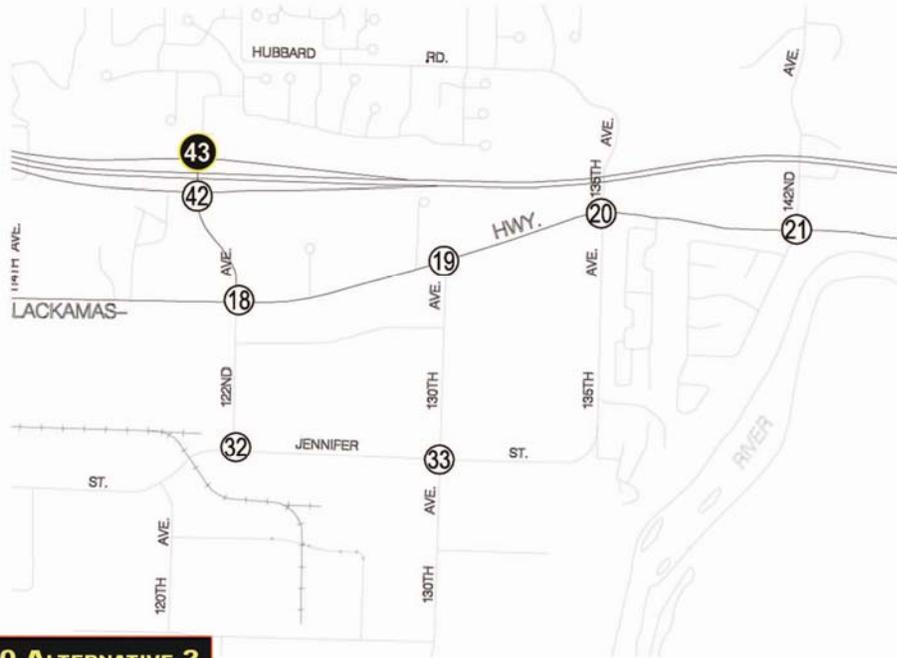


2030 ALTERNATIVE 2

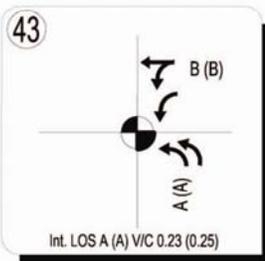
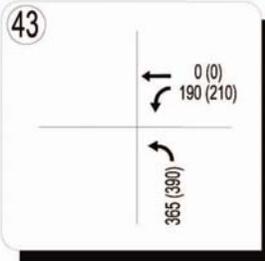


AM PEAK HOURS
VOLUME AND LOS
1ST HOUR (2ND HOUR)

SUNRISE EB OFF AT MIDPOINT INTERSECTION (SUNRISE SDEIS #43PM)



2030 ALTERNATIVE 2

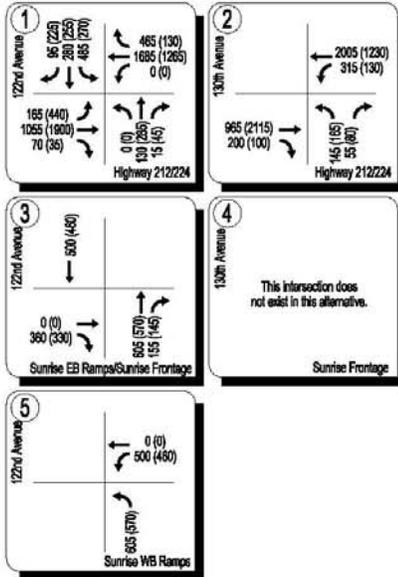


PM PEAK HOURS
VOLUME AND LOS
1ST HOUR (2ND HOUR)

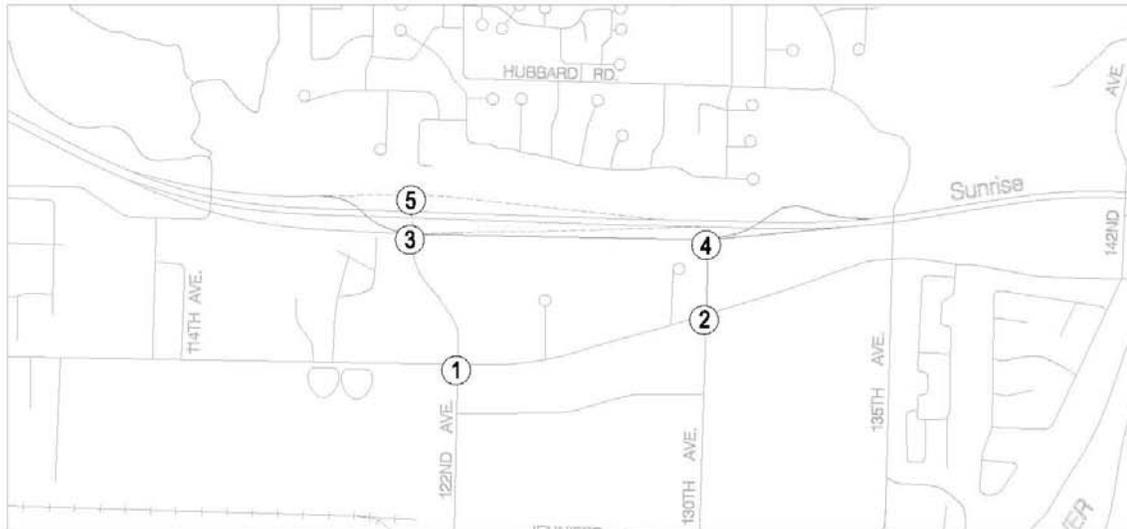
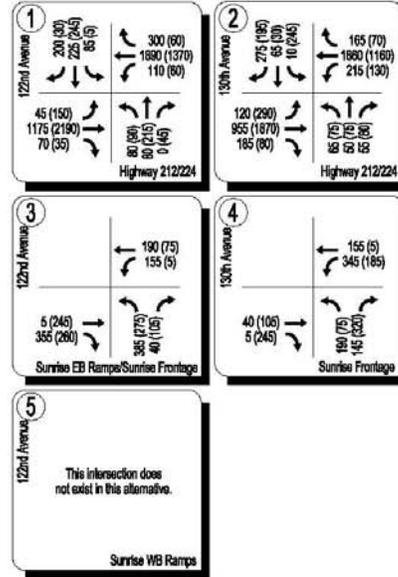
Design Option B-2 Split Diamond Interchange Intersections

Design Option B-2 was not selected to be part of the Preferred Alternative and has limited analysis of its intersection capacity which is shown on the following pages.

ALTERNATIVE 2 PEAK PERIOD VOLUMES



DESIGN OPTION B2 PEAK PERIOD VOLUMES



Legend:

- ⊕ Study Area Intersection
- Turning Movement
- 545 (335) 7:00-8:00 AM (4:30-5:30 PM) Turning Movement Volumes
- New connections in Design Option B2
- Alternative 2 Design Option B1 Alignment

FIGURE 6-62

ALTERNATIVE 2: 2030 BUILD
DESIGN OPTION B2
SPLIT DIAMOND INTERCHANGE
PEAK PERIOD VOLUMES

Sunrise Project, I-205 to Rock Creek Junction

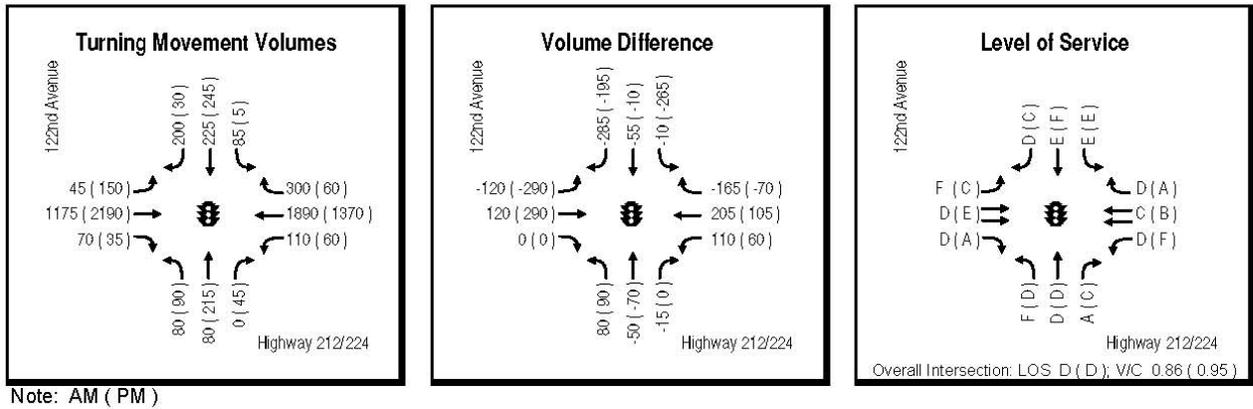


Figure 6-60

Design Option B-2 Traffic Volumes and Level of Service
SE 122nd Avenue at Clackamas Highway

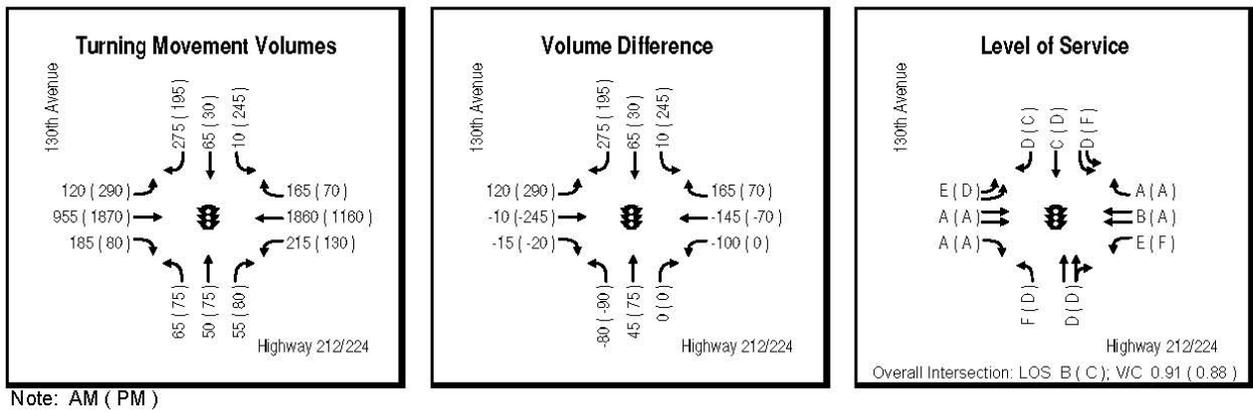


Figure 6-61

Design Option B-2 Traffic Volumes and Level of Service
SE 130th Avenue at Clackamas Highway

Intersection Operations Summary Tables

The following tables are shows the results of the Queue and Delay analysis from for the Sunrise Project SDEIS by David Evans and Associates in August 2008.

TABLE 11 SUMMARY OF INTERSECTION OPERATIONS FOR EXISTING AND FUTURE ALTERNATIVES

Existing Conditions						
Intersection	LANE DATA		Intersection LOS		Intersection V/C	
	AM (PM)		1st Hour (2nd Hour)		1st Hour (2nd Hour)	
	Delay ¹	Queue ²	AM	PM	AM	PM
15: Hwy 212/224 / 102nd	20 (53)	0 (2)	C (D)	C (E)	0.69 (0.60)	0.65 (0.84)
17: Hwy 212/224 @ Fred Meyer	9 (10)	0 (0)	A (B)	A (B)	0.62 (0.54)	0.61 (0.64)
18: Hwy 212/224 @ 122nd	7 (12)	0 (0)	E Nbnd	F Nbnd	unsig	unsig
19: Hwy 212/224 @ 130th	10 (12)	0 (0)	A (B)	B (B)	0.61 (0.49)	0.64 (0.66)
20: Hwy 212/224 @ 135th	96 (94)	2 (4)	F (E)	E (F)	0.92 (0.77)	0.82 (0.87)
21: Hwy 212/224 @ 142nd	32 (17)	0 (0)	C (C)	B (B)	0.68 (0.54)	0.72 (0.79)
22: Hwy 212/224 / 152nd	3 (9)	0 (0)	B (A)	(F) Sbnd	unsig	unsig
42: Midpoint, EB Ramps						
43: Midpoint, WB Ramps						
No Build, Alternative 1						
Intersection	LANE DATA		Intersection LOS		Intersection V/C	
	AM (PM)		1st Hour (2nd Hour)		1st Hour (2nd Hour)	
	Delay ¹	Queue ²	AM	PM	AM	PM
15: Hwy 212/224 / 102nd	119 (679)	3 (4)	F (F)	F (F)	1.35 (1.10)	1.26 (1.35)
17: Hwy 212/224 @ Fred Meyer	227 (356)	2 (3)	F (F)	F (F)	1.10 (0.84)	0.87 (1.01)
18: Hwy 212/224 @ 122nd	188 (220)	1 (1)	F (F)	F (F)	0.97 (0.78)	0.88 (0.93)
19: Hwy 212/224 @ 130th	65 (213)	1 (3)	E (F)	F (F)	0.96 (0.80)	0.93 (0.95)
20: Hwy 212/224 @ 135th	118 (525)	4 (4)	F (F)	F (F)	1.53 (1.29)	1.34 (1.43)
21: Hwy 212/224 @ 142nd	266 (262)	3 (3)	F (F)	F (F)	1.59 (1.33)	1.13 (1.25)
22: Hwy 212/224 / 152nd	569 (367)	2 (2)	F Sbnd	F Sbnd	unsig	unsig
42: Midpoint, EB Ramps						
43: Midpoint, WB Ramps						

Alternative 2							
Intersection	LANE DATA		Intersection LOS		Intersection V/C		
	AM (PM)		1st Hour (2nd Hour)		1st Hour (2nd Hour)		
	Delay ¹	Queue ²	AM	PM	AM	PM	
15: Hwy 212/224 / 102nd	119 (562)	2 (3)	F (F)	F (F)	0.79 (0.80)	1.12 (1.04)	
17: Hwy 212/224 @ Fred Meyer	204 (237)	1 (3)	F (F)	F (F)	0.77 (0.67)	0.76 (0.86)	
18: Hwy 212/224 @ 122nd	213 (83)	3 (2)	F (F)	F (F)	0.80 (0.66)	0.82 (0.91)	
19: Hwy 212/224 @ 130th	248 (27)	2 (1)	F (F)	D (C)	0.71 (0.61)	0.88 (0.90)	
20: Hwy 212/224 @ 135th	710 (56)	4 (3)	F (F)	F (F)	1.11 (0.92)	0.87 (0.84)	
21: Hwy 212/224 @ 142nd	1044 (28)	4 (2)	F (F)	C (C)	1.08 (0.84)	0.67 (0.70)	
22: Hwy 212/224 / 152nd	385 (21)	2 (0)	F (F)	B (C)	0.97 (0.79)	0.61 (0.65)	
42: Midpoint, EB Ramps	25 (9)	1 (0)	C (B)	A (A)	0.20 (0.18)	0.19 (0.21)	
43: Midpoint, WB Ramps	51 ³ (9)	0 (0)	D (C)	A (A)	0.43 (0.40)	0.23 (0.25)	
Alternative 3							
Intersection	LANE DATA		Intersection LOS		Intersection V/C		
	AM (PM)		1st Hour (2nd Hour)		1st Hour (2nd Hour)		
	Delay ¹	Queue ²	AM	PM	AM	PM	
15: Hwy 212/224 / 102nd	275 (696)	3 (3)	F (F)	F (F)	0.92 (0.85)	1.02 (1.05)	
17: Hwy 212/224 @ Fred Meyer	439 (372)	2 (3)	F (F)	F (F)	0.79 (0.70)	0.75 (0.87)	
18: Hwy 212/224 @ 122nd	282 (201)	1 (2)	F (F)	F (F)	0.66 (0.53)	0.72 (0.76)	
19: Hwy 212/224 @ 130th	265 (57)	2 (2)	F (F)	F (E)	0.69 (0.63)	0.85 (0.86)	
20: Hwy 212/224 @ 135th	537 (75)	3 (2)	F (F)	F (F)	0.99 (0.85)	0.82 (0.82)	
21: Hwy 212/224 @ 142nd	1138 (29)	4 (2)	F (F)	F (C)	1.01 (0.83)	0.72 (0.77)	
22: Hwy 212/224 / 152nd	460 (16)	2 (0)	F (F)	C (B)	0.83 (0.72)	0.63 (0.69)	
42: Midpoint, EB Ramps							
43: Midpoint, WB Ramps							

Table Notes:

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

¹ Delay in seconds.

² Queue: number of the 4 approaches (North, South, East, West) with forecasted queue lengths greater than available storage. Most approaches are multi-lane.

³ Alt. 2 Westbound ramps have one lane LOS "F" in AM